

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR208 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April		May		June	July	August		September	October	November	December	
1	08:04	07:50	07:14	07:23		06:38		19:54 (Alt-04)	06:09	06:10	06:34		07:05	07:35	07:09	07:44
	17:21	17:55	18:29	20:02		20:34	10	20:04 (Alt-04)	21:03	21:15	20:57		20:14	19:22	17:35	17:11
2	08:04	07:49	07:13	07:22		06:36		19:57 (Alt-04)	06:09	06:10	06:35		07:06	07:36	07:10	07:45
	17:21	17:56	18:30	20:03		20:35	5	20:02 (Alt-04)	21:04	21:15	20:56		20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20		06:35		06:08	06:11	06:36		07:07	07:37	07:11	07:46	
	17:22	17:57	18:31	20:04		20:36		21:05	21:15	20:55		20:11	19:19	17:33	17:11	
4	08:04	07:47	07:09	07:18		06:34		06:08	06:11	06:37		07:08	07:38	07:12	07:47	
	17:23	17:59	18:32	20:05		20:37		21:06	21:15	20:53		20:09	19:17	17:32	17:11	
5	08:04	07:46	07:08	07:17		06:33		06:07	06:12	06:38		07:09	07:39	07:14	07:48	
	17:24	18:00	18:34	20:06		20:38		21:06	21:14	20:52		20:08	19:15	17:31	17:10	
6	08:04	07:45	07:06	07:15		06:31		06:07	06:12	06:39		07:10	07:40	07:15	07:49	
	17:25	18:01	18:35	20:07		20:39		21:07	21:14	20:51		20:06	19:14	17:29	17:10	
7	08:04	07:44	07:05	07:13		06:30		06:07	06:13	06:40		07:10	07:41	07:16	07:50	
	17:26	18:02	18:36	20:08		20:40		21:08	21:14	20:50		20:04	19:12	17:28	17:10	
8	08:04	07:43	08:03	07:12		06:29		06:07	06:14	06:41		07:11	07:42	07:17	07:50	
	17:27	18:04	19:37	20:09		20:41		21:08	21:14	20:49		20:03	19:10	17:27	17:10	
9	08:04	07:42	08:01	07:10		06:28		06:06	06:14	06:42		07:12	07:43	07:18	07:51	
	17:28	18:05	19:38	20:10		20:42		21:09	21:13	20:48		20:01	19:09	17:26	17:10	
10	08:03	07:40	08:00	07:09		06:27		06:06	06:15	06:43		07:13	07:44	07:20	07:52	
	17:29	18:06	19:39	20:11		20:43		21:10	21:13	20:46		19:58	19:07	17:25	17:10	
11	08:03	07:39	07:58	07:07		06:26		06:06	06:16	06:44		20:04 (Alt-04)	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:13		20:44		21:10	21:13	20:45	7	20:11 (Alt-04)	19:56	19:05	17:24	17:10
12	08:03	07:38	07:57	07:05		06:25		06:06	06:16	06:45		20:02 (Alt-04)	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:14		20:45		21:11	21:12	20:44	11	20:13 (Alt-04)	19:54	19:04	17:23	17:10
13	08:03	07:37	07:55	07:04		06:23		06:06	06:17	06:46		20:01 (Alt-04)	07:16	07:47	07:23	07:55
	17:32	18:10	19:42	20:15		20:46		21:11	21:12	20:42	14	20:15 (Alt-04)	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02		06:22		06:06	06:18	06:47		20:00 (Alt-04)	07:17	07:48	07:24	07:55
	17:33	18:11	19:44	20:16		20:47		21:12	21:11	20:41	15	20:15 (Alt-04)	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01		06:21		06:06	06:19	06:48		19:59 (Alt-04)	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17		20:48		21:12	21:11	20:40	17	20:16 (Alt-04)	19:49	18:59	17:21	17:11
16	08:02	07:33	07:50	06:59		06:20		06:06	06:19	06:49		19:58 (Alt-04)	07:19	07:50	07:27	07:57
	17:36	18:13	19:46	20:18		20:49		21:12	21:10	20:38	17	20:15 (Alt-04)	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58		06:20		06:06	06:20	06:50		19:58 (Alt-04)	07:20	07:52	07:28	07:58
	17:37	18:15	19:47	20:19		20:50		21:13	21:09	20:37	15	20:13 (Alt-04)	19:46	18:56	17:19	17:11
18	08:01	07:30	07:47	06:56		06:19		06:06	06:21	06:51		19:58 (Alt-04)	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20		20:51		21:13	21:09	20:35	14	20:12 (Alt-04)	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55		06:18	19:59 (Alt-04)	06:06	06:22	06:52		19:58 (Alt-04)	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	1	20:00 (Alt-04)	20:52	21:14	21:08	20:34	13	20:11 (Alt-04)	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53		19:55 (Alt-04)	06:17	06:06	06:23	06:53		19:58 (Alt-04)	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	5	20:00 (Alt-04)	20:53	21:14	21:07	20:33	11	20:09 (Alt-04)	19:41	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52		19:54 (Alt-04)	06:16	06:06	06:24	06:54		19:58 (Alt-04)	07:24	07:56	07:33	08:00
	17:41	18:20	19:51	20:23	8	20:02 (Alt-04)	20:54	21:14	21:07	20:31	10	20:08 (Alt-04)	19:39	18:50	17:16	17:13
22	07:58	07:25	07:40	06:50		19:53 (Alt-04)	06:15	06:07	06:25	06:55		19:59 (Alt-04)	07:25	07:57	07:34	08:00
	17:43	18:21	19:52	20:24	9	20:02 (Alt-04)	20:55	21:14	21:06	20:30	7	20:06 (Alt-04)	19:37	18:49	17:15	17:14
23	07:58	07:23	07:38	06:49		19:52 (Alt-04)	06:14	06:07	06:25	06:56		19:59 (Alt-04)	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	12	20:04 (Alt-04)	20:56	21:15	21:05	20:28	5	20:04 (Alt-04)	19:35	18:47	17:15	17:14
24	07:57	07:22	07:37	06:47		19:52 (Alt-04)	06:14	06:07	06:26	06:57		20:02 (Alt-04)	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	13	20:05 (Alt-04)	20:57	21:15	21:04	20:27	1	20:03 (Alt-04)	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46		19:51 (Alt-04)	06:13	06:07	06:27	06:58		07:28	08:01	07:37	08:02	
	17:46	18:24	19:55	20:27	14	20:05 (Alt-04)	20:58	21:15	21:03	20:25		19:32	18:45	17:14	17:15	
26	07:55	07:19	07:33	06:44		19:51 (Alt-04)	06:12	06:08	06:28	06:59		07:29	08:02	07:38	08:02	
	17:47	18:25	19:57	20:28	16	20:07 (Alt-04)	20:59	21:15	21:03	20:24		19:30	18:43	17:13	17:16	
27	07:55	07:17	07:32	06:43		19:51 (Alt-04)	06:12	06:08	06:29	07:00		07:30	08:03	07:39	08:03	
	17:49	18:27	19:58	20:30	16	20:07 (Alt-04)	20:59	21:15	21:02	20:22		19:29	18:42	17:13	17:17	
28	07:54	07:16	07:30	06:42		19:51 (Alt-04)	06:11	06:08	06:30	07:01		07:31	08:04	07:40	08:03	
	17:50	18:28	19:59	20:31	17	20:08 (Alt-04)	21:00	21:15	21:01	20:20		19:27	18:40	17:12	17:17	
29	07:53		07:28	06:40		19:52 (Alt-04)	06:11	06:09	06:31	07:02		07:32	08:05	07:42	08:03	
	17:51		20:00	20:32	15	20:07 (Alt-04)	21:01	21:15	21:00	20:19		19:25	18:39	17:12	17:18	
30	07:52		07:27	06:39		19:53 (Alt-04)	06:10	06:09	06:32	07:03		07:34	08:06	07:43	08:03	
	17:52		20:00	20:33	14	20:07 (Alt-04)	21:02	21:15	20:59	20:17		19:24	18:38	17:12	17:19	
31	07:51		07:25			06:09			06:33	07:04			08:08		08:04	
	17:54		20:01			21:03			20:58	20:16			18:37		17:19	
Potential sun hours	298	297	370	398		448		452	459	428		375	345	298	288	
Total, worst case				140		15				157						
Sun reduction				0.60		0.68				0.74						
Oper. time red.				0.97		0.97				0.97						
Wind dir. red.				0.61		0.61				0.61						
Total reduction				0.35		0.40				0.43						
Total, real				49		6				68						

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR209 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December		
1	08:04	07:50	08:13 (T-39)	07:14	07:23	06:38	06:09	06:10	06:34	07:05	07:35	07:09	07:44	
	17:20	17:55	15 08:28 (T-39)	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11	
2	08:04	07:49	08:14 (T-39)	07:13	07:22	06:36	06:08	06:10	06:35	07:06	07:36	07:10	07:45	
	17:21	17:56	14 08:28 (T-39)	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11	
3	08:04	07:48	08:14 (T-39)	07:11	07:20	06:35	06:08	06:11	06:36	07:07	07:37	07:11	07:46	
	17:22	17:57	12 08:26 (T-39)	18:31	20:04	20:36	21:05	21:15	20:55	20:11	19:19	17:33	17:11	
4	08:04	07:47	08:16 (T-39)	07:09	07:18	06:34	06:08	06:11	06:37	07:08	07:38	07:12	07:47	
	17:23	17:59	8 08:24 (T-39)	18:32	20:05	20:37	21:06	21:15	20:54	20:09	19:17	17:32	17:10	
5	08:04	07:46		07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:14	07:48	
	17:24	18:00		18:34	20:06	20:38	21:06	21:14	20:52	20:08	19:15	17:31	17:10	
6	08:04	07:45		07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:49	
	17:25	18:01		18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29	2 07:51 (T-39)	17:10
7	08:04	07:44		07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:46 (T-39)	07:50
	17:26	18:02		18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	9 07:55 (T-39)	17:10
8	08:04	07:43		08:03	07:12	06:29	06:06	06:14	06:41	07:11	07:42	07:17	07:45 (T-39)	07:50
	17:27	18:04		19:37	20:09	20:41	21:08	21:14	20:49	20:03	19:10	17:27	12 07:57 (T-39)	17:10
9	08:04	07:42		08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:43 (T-39)	07:51
	17:28	18:05		19:38	20:10	20:42	21:09	21:13	20:48	20:01	19:09	17:26	15 07:58 (T-39)	17:10
10	08:04	07:40		08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:20	07:43 (T-39)	07:52
	17:29	18:06		19:39	20:11	20:43	21:10	21:13	20:46	19:58	19:07	17:25	16 07:59 (T-39)	17:10
11	08:03	07:39		07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:43 (T-39)	07:53
	17:30	18:07		19:40	20:13	20:44	21:10	21:13	20:45	19:56	19:05	17:24	17 08:00 (T-39)	17:10
12	08:03	07:38		07:57	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22	07:44 (T-39)	07:54
	17:31	18:09		19:41	20:14	20:45	21:11	21:12	20:44	19:54	19:04	17:23	16 08:00 (T-39)	17:10
13	08:03	07:37		07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:45 (T-39)	07:55
	17:32	18:10		19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22	15 08:00 (T-39)	17:10
14	08:02	07:35		07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:47 (T-39)	07:55
	17:33	18:11		19:44	20:16	20:47	21:12	21:11	20:41	19:51	19:01	17:21	14 08:01 (T-39)	17:11
15	08:02	07:34		07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:26	07:48 (T-39)	07:56
	17:34	18:12		19:45	20:17	20:48	21:12	21:11	20:40	19:49	18:59	17:20	13 08:01 (T-39)	17:11
16	08:02	07:33		07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:27	07:49 (T-39)	07:57
	17:36	18:13		19:46	20:18	20:49	21:13	21:10	20:38	19:47	18:58	17:20	11 08:00 (T-39)	17:11
17	08:01	07:31		07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:52	07:28	07:50 (T-39)	07:58
	17:37	18:15		19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	10 08:00 (T-39)	17:11
18	08:01	07:30		07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:52 (T-39)	07:58
	17:38	18:16		19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	8 08:00 (T-39)	17:12
19	08:00	07:29		07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:53 (T-39)	07:59
	17:39	18:17		19:49	20:21	20:52	21:14	21:08	20:34	19:42	18:53	17:17	6 07:59 (T-39)	17:12
20	08:00	07:27		07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:54 (T-39)	07:59
	17:40	18:18		19:50	20:22	20:53	21:14	21:07	20:33	19:41	18:52	17:17	4 07:58 (T-39)	17:13
21	07:59	08:20 (T-39)	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:33	07:55 (T-39)	08:00
	17:41	2 08:22 (T-39)	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	2 07:57 (T-39)	17:13
22	07:58	08:19 (T-39)	07:25	07:40	06:50	06:15	06:06	06:24	06:55	07:25	07:57	07:34		08:01
	17:43	4 08:23 (T-39)	18:21	19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15		17:14
23	07:58	08:18 (T-39)	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35		08:01
	17:44	6 08:24 (T-39)	18:22	19:53	20:25	20:56	21:15	21:05	20:28	19:35	18:47	17:15		17:14
24	07:57	08:18 (T-39)	07:22	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36		08:01
	17:45	8 08:26 (T-39)	18:23	19:54	20:26	20:57	21:15	21:04	20:27	19:34	18:46	17:14		17:15
25	07:56	08:17 (T-39)	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:01	07:37		08:02
	17:46	10 08:27 (T-39)	18:24	19:55	20:27	20:58	21:15	21:04	20:25	19:32	18:44	17:14		17:15
26	07:55	08:16 (T-39)	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38		08:02
	17:47	11 08:27 (T-39)	18:25	19:57	20:28	20:59	21:15	21:03	20:24	19:30	18:43	17:13		17:16
27	07:55	08:15 (T-39)	07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39		08:03
	17:49	13 08:28 (T-39)	18:27	19:58	20:30	20:59	21:15	21:02	20:22	19:29	18:42	17:13		17:16
28	07:54	08:14 (T-39)	07:16	07:30	06:42	06:11	06:08	06:30	07:01	07:31	08:04	07:40		08:03
	17:50	14 08:28 (T-39)	18:28	19:59	20:31	21:00	21:15	21:01	20:20	19:27	18:40	17:12		17:17
29	07:53	08:13 (T-39)		07:28	06:40	06:10	06:09	06:31	07:02	07:32	08:05	07:42		08:03
	17:51	15 08:28 (T-39)		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12		17:18
30	07:52	08:12 (T-39)		07:27	06:39	06:10	06:09	06:32	07:03	07:34	08:06	07:43		08:03
	17:52	16 08:28 (T-39)		20:00	20:33	21:02	21:15	20:59	20:17	19:24	18:38	17:11		17:19
31	07:51	08:12 (T-39)		07:25		06:09		06:33	07:04		08:08			08:04
	17:54	17 08:29 (T-39)		20:01		21:03		20:58	20:16		18:37			17:19
Potential sun hours	298	297		370	398	448	452	459	428	375	345	298	288	
Total, worst case	116	49										170		
Sun reduction	0.46	0.51										0.42		
Oper. time red.	0.97	0.97										0.97		
Wind dir. red.	0.60	0.60										0.60		
Total reduction	0.27	0.30										0.24		
Total, real	31	14										41		

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR210 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December				
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:32 (T-41)	06:34	07:05	07:35	07:09	07:44			
	17:21	17:55	18:29	20:02	20:34	21:03	21:15	7	06:39 (T-41)	20:57	20:14	19:22	17:35	17:11		
2	08:04	07:49	07:13	07:22	06:36	06:09	06:10	06:33 (T-41)	06:35	07:06	07:36	07:10	07:45			
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	7	06:40 (T-41)	20:56	20:12	19:20	17:34	17:11		
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:33 (T-41)	06:36	07:07	07:37	07:11	07:46			
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	6	06:39 (T-41)	20:55	20:11	19:19	17:33	17:11		
4	08:04	07:47	07:09	07:18	06:34	06:08	06:30 (T-41)	06:11	06:34 (T-41)	06:37	07:08	07:38	07:12	07:47		
	17:23	17:59	18:32	20:05	20:37	21:06	1	06:31 (T-41)	21:15	6	06:40 (T-41)	20:53	20:09	19:17	17:32	17:11
5	08:04	07:46	07:08	07:17	06:33	06:07	06:29 (T-41)	06:12	06:34 (T-41)	06:38	07:09	07:39	07:13	07:48		
	17:24	18:00	18:34	20:06	20:38	21:06	2	06:31 (T-41)	21:14	5	06:39 (T-41)	20:52	20:08	19:15	17:31	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:29 (T-41)	06:13	06:35 (T-41)	06:39	07:10	07:40	07:15	07:49		
	17:25	18:01	18:35	20:07	20:39	21:07	4	06:33 (T-41)	21:14	4	06:39 (T-41)	20:51	20:06	19:14	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:29 (T-41)	06:13	06:36 (T-41)	06:40	07:11	07:41	07:16	07:49		
	17:26	18:02	18:36	20:08	20:40	21:08	4	06:33 (T-41)	21:14	3	06:39 (T-41)	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:07	06:29 (T-41)	06:14	06:36 (T-41)	06:41	07:12	07:42	07:17	07:50		
	17:27	18:04	19:37	20:09	20:41	21:08	5	06:34 (T-41)	21:14	2	06:38 (T-41)	20:49	20:03	19:10	17:27	17:10
9	08:04	07:42	08:01	07:10	06:28	06:06	06:28 (T-41)	06:14	06:42	07:12	07:43	07:18	07:51			
	17:28	18:05	19:38	20:10	20:42	21:09	6	06:34 (T-41)	21:13		20:47	20:01	19:09	17:26	17:10	
10	08:03	07:40	08:00	07:09	06:27	06:06	06:28 (T-41)	06:15	06:43	07:13	07:44	07:19	07:52			
	17:29	18:06	19:39	20:11	20:43	21:09	7	06:35 (T-41)	21:13		20:46	19:58	19:07	17:25	17:10	
11	08:03	07:39	07:58	07:07	06:26	06:06	06:28 (T-41)	06:16	06:44	07:14	07:45	07:21	07:53			
	17:30	18:07	19:40	20:12	20:44	21:10	7	06:35 (T-41)	21:12		20:45	19:56	19:05	17:24	17:10	
12	08:03	07:38	07:57	07:05	06:25	06:06	06:28 (T-41)	06:17	06:45	07:15	07:46	07:22	07:54			
	17:31	18:09	19:41	20:14	20:45	21:11	8	06:36 (T-41)	21:12		20:44	19:54	19:04	17:23	17:10	
13	08:03	07:37	07:55	07:04	06:24	06:06	06:28 (T-41)	06:17	06:46	07:16	07:47	07:23	07:55			
	17:32	18:10	19:42	20:15	20:46	21:11	8	06:36 (T-41)	21:12		20:42	19:52	19:02	17:22	17:11	
14	08:02	07:35	07:53	07:02	06:23	06:06	06:28 (T-41)	06:18	06:47	07:17	07:48	07:24	07:55			
	17:33	18:11	19:44	20:16	20:47	21:11	8	06:36 (T-41)	21:11		20:41	19:51	19:01	17:21	17:11	
15	08:02	07:34	07:52	07:01	06:22	06:06	06:28 (T-41)	06:19	06:48	07:18	07:49	07:25	07:56			
	17:34	18:12	19:45	20:17	20:48	21:12	9	06:37 (T-41)	21:11		20:40	19:49	18:59	17:21	17:11	
16	08:01	07:33	07:50	06:59	06:21	06:06	06:28 (T-41)	06:20	06:49	07:19	07:50	07:27	07:57			
	17:36	18:14	19:46	20:18	20:49	21:12	9	06:37 (T-41)	21:10		20:38	19:47	18:58	17:20	17:11	
17	08:01	07:31	07:48	06:58	06:20	06:06	06:28 (T-41)	06:20	06:50	07:20	07:52	07:28	07:57			
	17:37	18:15	19:47	20:19	20:50	21:13	9	06:37 (T-41)	21:09		20:37	19:46	18:56	17:19	17:12	
18	08:01	07:30	07:47	06:56	06:19	06:06	06:28 (T-41)	06:21	06:51	07:21	07:53	07:29	07:58			
	17:38	18:16	19:48	20:20	20:51	21:13	9	06:37 (T-41)	21:09		20:35	19:44	18:55	17:18	17:12	
19	08:00	07:29	07:45	06:55	06:18	06:06	06:28 (T-41)	06:22	06:52	07:22	07:54	07:30	07:59			
	17:39	18:17	19:49	20:21	20:52	21:13	9	06:37 (T-41)	21:08		20:34	19:42	18:53	17:17	17:12	
20	07:59	07:27	07:43	06:53	06:17	06:06	06:29 (T-41)	06:23	06:53	07:23	07:55	07:31	07:59			
	17:40	18:18	19:50	20:22	20:53	21:14	9	06:38 (T-41)	21:07		20:32	19:41	18:52	17:17	17:13	
21	07:59	07:26	07:42	06:52	06:16	06:06	06:29 (T-41)	06:24	06:54	07:24	07:56	07:32	08:00			
	17:41	18:20	19:51	20:23	20:54	21:14	10	06:39 (T-41)	21:07		20:31	19:39	18:50	17:16	17:13	
22	07:58	07:24	07:40	06:50	06:15	06:07	06:29 (T-41)	06:25	06:55	07:25	07:57	07:34	08:00			
	17:43	18:21	19:52	20:24	20:55	21:14	9	06:38 (T-41)	21:06		20:30	19:37	18:49	17:15	17:14	
23	07:58	07:23	07:38	06:49	06:15	06:07	06:29 (T-41)	06:25	06:56	07:26	07:58	07:35	08:01			
	17:44	18:22	19:53	20:25	20:56	21:14	9	06:38 (T-41)	21:05		20:28	19:35	18:47	17:15	17:14	
24	07:57	07:22	07:37	06:47	06:14	06:07	06:30 (T-41)	06:26	06:57	07:27	07:59	07:36	08:01			
	17:45	18:23	19:54	20:26	20:57	21:15	9	06:39 (T-41)	21:04		20:27	19:34	18:46	17:14	17:15	
25	07:56	07:20	07:35	06:46	06:13	06:07	06:30 (T-41)	06:27	06:58	07:28	08:01	07:37	08:02			
	17:46	18:24	19:55	20:27	20:58	21:15	9	06:39 (T-41)	21:03		20:25	19:32	18:45	17:14	17:15	
26	07:55	07:19	07:33	06:44	06:12	06:08	06:30 (T-41)	06:28	06:59	07:29	08:02	07:38	08:02			
	17:47	18:25	19:57	20:28	20:58	21:15	9	06:39 (T-41)	21:03		20:23	19:30	18:43	17:13	17:16	
27	07:55	07:17	07:32	06:43	06:12	06:08	06:31 (T-41)	06:29	07:00	07:30	08:03	07:39	08:02			
	17:49	18:27	19:58	20:29	20:59	21:15	9	06:40 (T-41)	21:02		20:22	19:29	18:42	17:13	17:17	
28	07:54	07:16	07:30	06:42	06:11	06:08	06:31 (T-41)	06:30	07:01	07:31	08:04	07:40	08:03			
	17:50	18:28	19:59	20:31	21:00	21:15	8	06:39 (T-41)	21:01		20:20	19:27	18:40	17:12	17:17	
29	07:53		07:28	06:40	06:11	06:09	06:31 (T-41)	06:31	07:02	07:32	08:05	07:41	08:03			
	17:51		20:00	20:32	21:01	21:15	8	06:39 (T-41)	21:00		20:19	19:25	18:39	17:12	17:18	
30	07:52		07:27	06:39	06:10	06:09	06:32 (T-41)	06:32	07:03	07:33	08:06	07:42	08:03			
	17:52		20:00	20:33	21:02	21:15	8	06:40 (T-41)	20:59		20:17	19:24	18:38	17:12	17:19	
31	07:51		07:25		06:10		06:33		07:04		08:08		08:03			
	17:54		20:01		21:03		20:58		20:16		18:37		17:20			
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288				
Total, worst case						202	40									
Sun reduction						0.74	0.75									
Oper. time red.						0.97	0.97									
Wind dir. red.						0.69	0.69									
Total reduction						0.49	0.50									
Total, real						100	20									

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR211 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	08:32 (T-41)	07:50	08:34 (T-38)	07:14	17:12 (T-35)	07:23	06:38		06:09	06:31 (Alt-03)
	17:21	12	08:44 (T-41)	17:55	5	08:39 (T-38)	18:29	13	17:25 (T-35)	20:02	20:34
2	08:04	08:33 (T-41)	07:49				07:13			20:22	20:36
	17:21	11	08:44 (T-41)	17:56			18:30			20:03	20:35
3	08:04	08:26 (T-38)	07:48	17:13 (T-35)	07:11		07:20			20:20	20:35
	17:22	15	08:44 (T-41)	17:57	12	17:25 (T-35)	18:31			20:04	20:36
4	08:04	08:26 (T-38)	07:47	17:10 (T-35)	07:09		07:18			20:18	20:34
	17:23	15	08:43 (T-41)	17:59	18	17:28 (T-35)	18:32			20:05	20:37
5	08:04	08:26 (T-38)	07:46	17:08 (T-35)	07:08		07:17			20:17	20:33
	17:24	14	08:43 (T-41)	18:00	22	17:30 (T-35)	18:34			20:06	20:38
6	08:04	08:26 (T-38)	07:45	17:07 (T-35)	07:06		07:15			20:15	20:31
	17:25	11	08:41 (T-41)	18:01	25	17:32 (T-35)	18:35			20:07	20:39
7	08:04	08:26 (T-38)	07:44	17:06 (T-35)	07:05		07:13			20:13	20:30
	17:26	11	08:37 (T-38)	18:02	28	17:34 (T-35)	18:36			20:08	20:40
8	08:04	08:26 (T-38)	07:43	17:05 (T-35)	08:03		07:12			20:12	20:29
	17:27	12	08:38 (T-38)	18:04	30	17:35 (T-35)	19:37			20:09	20:41
9	08:04	08:25 (T-38)	07:42	17:04 (T-35)	08:01		07:10			20:10	20:28
	17:28	14	08:39 (T-38)	18:05	32	17:36 (T-35)	19:38			20:10	20:42
10	08:03	08:25 (T-38)	07:40	17:03 (T-35)	08:00		07:09			20:09	20:27
	17:29	15	08:40 (T-38)	18:06	33	17:36 (T-35)	19:39			20:11	20:43
11	08:03	08:25 (T-38)	07:39	17:02 (T-35)	07:58		07:07			20:07	20:26
	17:30	16	08:41 (T-38)	18:07	35	17:37 (T-35)	19:40			20:12	20:44
12	08:03	08:25 (T-38)	07:38	17:02 (T-35)	07:57		07:05			20:05	20:25
	17:31	18	08:43 (T-38)	18:09	36	17:38 (T-35)	19:41			20:14	20:45
13	08:03	08:24 (T-38)	07:37	17:01 (T-35)	07:55		07:04			20:04	20:24
	17:32	19	08:43 (T-38)	18:10	37	17:38 (T-35)	19:42			20:15	20:46
14	08:02	08:24 (T-38)	07:35	17:01 (T-35)	07:53		07:02			20:02	20:22
	17:33	20	08:44 (T-38)	18:11	38	17:39 (T-35)	19:44			20:16	20:47
15	08:02	08:23 (T-38)	07:34	17:01 (T-35)	07:52		07:01			20:01	20:21
	17:34	21	08:44 (T-38)	18:12	38	17:39 (T-35)	19:45			20:17	20:48
16	08:01	08:23 (T-38)	07:33	17:01 (T-35)	07:50		06:59			20:59	20:21
	17:36	22	08:45 (T-38)	18:13	39	17:40 (T-35)	19:46			20:18	20:49
17	08:01	08:22 (T-38)	07:31	17:00 (T-35)	07:48		06:58			20:58	20:20
	17:37	23	08:45 (T-38)	18:15	39	17:39 (T-35)	19:47			20:19	20:50
18	08:01	08:22 (T-38)	07:30	17:01 (T-35)	07:47		06:56			20:56	20:19
	17:38	24	08:46 (T-38)	18:16	38	17:39 (T-35)	19:48			20:20	20:51
19	08:00	08:22 (T-38)	07:29	17:01 (T-35)	07:45		06:55			20:55	20:18
	17:39	25	08:47 (T-38)	18:17	37	17:38 (T-35)	19:49			20:21	20:52
20	07:59	08:22 (T-38)	07:27	17:01 (T-35)	07:43		06:53			20:53	20:17
	17:40	25	08:47 (T-38)	18:18	38	17:39 (T-35)	19:50			20:22	20:53
21	07:59	08:23 (T-38)	07:26	17:02 (T-35)	07:42		06:52			20:52	20:16
	17:41	24	08:47 (T-38)	18:20	36	17:38 (T-35)	19:51			20:23	20:54
22	07:58	08:23 (T-38)	07:24	17:02 (T-35)	07:40		06:50			20:50	20:15
	17:43	24	08:47 (T-38)	18:21	35	17:37 (T-35)	19:52			20:24	20:55
23	07:58	08:23 (T-38)	07:23	17:03 (T-35)	07:38		06:49			20:51	20:15
	17:44	24	08:47 (T-38)	18:22	34	17:37 (T-35)	19:53			20:25	20:56
24	07:57	08:24 (T-38)	07:22	17:04 (T-35)	07:37		06:47			20:47	20:14
	17:45	24	08:48 (T-38)	18:23	31	17:35 (T-35)	19:54			20:26	20:57
25	07:56	08:24 (T-38)	07:20	17:05 (T-35)	07:35		06:46			20:46	20:13
	17:46	24	08:48 (T-38)	18:24	30	17:35 (T-35)	19:55			20:27	20:58
26	07:55	08:25 (T-38)	07:19	17:06 (T-35)	07:33		06:44			20:44	20:12
	17:47	22	08:47 (T-38)	18:25	27	17:33 (T-35)	19:57			20:28	20:58
27	07:55	08:26 (T-38)	07:17	17:08 (T-35)	07:32		06:43			20:43	20:12
	17:49	21	08:47 (T-38)	18:27	23	17:31 (T-35)	19:58			20:29	20:59
28	07:54	08:26 (T-38)	07:16	17:10 (T-35)	07:30		06:42			20:42	20:11
	17:50	20	08:46 (T-38)	18:28	19	17:29 (T-35)	19:59			20:31	21:00
29	07:53	08:28 (T-38)					07:28			20:40	20:11
	17:51	17	08:45 (T-38)				20:00			20:32	21:01
30	07:52	08:29 (T-38)					07:27			20:39	20:10
	17:52	15	08:44 (T-38)				20:00			20:33	21:02
31	07:51	08:31 (T-38)					07:25			20:31	21:00
	17:54	11	08:42 (T-38)				20:01			21:03	21:08
Potential sun hours	298		297		370		398		448		452
Total, worst case	569		815		13		174		453		
Sun reduction	0.46		0.51		0.55		0.68		0.74		
Oper. time red.	0.97		0.97		0.97		0.97		0.97		
Wind dir. red.	0.59		0.68		0.69		0.69		0.69		
Total reduction	0.26		0.33		0.36		0.45		0.49		
Total, real	149		272		5		78		220		

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR211 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	[July]		[August]		[September]		[October]		[November]		[December]			
1	06:10		06:38 (Alt-03)	06:34	07:05	07:35			07:09	16:32 (T-35)	07:44	08:07 (T-38)		
	21:15	15	06:53 (Alt-03)	20:57	20:14	19:22			17:35	34	17:06 (T-35)	17:11	16	08:23 (T-38)
2	06:10		06:38 (Alt-03)	06:35	07:06	07:36			07:10		16:33 (T-35)	07:45		08:08 (T-38)
	21:15	16	06:54 (Alt-03)	20:56	20:12	19:20			17:34	32	17:05 (T-35)	17:11	15	08:23 (T-38)
3	06:11		06:37 (Alt-03)	06:36	07:07	07:37			07:11		16:35 (T-35)	07:46		08:09 (T-38)
	21:15	17	06:54 (Alt-03)	20:55	20:11	19:19			17:33	30	17:05 (T-35)	17:11	14	08:23 (T-38)
4	06:11		06:38 (Alt-03)	06:37	07:08	07:38			07:12		16:36 (T-35)	07:47		08:10 (T-38)
	21:15	17	06:55 (Alt-03)	20:53	20:09	19:17			17:32	27	17:03 (T-35)	17:11	13	08:23 (T-38)
5	06:12		06:37 (Alt-03)	06:38	07:09	07:39			07:14		16:37 (T-35)	07:48		08:11 (T-38)
	21:14	17	06:54 (Alt-03)	20:52	20:08	19:15			17:31	25	17:02 (T-35)	17:10	11	08:22 (T-38)
6	06:12		06:38 (Alt-03)	06:39	07:10	07:40			07:15		16:38 (T-35)	07:49		08:12 (T-38)
	21:14	17	06:55 (Alt-03)	20:51	20:06	19:14			17:29	22	17:00 (T-35)	17:10	10	08:22 (T-38)
7	06:13		06:38 (Alt-03)	06:40	07:10	07:41			07:16		16:41 (T-35)	07:49		08:13 (T-38)
	21:14	18	06:56 (Alt-03)	20:50	20:04	19:12			17:28	17	16:58 (T-35)	17:10	14	08:30 (T-41)
8	06:14		06:37 (Alt-03)	06:41	07:11	07:42			07:17		16:44 (T-35)	07:50		08:14 (T-38)
	21:14	19	06:56 (Alt-03)	20:49	20:03	19:10			17:27	11	16:55 (T-35)	17:10	15	08:31 (T-41)
9	06:14		06:38 (Alt-03)	06:42	07:12	07:43			07:18			07:51		08:15 (T-38)
	21:13	19	06:57 (Alt-03)	20:47	20:01	19:09			17:26			17:10	15	08:33 (T-41)
10	06:15		06:37 (Alt-03)	06:43	07:13	07:44			07:19		08:05 (T-38)	07:52		08:17 (T-38)
	21:13	19	06:56 (Alt-03)	20:46	19:58	19:07			17:25	6	08:11 (T-38)	17:10	12	08:34 (T-41)
11	06:16		06:38 (Alt-03)	06:44	07:14	07:45			07:21		08:03 (T-38)	07:53		08:22 (T-41)
	21:12	19	06:57 (Alt-03)	20:45	19:56	19:05			17:24	12	08:15 (T-38)	17:10	12	08:34 (T-41)
12	06:16		06:39 (Alt-03)	06:45	07:15	07:46			07:22		08:01 (T-38)	07:54		08:23 (T-41)
	21:12	18	06:57 (Alt-03)	20:44	19:54	19:04	5	17:55 (T-35)	17:23	15	08:16 (T-38)	17:10	12	08:35 (T-41)
13	06:17		06:40 (Alt-03)	06:46	07:16	07:47			17:44 (T-35)	07:23	07:59 (T-38)	07:55		08:23 (T-41)
	21:12	18	06:58 (Alt-03)	20:42	19:52	19:02	16	18:00 (T-35)	17:22	18	08:17 (T-38)	17:11	13	08:36 (T-41)
14	06:18		06:40 (Alt-03)	06:47	07:17	07:48			17:41 (T-35)	07:24	07:59 (T-38)	07:55		08:23 (T-41)
	21:11	17	06:57 (Alt-03)	20:41	19:51	19:01	21	18:02 (T-35)	17:21	20	08:19 (T-38)	17:11	14	08:37 (T-41)
15	06:19		06:41 (Alt-03)	06:48	07:18	07:49			17:39 (T-35)	07:25	07:59 (T-38)	07:56		08:24 (T-41)
	21:11	17	06:58 (Alt-03)	20:40	19:49	18:59	25	18:04 (T-35)	17:21	21	08:20 (T-38)	17:11	14	08:38 (T-41)
16	06:20		06:42 (Alt-03)	06:49	07:19	07:50			17:38 (T-35)	07:27	07:58 (T-38)	07:57		08:24 (T-41)
	21:10	16	06:58 (Alt-03)	20:38	19:47	18:58	28	18:06 (T-35)	17:20	22	08:20 (T-38)	17:11	14	08:38 (T-41)
17	06:20		06:43 (Alt-03)	06:50	07:20	07:52			17:36 (T-35)	07:28	07:57 (T-38)	07:57		08:24 (T-41)
	21:09	15	06:58 (Alt-03)	20:37	19:46	18:56	31	18:07 (T-35)	17:19	24	08:21 (T-38)	17:12	15	08:39 (T-41)
18	06:21		06:43 (Alt-03)	06:51	07:21	07:53			17:35 (T-35)	07:29	07:58 (T-38)	07:58		08:24 (T-41)
	21:09	14	06:57 (Alt-03)	20:35	19:44	18:55	32	18:07 (T-35)	17:18	24	08:22 (T-38)	17:12	15	08:39 (T-41)
19	06:22		06:44 (Alt-03)	06:52	07:22	07:54			17:33 (T-35)	07:30	07:58 (T-38)	07:59		08:25 (T-41)
	21:08	13	06:57 (Alt-03)	20:34	19:42	18:53	35	18:08 (T-35)	17:17	24	08:22 (T-38)	17:12	15	08:40 (T-41)
20	06:23		06:45 (Alt-03)	06:53	07:23	07:55			17:32 (T-35)	07:31	07:58 (T-38)	07:59		08:26 (T-41)
	21:07	12	06:57 (Alt-03)	20:33	19:41	18:52	36	18:08 (T-35)	17:17	24	08:22 (T-38)	17:13	15	08:41 (T-41)
21	06:24		06:46 (Alt-03)	06:54	07:24	07:56			17:32 (T-35)	07:32	07:58 (T-38)	08:00		08:26 (T-41)
	21:07	11	06:57 (Alt-03)	20:31	19:39	18:50	36	18:08 (T-35)	17:16	24	08:22 (T-38)	17:13	15	08:41 (T-41)
22	06:25		06:47 (Alt-03)	06:55	07:25	07:57			17:32 (T-35)	07:34	07:59 (T-38)	08:00		08:27 (T-41)
	21:06	10	06:57 (Alt-03)	20:30	19:37	18:49	37	18:09 (T-35)	17:15	25	08:24 (T-38)	17:14	15	08:42 (T-41)
23	06:25		06:48 (Alt-03)	06:56	07:26	07:58			17:31 (T-35)	07:35	07:59 (T-38)	08:01		08:27 (T-41)
	21:05	8	06:56 (Alt-03)	20:28	19:35	18:47	38	18:09 (T-35)	17:15	25	08:24 (T-38)	17:14	15	08:42 (T-41)
24	06:26		06:48 (Alt-03)	06:57	07:27	07:59			17:31 (T-35)	07:36	07:59 (T-38)	08:01		08:27 (T-41)
	21:04	7	06:55 (Alt-03)	20:27	19:34	18:46	38	18:09 (T-35)	17:14	24	08:23 (T-38)	17:15	15	08:42 (T-41)
25	06:27		06:49 (Alt-03)	06:58	07:28	08:01			17:30 (T-35)	07:37	08:00 (T-38)	08:02		08:28 (T-41)
	21:03	5	06:54 (Alt-03)	20:25	19:32	18:45	39	18:09 (T-35)	17:14	23	08:23 (T-38)	17:15	15	08:43 (T-41)
26	06:28		06:50 (Alt-03)	06:59	07:29	08:02			17:31 (T-35)	07:38	08:01 (T-38)	08:02		08:28 (T-41)
	21:03	2	06:52 (Alt-03)	20:23	19:30	18:43	38	18:09 (T-35)	17:13	22	08:23 (T-38)	17:16	15	08:43 (T-41)
27	06:29			07:00	07:30	08:03			17:31 (T-35)	07:39	08:02 (T-38)	08:03		08:28 (T-41)
	21:02			07:01	07:31	08:04	38	18:09 (T-35)	17:13	21	08:23 (T-38)	17:17	15	08:43 (T-41)
28	06:30			07:02	07:31	08:04			17:31 (T-35)	07:40	08:04 (T-38)	08:03		08:30 (T-41)
	21:01			07:03	07:32	08:05	37	18:08 (T-35)	17:12	20	08:24 (T-38)	17:17	14	08:44 (T-41)
29	06:31			07:02	07:32	08:05			17:31 (T-35)	07:41	08:05 (T-38)	08:03		08:30 (T-41)
	21:00			07:03	07:33	08:06	37	18:08 (T-35)	17:12	19	08:24 (T-38)	17:18	14	08:44 (T-41)
30	06:32			07:03	07:33	08:06			17:31 (T-35)	07:43	08:06 (T-38)	08:03		08:31 (T-41)
	20:59			07:04	07:34	08:07	36	18:07 (T-35)	17:12	18	08:24 (T-38)	17:19	13	08:44 (T-41)
31	06:33			07:04	07:34	08:08			17:32 (T-35)			08:04		08:31 (T-41)
	20:58			07:05	07:35	08:09	35	18:07 (T-35)				17:20	13	08:44 (T-41)
Potential sun hours	459			428	375	345			298			288		
Total, worst case		376				638			629			433		
Sun reduction		0.75				0.62			0.42			0.38		
Oper. time red.		0.97				0.97			0.97			0.97		
Wind dir. red.		0.69				0.69			0.62			0.59		
Total reduction		0.49				0.41			0.25			0.21		
Total, real		185				259			157			93		

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR212 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March	April	May	June	July	August	September	October	November	December	
1	08:04	08:31 (T-40)	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:05	07:35	07:09	07:44	08:25 (T-39)
2	08:04	08:31 (T-40)	07:49	07:13	07:22	06:36	06:08	06:10	06:35	07:05	07:36	07:10	07:45	08:25 (T-39)
3	08:04	08:32 (T-40)	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11	07:46	08:24 (T-39)
4	08:04	08:33 (T-40)	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:47	08:24 (T-39)
5	08:04	08:34 (T-40)	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:14	07:48	08:23 (T-40)
6	08:04	08:36 (T-40)	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:49	08:22 (T-40)
7	08:04	08:38 (T-40)	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:50	08:21 (T-40)
8	08:04	08:40 (T-40)	07:43	08:03	07:12	06:29	06:06	06:14	06:41	07:11	07:42	07:17	07:50	08:21 (T-40)
9	08:04	08:41 (T-40)	07:42	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51	08:21 (T-40)
10	08:04	08:42 (T-40)	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:20	07:52	08:21 (T-40)
11	08:04	08:43 (T-40)	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53	08:22 (T-40)
12	08:03	08:45 (T-40)	07:38	07:57	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22	07:54	08:21 (T-40)
13	08:03	08:46 (T-40)	07:37	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:55	08:21 (T-40)
14	08:02	08:50 (T-40)	07:35	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:55	08:22 (T-40)
15	08:02	08:53 (T-40)	07:34	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25	07:56	08:22 (T-40)
16	08:02	08:55 (T-40)	07:33	07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:27	07:57	08:22 (T-40)
17	08:01	08:57 (T-40)	07:32	07:48	06:58	06:19	06:06	06:20	06:50	07:20	07:52	07:28	07:58	08:23 (T-40)
18	08:01	08:59 (T-40)	07:31	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58	08:24 (T-40)
19	08:00	09:00 (T-40)	07:30	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59	08:23 (T-40)
20	08:00	09:01 (T-40)	07:29	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59	08:24 (T-40)
21	07:59	09:02 (T-40)	07:28	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:33	08:00	08:24 (T-40)
22	07:58	09:03 (T-40)	07:27	07:41	06:51	06:15	06:06	06:24	06:55	07:25	07:57	07:34	08:01	08:25 (T-40)
23	07:58	09:04 (T-40)	07:26	07:40	06:50	06:14	06:06	06:25	06:56	07:26	07:58	07:35	08:01	08:25 (T-40)
24	07:57	09:05 (T-40)	07:25	07:39	06:49	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01	08:26 (T-40)
25	07:56	09:06 (T-40)	07:24	07:38	06:48	06:13	06:07	06:27	06:58	07:28	08:01	07:37	08:02	08:26 (T-40)
26	07:55	09:07 (T-40)	07:23	07:37	06:47	06:12	06:08	06:28	06:59	07:29	08:02	07:38	08:02	08:27 (T-40)
27	07:55	09:08 (T-40)	07:22	07:36	06:46	06:11	06:08	06:29	07:00	07:30	08:03	07:39	08:03	08:27 (T-40)
28	07:54	09:09 (T-40)	07:21	07:35	06:45	06:10	06:09	06:30	07:01	07:31	08:04	07:40	08:03	08:28 (T-40)
29	07:53	09:10 (T-40)	07:20	07:34	06:44	06:09	06:10	06:31	07:02	07:32	08:05	07:42	08:03	08:29 (T-40)
30	07:52	09:11 (T-40)	07:19	07:33	06:43	06:08	06:11	06:32	07:03	07:33	08:06	07:43	08:03	08:29 (T-40)
31	07:51	09:12 (T-40)	07:18	07:32	06:42	06:07	06:12	06:33	07:04	07:34	08:07	07:44	08:04	08:30 (T-40)
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288	791	
Total, worst case	256										24		791	
Sun reduction	0.46										0.42		0.38	
Oper. time red.	0.97										0.97		0.97	
Wind dir. red.	0.59										0.58		0.59	
Total reduction	0.26										0.24		0.21	
Total, real	67										6		170	

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520**Shadow receptor:** SR213 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S_0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	[January	[February	[March	[April	[May	[June	[July	[August	[September	[October	[November	[December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:35	07:09	07:44
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:13	07:22	06:36	06:08	06:10	06:35	07:05	07:36	07:10	07:45
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11	07:46
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:55	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:47
	17:23	17:59	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:14	07:48
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:08	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:49
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:50
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:14	20:49	20:03	19:10	17:27	17:10
9	08:04	07:42	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:48	20:01	19:09	17:26	17:10
10	08:04	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:20	07:52
	17:29	18:06	19:39	20:11	20:43	21:10	21:13	20:46	19:58	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:13	20:44	21:10	21:13	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:57	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:14	20:45	21:11	21:12	20:44	19:54	19:04	17:23	17:10
13	08:03	07:37	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:55
	17:32	18:10	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:55
	17:33	18:11	19:44	20:16	20:47	21:12	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:11	20:40	19:49	18:59	17:20	17:11
16	08:02	07:33	07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:27	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:19	06:06	06:20	06:50	07:20	07:52	07:28	07:58
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:01	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:14	21:08	20:34	19:42	18:53	17:17	17:12
20	08:00	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:33	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:33	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:25	07:40	06:50	06:15	06:06	06:24	06:55	07:25	07:57	07:34	08:01
	17:42	18:21	19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15	17:13
23	07:58	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:15	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:22	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:27	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:01	07:37	08:02
	17:46	18:24	19:55	20:27	20:58	21:15	21:04	20:25	19:32	18:44	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38	08:02
	17:47	18:25	19:57	20:28	20:59	21:15	21:03	20:24	19:30	18:43	17:13	17:16
27	07:55	07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39	08:03
	17:49	18:27	19:58	20:30	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:16
28	07:54	07:16	07:30	06:42	06:11	06:08	06:30	07:01	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:31	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:02	07:32	08:05	07:42	08:03
	17:51		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:03	07:33	08:06	07:43	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:24	18:38	17:11	17:19
31	07:51		07:25		06:09		06:33	07:04		08:08		08:04
	17:54		20:01		21:03		20:58	20:16		18:37		17:19
Potential sun hours	298	297	370	399	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520**Shadow receptor:** SR214 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S_0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	[January	[February	[March	[April	[May	[June	[July	[August	[September	[October	[November	[December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:35	07:09	07:44
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:13	07:22	06:36	06:08	06:10	06:35	07:05	07:36	07:10	07:45
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11	07:46
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:55	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:47
	17:23	17:59	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:14	07:48
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:08	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:49
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:50
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:14	20:49	20:03	19:10	17:27	17:10
9	08:04	07:42	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:48	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:20	07:52
	17:29	18:06	19:39	20:11	20:43	21:10	21:13	20:46	19:58	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:13	20:44	21:10	21:13	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:57	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:14	20:45	21:11	21:12	20:44	19:54	19:04	17:23	17:10
13	08:03	07:37	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:55
	17:32	18:10	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:55
	17:33	18:11	19:44	20:16	20:47	21:12	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:11	20:40	19:49	18:59	17:20	17:11
16	08:02	07:33	07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:27	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:19	06:06	06:20	06:50	07:20	07:52	07:28	07:58
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:01	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:14	21:08	20:34	19:42	18:53	17:17	17:12
20	08:00	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:33	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:33	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:25	07:40	06:50	06:15	06:06	06:24	06:55	07:25	07:57	07:34	08:01
	17:42	18:21	19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15	17:13
23	07:58	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:15	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:22	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:27	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:01	07:37	08:02
	17:46	18:24	19:55	20:27	20:58	21:15	21:04	20:25	19:32	18:44	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38	08:02
	17:47	18:25	19:57	20:28	20:59	21:15	21:03	20:24	19:30	18:43	17:13	17:16
27	07:55	07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39	08:03
	17:49	18:27	19:58	20:30	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:16
28	07:54	07:16	07:30	06:42	06:11	06:08	06:30	07:01	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:31	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:02	07:32	08:05	07:42	08:03
	17:51		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:03	07:33	08:06	07:43	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:24	18:38	17:11	17:19
31	07:51		07:25		06:09		06:33	07:04		08:08		08:04
	17:54		20:01		21:03		20:58	20:16		18:37		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR215 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	08:44 (Alt-03)	07:50	17:07 (Alt-09)	07:14	07:23		06:38	06:09		
	17:21	11 08:55 (Alt-03)	17:55	20 17:27 (Alt-09)	18:29	20:02		20:34	21:03		
2	08:04	08:45 (Alt-03)	07:49	17:08 (Alt-09)	07:13	07:22		06:36	06:09		
	17:21	10 08:55 (Alt-03)	17:56	18 17:26 (Alt-09)	18:30	20:03		20:35	21:04		
3	08:04	08:46 (Alt-03)	07:48	17:09 (Alt-09)	07:11	07:20		06:35	06:08		
	17:22	8 08:54 (Alt-03)	17:57	17 17:26 (Alt-09)	18:31	20:04		20:36	21:05		
4	08:04	08:48 (Alt-03)	07:47	17:10 (Alt-09)	07:09	07:18		06:34	06:08		
	17:23	5 08:53 (Alt-03)	17:59	15 17:25 (Alt-09)	18:32	20:05		20:37	21:06		
5	08:04		07:46	17:12 (Alt-09)	07:08	07:17		07:36 (T-42)	06:33	06:07	
	17:24		18:00	11 17:23 (Alt-09)	18:33	20:06	4	07:40 (T-42)	20:38	21:06	
6	08:04		07:45	17:16 (Alt-09)	07:06	07:15		07:34 (T-42)	06:31	06:07	
	17:25		18:01	5 17:21 (Alt-09)	18:35	20:07	9	07:43 (T-42)	20:39	21:07	
7	08:04		07:44		07:05	07:13		07:32 (T-42)	06:30	06:07	
	17:26		18:02		18:36	20:08	12	07:44 (T-42)	20:40	21:08	
8	08:04		07:43		08:03	07:12		07:31 (T-42)	06:29	06:07	
	17:27		18:04		19:37	20:09	14	07:45 (T-42)	20:41	21:08	
9	08:04		07:42		08:01	07:10		07:29 (T-42)	06:28	06:06	
	17:28		18:05		19:38	20:10	16	07:45 (T-42)	20:42	21:09	
10	08:03		07:40		08:00	07:09		07:28 (T-42)	06:27	06:06	
	17:29		18:06		19:39	20:11	18	07:46 (T-42)	20:43	21:09	
11	08:03		07:39		07:58	07:07		07:26 (T-42)	06:26	06:06	
	17:30		18:07		19:40	20:12	20	07:46 (T-42)	20:44	21:10	
12	08:03		07:38		07:57	07:05		07:24 (T-42)	06:25	06:06	
	17:31		18:09		19:41	20:14	21	07:45 (T-42)	20:45	21:11	
13	08:03		07:37		07:55	07:04		07:24 (T-42)	06:23	06:06	
	17:32		18:10		19:42	20:15	21	07:45 (T-42)	20:46	21:11	
14	08:02		07:35		07:53	07:02		07:24 (T-42)	06:22	06:06	
	17:33		18:11		19:44	20:16	20	07:44 (T-42)	20:47	21:12	
15	08:02		07:34		07:52	07:01		07:25 (T-42)	06:21	06:06	
	17:34		18:12		19:45	20:17	18	07:43 (T-42)	20:48	21:12	
16	08:01		07:33		07:50	06:59		07:25 (T-42)	06:20	06:06	
	17:36		18:13		19:46	20:18	17	07:42 (T-42)	20:49	21:12	
17	08:01		07:31		07:48	06:58		07:26 (T-42)	06:20	06:06	
	17:37		18:15		19:47	20:19	15	07:41 (T-42)	20:50	21:13	
18	08:01		07:30		07:47	06:56		07:27 (T-42)	06:19	06:06	
	17:38		18:16		19:48	20:20	11	07:38 (T-42)	20:51	21:13	
19	08:00	17:10 (Alt-09)	07:29		07:45	06:55		07:32 (T-42)	06:18	06:06	
	17:39	3 17:13 (Alt-09)	18:17		19:49	20:21	2	07:34 (T-42)	20:52	21:13	
20	07:59	17:08 (Alt-09)	07:27		07:43	06:53			06:17	06:06	
	17:40	6 17:14 (Alt-09)	18:18		19:50	20:22			20:53	21:14	
21	07:59	17:08 (Alt-09)	07:26		07:42	06:52			06:16	06:06	
	17:41	8 17:16 (Alt-09)	18:19		19:51	20:23			20:54	21:14	
22	07:58	17:07 (Alt-09)	07:24		07:40	06:50			06:15	06:06	
	17:43	10 17:17 (Alt-09)	18:21		19:52	20:24			20:55	21:14	
23	07:58	17:06 (Alt-09)	07:23		07:38	06:49			06:14	06:07	
	17:44	12 17:18 (Alt-09)	18:22		19:53	20:25			20:56	21:15	
24	07:57	17:07 (Alt-09)	07:22		07:37	06:47			06:14	06:07	
	17:45	13 17:20 (Alt-09)	18:23		19:54	20:26			20:57	21:15	
25	07:56	17:06 (Alt-09)	07:20		07:35	06:46			06:13	06:07	
	17:46	15 17:21 (Alt-09)	18:24		19:55	20:27			20:58	21:15	
26	07:55	17:06 (Alt-09)	07:19		07:33	06:44			06:12	06:08	
	17:47	17 17:23 (Alt-09)	18:25		19:57	20:28			20:58	21:15	
27	07:55	17:06 (Alt-09)	07:17		07:32	06:43			06:12	06:08	
	17:49	18 17:24 (Alt-09)	18:27		19:58	20:29			20:59	21:15	
28	07:54	17:06 (Alt-09)	07:16		07:30	06:42			06:11	06:08	
	17:50	19 17:25 (Alt-09)	18:28		19:59	20:31			21:00	21:15	
29	07:53	17:06 (Alt-09)			07:28	06:40			06:11	06:09	
	17:51	20 17:26 (Alt-09)			20:00	20:32			21:01	21:15	
30	07:52	17:06 (Alt-09)			07:27	06:39			06:10	06:09	
	17:52	21 17:27 (Alt-09)			20:00	20:33			21:02	21:15	
31	07:51	17:07 (Alt-09)			07:25				06:09		
	17:54	20 17:27 (Alt-09)			20:01				21:03		
Potential sun hours	298		297		370	398		448	452		
Total, worst case	216		86			218					
Sun reduction	0.46		0.51			0.60					
Oper. time red.	0.97		0.97			0.97					
Wind dir. red.	0.67		0.69			0.66					
Total reduction	0.30		0.34			0.38					
Total, real	64		29			82					

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR215 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10 21:15	06:34 20:57		07:05 20:14	07:25 (T-42) 07:45 (T-42)	07:35 19:22	07:09 17:35			07:44 17:11	
2	06:10 21:15	06:35 20:56		07:06 20:12	07:26 (T-42) 07:44 (T-42)	07:36 19:20	07:10 17:34			07:45 17:11	
3	06:11 21:15	06:36 20:55		07:07 20:11	07:27 (T-42) 07:43 (T-42)	07:37 19:19	07:11 17:33			07:46 17:11	
4	06:11 21:15	06:37 20:53		07:08 20:09	07:28 (T-42) 07:42 (T-42)	07:38 19:17	07:12 17:32			07:47 17:10	
5	06:12 21:14	06:38 20:52		07:08 20:08	07:29 (T-42) 07:41 (T-42)	07:39 19:15	07:14 17:31	16:45 (Alt-09) 16:51 (Alt-09)	07:48 17:10		
6	06:12 21:14	06:39 20:51		07:09 20:06	07:30 (T-42) 07:39 (T-42)	07:40 19:14	07:15 17:29	16:42 (Alt-09) 16:53 (Alt-09)	07:49 17:10		
7	06:13 21:14	06:40 20:50		07:10 20:04	07:31 (T-42) 07:36 (T-42)	07:41 19:12	07:16 17:28	16:41 (Alt-09) 16:56 (Alt-09)	07:50 17:10		
8	06:14 21:14	06:41 20:49		07:11 20:03		07:42 19:10	07:17 17:27	16:40 (Alt-09) 16:57 (Alt-09)	07:50 17:10	08:37 (Alt-03) 08:41 (Alt-03)	
9	06:14 21:13	06:42 20:47		07:12 20:01		07:43 19:09	07:18 17:26	16:39 (Alt-09) 16:57 (Alt-09)	07:51 17:10	08:36 (Alt-03) 08:43 (Alt-03)	
10	06:15 21:13	06:43 20:46		07:13 19:58		07:44 19:07	07:19 17:25	16:38 (Alt-09) 16:58 (Alt-09)	07:52 17:10	08:35 (Alt-03) 08:45 (Alt-03)	
11	06:16 21:13	06:44 20:45		07:14 19:56		07:45 19:05	07:21 17:24	16:39 (Alt-09) 16:59 (Alt-09)	07:53 17:10	08:34 (Alt-03) 08:45 (Alt-03)	
12	06:16 21:12	06:45 20:44		07:15 19:54		07:46 19:04	07:22 17:23	16:38 (Alt-09) 16:59 (Alt-09)	07:54 17:10	08:34 (Alt-03) 08:46 (Alt-03)	
13	06:17 21:12	06:46 20:42		07:16 19:52		07:47 19:02	07:23 17:22	16:38 (Alt-09) 16:58 (Alt-09)	07:55 17:10	08:34 (Alt-03) 08:48 (Alt-03)	
14	06:18 21:11	06:47 20:41		07:17 19:51		07:48 19:01	07:24 17:21	16:39 (Alt-09) 16:58 (Alt-09)	07:55 17:11	08:35 (Alt-03) 08:49 (Alt-03)	
15	06:19 21:11	06:48 20:40		07:18 19:49		07:49 18:59	07:25 17:21	16:39 (Alt-09) 16:57 (Alt-09)	07:56 17:11	08:35 (Alt-03) 08:50 (Alt-03)	
16	06:19 21:10	06:49 20:38		07:19 19:47		07:50 18:58	07:27 17:20	16:39 (Alt-09) 16:56 (Alt-09)	07:57 17:11	08:35 (Alt-03) 08:50 (Alt-03)	
17	06:20 21:09	06:50 20:37		07:20 19:46		07:52 18:56	07:28 17:19	16:39 (Alt-09) 16:54 (Alt-09)	07:58 17:11	08:35 (Alt-03) 08:51 (Alt-03)	
18	06:21 21:09	06:51 20:35		07:21 19:44		07:53 18:55	07:29 17:18	16:41 (Alt-09) 16:54 (Alt-09)	07:58 17:12	08:35 (Alt-03) 08:51 (Alt-03)	
19	06:22 21:08	06:52 20:34		07:22 19:42		07:54 18:53	07:30 17:17	16:41 (Alt-09) 16:53 (Alt-09)	07:59 17:12	08:36 (Alt-03) 08:52 (Alt-03)	
20	06:23 21:07	06:53 20:33		07:23 19:40		07:55 18:52	07:31 17:17	16:42 (Alt-09) 16:52 (Alt-09)	07:59 17:13	08:36 (Alt-03) 08:53 (Alt-03)	
21	06:24 21:07	06:54 20:31		07:24 19:39		07:56 18:50	07:32 17:16	16:43 (Alt-09) 16:51 (Alt-09)	08:00 17:13	08:36 (Alt-03) 08:53 (Alt-03)	
22	06:24 21:06	06:55 20:30		07:25 19:37		07:57 18:49	07:34 17:15	16:45 (Alt-09) 16:51 (Alt-09)	08:00 17:14	08:37 (Alt-03) 08:54 (Alt-03)	
23	06:25 21:05	06:56 20:28		07:26 19:35		07:58 18:47	07:35 17:15	16:47 (Alt-09) 16:51 (Alt-09)	08:01 17:14	08:37 (Alt-03) 08:54 (Alt-03)	
24	06:26 21:04	06:57 20:27	07:34 (T-42)	07:27 19:34		07:59 18:46	07:36 17:14		08:01 17:15	08:38 (Alt-03) 08:54 (Alt-03)	
25	06:27 21:03	06:58 20:25	07:38 (T-42)	07:30 (T-42)	07:28	08:01	07:37		08:02	08:39 (Alt-03)	
26	06:28 21:03	06:59 20:23	07:41 (T-42)	07:29	07:29	08:02	07:38		08:02	08:39 (Alt-03)	
27	06:29 21:02	07:00 20:22	07:43 (T-42)	07:30	07:30	08:03	07:39		08:03	08:39 (Alt-03)	
28	06:30 21:01	07:01 20:21	07:44 (T-42)	07:31	07:31	08:04	07:40		08:03	08:41 (Alt-03)	
29	06:31 21:00	07:02 20:19	07:45 (T-42)	07:32	07:32	08:05	07:41		08:03	08:41 (Alt-03)	
30	06:32 20:59	07:03 20:17	07:45 (T-42)	07:33	07:33	08:06	07:43		08:03	08:42 (Alt-03)	
31	06:33 20:58	07:04 20:16	07:45 (T-42)	07:34	07:34	08:08 18:37			08:04 17:19	08:43 (Alt-03) 08:55 (Alt-03)	
Potential sun hours	459	428		375		345	298		288		
Total, worst case		128		94			270		338		
Sun reduction		0.74		0.68			0.42		0.38		
Oper. time red.		0.97		0.97			0.97		0.97		
Wind dir. red.		0.66		0.66			0.69		0.58		
Total reduction		0.47		0.43			0.28		0.21		
Total, real		60		40			75		72		

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR216 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June
1	08:04	07:50	07:14	17:34 (Alt-08) 07:23	19:19 (Alt-09) 06:38	06:09
	17:21	17:55	18:29	7 17:41 (Alt-08) 20:02	22 19:41 (Alt-09) 20:34	21:03
2	08:04	07:49	07:13	07:22	19:20 (Alt-09) 06:36	06:09
	17:21	17:56	18:30	22 20:03	19:42 (Alt-09) 20:35	21:04
3	08:04	07:48	07:11	07:20	19:19 (Alt-09) 06:35	06:08
	17:22	17:57	18:31	22 20:04	19:41 (Alt-09) 20:36	21:05
4	08:04	07:47	07:09	07:18	19:19 (Alt-09) 06:34	06:08
	17:23	17:59	18:32	21 20:05	19:40 (Alt-09) 20:37	21:06
5	08:04	07:46	07:08	07:17	19:20 (Alt-09) 06:33	06:07
	17:24	18:00	18:33	20 20:06	19:40 (Alt-09) 20:38	21:06
6	08:04	07:45	07:06	07:15	19:20 (Alt-09) 06:31	06:07
	17:25	18:01	18:35	18 20:07	19:38 (Alt-09) 20:39	21:07
7	08:04	07:44	07:05	07:13	19:21 (Alt-09) 06:30	06:07
	17:26	18:02	18:36	15 20:08	19:36 (Alt-09) 20:40	21:08
8	08:04	07:43	08:03	08:24 (Alt-03) 07:12	19:23 (Alt-09) 06:29	06:07
	17:27	18:04	19:37	8 08:32 (Alt-03) 20:09	12 19:35 (Alt-09) 20:41	21:08
9	08:04	07:42	08:01	08:21 (Alt-03) 07:10	19:27 (Alt-09) 06:28	06:06
	17:28	18:05	19:38	15 08:36 (Alt-03) 20:10	2 19:29 (Alt-09) 20:42	21:09
10	08:03	07:40	08:00	08:19 (Alt-03) 07:09		06:27
	17:29	18:06	19:39	18 08:37 (Alt-03) 20:11		21:09
11	08:03	07:39	17:35 (Alt-08) 07:58	08:17 (Alt-03) 07:07		06:26
	17:30	18:07	8 17:43 (Alt-08) 19:40	21 08:38 (Alt-03) 20:12		21:10
12	08:03	07:38	17:32 (Alt-08) 07:57	08:16 (Alt-03) 07:05		06:25
	17:31	18:09	14 17:46 (Alt-08) 19:41	24 08:40 (Alt-03) 20:14		21:11
13	08:03	07:37	17:29 (Alt-08) 07:55	08:14 (Alt-03) 07:04		06:23
	17:32	18:10	17 17:46 (Alt-08) 19:42	26 08:40 (Alt-03) 20:15		21:11
14	08:02	07:35	17:28 (Alt-08) 07:53	08:13 (Alt-03) 07:02		06:22
	17:33	18:11	20 17:48 (Alt-08) 19:44	27 08:40 (Alt-03) 20:16		21:12
15	08:02	07:34	17:28 (Alt-08) 07:52	08:13 (Alt-03) 07:01		06:21
	17:34	18:12	22 17:50 (Alt-08) 19:45	27 08:40 (Alt-03) 20:17		21:12
16	08:01	07:33	17:27 (Alt-08) 07:50	08:12 (Alt-03) 06:59		06:20
	17:36	18:13	24 17:51 (Alt-08) 19:46	28 08:40 (Alt-03) 20:18		21:12
17	08:01	07:31	17:26 (Alt-08) 07:48	08:12 (Alt-03) 06:58		06:20
	17:37	18:15	25 17:51 (Alt-08) 19:47	27 08:39 (Alt-03) 20:19		21:13
18	08:01	07:30	17:26 (Alt-08) 07:47	08:12 (Alt-03) 06:56		06:19
	17:38	18:16	26 17:52 (Alt-08) 19:48	27 08:39 (Alt-03) 20:20		21:13
19	08:00	07:29	17:25 (Alt-08) 07:45	08:12 (Alt-03) 06:55		06:18
	17:39	18:17	27 17:52 (Alt-08) 19:49	26 08:38 (Alt-03) 20:21		21:13
20	07:59	07:27	17:25 (Alt-08) 07:43	08:12 (Alt-03) 06:53		06:17
	17:40	18:18	27 17:52 (Alt-08) 19:50	25 08:37 (Alt-03) 20:22		21:14
21	07:59	07:26	17:24 (Alt-08) 07:42	08:14 (Alt-03) 06:52		06:16
	17:41	18:20	28 17:52 (Alt-08) 19:51	23 08:37 (Alt-03) 20:23		21:14
22	07:58	07:24	17:25 (Alt-08) 07:40	08:14 (Alt-03) 06:50		06:15
	17:43	18:21	27 17:52 (Alt-08) 19:52	21 08:35 (Alt-03) 20:24		21:14
23	07:58	07:23	17:26 (Alt-08) 07:38	08:15 (Alt-03) 06:49		06:14
	17:44	18:22	26 17:52 (Alt-08) 19:53	18 08:33 (Alt-03) 20:25		21:14
24	07:57	07:22	17:26 (Alt-08) 07:37	08:18 (Alt-03) 06:47		06:14
	17:45	18:23	25 17:51 (Alt-08) 19:54	13 08:31 (Alt-03) 20:26		21:15
25	07:56	07:20	17:27 (Alt-08) 07:35	08:22 (Alt-03) 06:46		06:13
	17:46	18:24	23 17:50 (Alt-08) 19:55	3 08:25 (Alt-03) 20:27		21:15
26	07:55	07:19	17:28 (Alt-08) 07:33	19:28 (Alt-09) 06:44		06:12
	17:47	18:25	20 17:48 (Alt-08) 19:57	7 19:35 (Alt-09) 20:28		21:15
27	07:55	07:17	17:29 (Alt-08) 07:32	19:26 (Alt-09) 06:43		06:12
	17:49	18:27	18 17:47 (Alt-08) 19:58	11 19:37 (Alt-09) 20:29		21:15
28	07:54	07:16	17:31 (Alt-08) 07:30	19:24 (Alt-09) 06:42		06:11
	17:50	18:28	14 17:45 (Alt-08) 19:59	13 19:37 (Alt-09) 20:31		21:15
29	07:53			19:22 (Alt-09) 06:40		06:11
	17:51			16 19:38 (Alt-09) 20:32		21:01
30	07:52			19:21 (Alt-09) 06:39		06:10
	17:52			19 19:40 (Alt-09) 20:33		21:02
31	07:51			07:25		06:09
	17:54			21 19:41 (Alt-09)		21:03
Potential sun hours	298	297	370	398	448	452
Total, worst case		391	471	154		
Sun reduction		0.51	0.55	0.60		
Oper. time red.		0.97	0.97	0.97		
Wind dir. red.		0.68	0.63	0.65		
Total reduction		0.33	0.34	0.37		
Total, real		130	159	58		

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR216 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	July	August	September	October	November	December
1	06:10 21:15	06:34 20:57	07:05 20:14	07:35 19:22	07:54 (Alt-03) 08:19 (Alt-03)	07:09 17:35
2	06:10 21:15	06:35 20:56	07:06 20:12	07:36 19:20	07:55 (Alt-03) 08:17 (Alt-03)	07:10 17:34
3	06:11 21:15	06:36 20:55	07:07 20:11	19:25 (Alt-09) 19:27 (Alt-09)	07:37 19:19	07:11 17:33
4	06:11 21:15	06:37 20:53	07:08 20:09	19:20 (Alt-09) 19:32 (Alt-09)	07:38 19:17	07:12 17:32
5	06:12 21:14	06:38 20:52	07:08 20:08	19:18 (Alt-09) 19:33 (Alt-09)	07:39 19:15	07:13 17:31
6	06:12 21:14	06:39 20:51	07:09 20:06	19:17 (Alt-09) 19:34 (Alt-09)	07:40 19:14	07:15 17:29
7	06:13 21:14	06:40 20:50	07:10 20:04	19:15 (Alt-09) 19:35 (Alt-09)	07:41 19:12	07:16 17:28
8	06:14 21:14	06:41 20:49	07:11 20:03	19:14 (Alt-09) 19:35 (Alt-09)	07:42 19:10	07:17 17:27
9	06:14 21:13	06:42 20:47	07:12 20:01	19:13 (Alt-09) 19:36 (Alt-09)	07:43 19:09	07:18 17:26
10	06:15 21:13	06:43 20:46	07:13 19:57	19:13 (Alt-09) 19:35 (Alt-09)	07:44 19:07	07:19 17:25
11	06:16 21:12	06:44 20:45	07:14 19:56	19:13 (Alt-09) 19:35 (Alt-09)	07:45 19:05	07:21 17:24
12	06:16 21:12	06:45 20:44	07:15 19:54	19:12 (Alt-09) 19:33 (Alt-09)	07:46 19:04	07:22 17:23
13	06:17 21:12	06:46 20:42	07:16 19:52	19:12 (Alt-09) 19:30 (Alt-09)	07:47 19:02	18:05 (Alt-08) 18:16 (Alt-08)
14	06:18 21:11	06:47 20:41	07:17 19:51	19:12 (Alt-09) 19:29 (Alt-09)	07:48 19:01	18:02 (Alt-08) 18:18 (Alt-08)
15	06:19 21:11	06:48 20:40	07:18 19:49	19:13 (Alt-09) 19:27 (Alt-09)	07:49 18:59	07:25 18:19 (Alt-08)
16	06:19 21:10	06:49 20:38	07:19 19:47	19:14 (Alt-09) 19:25 (Alt-09)	07:50 18:58	07:27 18:21 (Alt-08)
17	06:20 21:09	06:50 20:37	07:20 19:46	19:16 (Alt-09) 19:24 (Alt-09)	07:52 18:56	17:58 (Alt-08) 18:22 (Alt-08)
18	06:21 21:09	06:51 20:35	07:21 19:44	07:53 18:55	07:29 18:22 (Alt-08)	17:57 (Alt-08) 17:19
19	06:22 21:08	06:52 20:34	07:22 19:42	08:05 (Alt-03) 08:16 (Alt-03)	07:54 18:53	17:56 (Alt-08) 18:22 (Alt-08)
20	06:23 21:07	06:53 20:33	07:23 19:40	08:02 (Alt-03) 08:18 (Alt-03)	07:55 18:52	17:56 (Alt-08) 18:22 (Alt-08)
21	06:24 21:07	06:54 20:31	07:24 19:39	08:00 (Alt-03) 08:20 (Alt-03)	07:56 18:50	17:55 (Alt-08) 18:22 (Alt-08)
22	06:25 21:06	06:55 20:30	07:25 19:37	07:58 (Alt-03) 08:21 (Alt-03)	07:57 18:49	17:56 (Alt-08) 18:23 (Alt-08)
23	06:25 21:05	06:56 20:28	07:26 19:35	07:57 (Alt-03) 08:21 (Alt-03)	07:58 18:47	17:55 (Alt-08) 18:22 (Alt-08)
24	06:26 21:04	06:57 20:27	07:27 19:34	07:56 (Alt-03) 08:22 (Alt-03)	07:59 18:46	17:55 (Alt-08) 18:22 (Alt-08)
25	06:27 21:03	06:58 20:25	07:28 19:32	07:55 (Alt-03) 08:22 (Alt-03)	08:01 18:44	17:56 (Alt-08) 18:21 (Alt-08)
26	06:28 21:03	06:59 20:23	07:29 19:30	07:54 (Alt-03) 08:22 (Alt-03)	08:02 18:43	17:57 (Alt-08) 18:21 (Alt-08)
27	06:29 21:02	07:00 20:22	07:30 19:29	07:54 (Alt-03) 08:21 (Alt-03)	08:03 18:42	17:58 (Alt-08) 18:19 (Alt-08)
28	06:30 21:01	07:01 20:20	07:31 19:27	07:54 (Alt-03) 08:21 (Alt-03)	08:04 18:40	17:58 (Alt-08) 18:17 (Alt-08)
29	06:31 21:00	07:02 20:19	07:32 19:25	07:54 (Alt-03) 08:20 (Alt-03)	08:05 18:39	17:59 (Alt-08) 18:16 (Alt-08)
30	06:32 20:59	07:03 20:17	07:33 19:24	07:54 (Alt-03) 08:20 (Alt-03)	08:06 18:38	18:01 (Alt-08) 18:14 (Alt-08)
31	06:33 20:58	07:04 20:16		08:08 18:37	08:08 18:11 (Alt-08)	18:05 (Alt-08) 17:19
Potential sun hours	459	428	375	345	298	288
Total, worst case			524	497		
Sun reduction			0.68	0.62		
Oper. time red.			0.97	0.97		
Wind dir. red.			0.64	0.67		
Total reduction			0.42	0.40		
Total, real			219	199		

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
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wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR217 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	16:32 (Alt-10)	07:50	07:14	07:23	07:45 (T-39)	06:38	06:09			
	17:20	20	16:52 (Alt-10)	17:55	18:29	22	08:07 (T-39)	20:34	21:03		
2	08:04	16:33 (Alt-10)	07:49	07:13	07:22	07:43 (T-39)	06:36	06:08			
	17:21	19	16:52 (Alt-10)	17:56	18:30	26	08:09 (T-39)	20:35	21:04		
3	08:04	16:33 (Alt-10)	07:48	07:11	07:11	07:42 (T-39)	06:35	06:08			
	17:22	19	16:52 (Alt-10)	17:57	18:31	6	07:36 (T-40)	20:04	21:05		
4	08:04	16:34 (Alt-10)	07:47	07:09	07:09	07:29 (T-40)	07:18	07:40 (T-39)	06:34	06:08	
	17:23	18	16:52 (Alt-10)	17:59	18:32	10	07:39 (T-40)	20:05	21:06		
5	08:04	16:35 (Alt-10)	07:46	07:08	07:08	07:27 (T-40)	07:17	07:40 (T-39)	06:32	06:07	
	17:24	18	16:53 (Alt-10)	18:00	18:33	13	07:40 (T-40)	20:06	21:06		
6	08:04	16:36 (Alt-10)	07:45	07:06	07:06	07:26 (T-40)	07:15	07:39 (T-39)	06:31	06:07	
	17:25	17	16:53 (Alt-10)	18:01	18:35	15	07:41 (T-40)	20:07	21:07		
7	08:04	16:37 (Alt-10)	07:44	07:05	07:05	07:24 (T-40)	07:13	07:38 (T-39)	06:30	06:07	
	17:26	16	16:53 (Alt-10)	18:02	18:36	18	07:42 (T-40)	20:08	21:08		
8	08:04	16:38 (Alt-10)	07:43	08:03	08:03	08:22 (T-40)	07:12	07:38 (T-39)	06:29	06:06	
	17:27	15	16:53 (Alt-10)	18:04	19:37	19	08:41 (T-40)	20:09	21:08		
9	08:04	16:39 (Alt-10)	07:42	08:02 (Alt-06)	08:01	08:21 (T-40)	07:10	07:37 (T-39)	06:28	06:06	
	17:28	14	16:53 (Alt-10)	18:05	2	08:04 (Alt-06)	19:38	21	08:42 (T-40)	20:10	33
10	08:03	16:39 (Alt-10)	07:40	08:00 (Alt-06)	08:00	08:20 (T-40)	07:09	07:38 (T-39)	06:27	06:06	
	17:29	13	16:52 (Alt-10)	18:06	5	08:05 (Alt-06)	19:39	21	08:41 (T-40)	20:11	32
11	08:03	16:41 (Alt-10)	07:39	07:59 (Alt-06)	07:58	08:19 (T-40)	07:07	07:37 (T-39)	06:26	06:06	
	17:30	11	16:52 (Alt-10)	18:07	7	08:06 (Alt-06)	19:40	21	08:40 (T-40)	20:12	32
12	08:03	16:43 (Alt-10)	07:38	07:58 (Alt-06)	07:57	08:20 (T-40)	07:05	07:37 (T-39)	06:24	06:06	
	17:31	9	16:52 (Alt-10)	18:09	9	08:07 (Alt-06)	19:41	20	08:40 (T-40)	20:14	31
13	08:03	16:44 (Alt-10)	07:37	07:57 (Alt-06)	07:55	08:21 (T-40)	07:04	07:38 (T-39)	06:23	06:06	
	17:32	6	16:50 (Alt-10)	18:10	11	08:08 (Alt-06)	19:42	18	08:39 (T-40)	20:15	29
14	08:02		07:35	07:55 (Alt-06)	07:53	08:21 (T-40)	07:02	07:38 (T-39)	06:22	06:06	
	17:33		18:11	13	08:08 (Alt-06)	19:44	16	08:37 (T-40)	20:16	28	08:06 (T-39)
15	08:02		07:34	07:54 (Alt-06)	07:52	08:23 (T-40)	07:01	07:39 (T-39)	06:21	06:06	
	17:34		18:12	14	08:08 (Alt-06)	19:45	12	08:35 (T-40)	20:17	26	08:05 (T-39)
16	08:02		07:33	07:53 (Alt-06)	07:50	08:26 (T-40)	06:59	07:39 (T-39)	06:20	06:06	
	17:35		18:13	15	08:08 (Alt-06)	19:46	5	08:31 (T-40)	20:18	24	08:03 (T-39)
17	08:01		07:31	07:52 (Alt-06)	07:48		06:58	07:41 (T-39)	06:19	06:06	
	17:37		18:15	14	08:06 (Alt-06)	19:47		20:19	21	08:02 (T-39)	20:50
18	08:01		07:30	07:53 (Alt-06)	07:47		06:56	07:42 (T-39)	06:19	06:06	
	17:38		18:16	13	08:06 (Alt-06)	19:48		20:20	17	07:59 (T-39)	20:51
19	08:00		07:29	07:54 (Alt-06)	07:45		06:55	07:45 (T-39)	06:18	06:06	
	17:39		18:17	9	08:03 (Alt-06)	19:49		20:21	12	07:57 (T-39)	20:52
20	07:59		07:27		07:43		06:53		06:17	06:06	
	17:40		18:18		19:50		20:22		20:53	21:14	
21	07:59		07:26		07:42		06:52		06:16	06:06	
	17:41		18:19		19:51		20:23		20:54	21:14	
22	07:58		07:24		07:40		06:50		06:15	06:06	
	17:43		18:21		19:52		20:24		20:55	21:14	
23	07:58		07:23		07:38		06:49		06:14	06:07	
	17:44		18:22		19:53		20:25		20:56	21:15	
24	07:57		07:22		07:37		06:47		06:14	06:07	
	17:45		18:23		19:54		20:26		20:57	21:15	
25	07:56		07:20		07:35		06:46		06:13	06:07	
	17:46		18:24		19:55		20:27		20:58	21:15	
26	07:55		07:19		07:33		06:44		06:12	06:08	
	17:47		18:25		19:57		20:28		20:59	21:15	
27	07:55		07:17		07:32		06:43		06:12	06:08	
	17:49		18:27		19:58		20:29		20:59	21:15	
28	07:54		07:16		07:30		06:42		06:11	06:08	
	17:50		18:28		19:59		20:31		21:00	21:15	
29	07:53				07:28		06:40		06:10	06:09	
	17:51				20:00		20:32		21:01	21:15	
30	07:52				07:27		07:50 (T-39)	06:39	06:10	06:09	
	17:52				20:00	14	08:04 (T-39)	20:33	21:02	21:15	
31	07:51				07:25		07:47 (T-39)		06:09		
	17:54				20:01	19	08:06 (T-39)		21:03		
Potential sun hours	298		297		370		398		448	452	
Total, worst case	195		112		248		514				
Sun reduction	0.46		0.51		0.55		0.60				
Oper. time red.	0.97		0.97		0.97		0.97				
Wind dir. red.	0.69		0.60		0.63		0.65				
Total reduction	0.31		0.30		0.33		0.38				
Total, real	60		33		83		196				

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
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Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR217 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:34		07:05	07:36 (T-39)	07:35		07:59 (T-40)	07:09	07:30 (Alt-06)	07:44
	21:15	20:57		20:14	32 08:08 (T-39)	19:22	19	08:18 (T-40)	17:35	5 07:35 (Alt-06)	17:11
2	06:10	06:35		07:05	07:35 (T-39)	07:36		07:58 (T-40)	07:10	07:31 (Alt-06)	07:45
	21:15	20:56		20:12	33 08:08 (T-39)	19:20	21	08:19 (T-40)	17:34	2 07:33 (Alt-06)	17:11
3	06:11	06:36		07:06	07:35 (T-39)	07:37		07:57 (T-40)	07:11		07:46
	21:15	20:55		20:11	33 08:08 (T-39)	19:18	22	08:19 (T-40)	17:33		17:11
4	06:11	06:37		07:07	07:35 (T-39)	07:38		07:57 (T-40)	07:12		07:47
	21:15	20:53		20:09	32 08:07 (T-39)	19:17	22	08:19 (T-40)	17:32		17:10
5	06:12	06:38		07:08	07:35 (T-39)	07:39		07:58 (T-40)	07:14		07:48
	21:14	20:52		20:08	32 08:07 (T-39)	19:15	20	08:18 (T-40)	17:31		17:10
6	06:12	06:39		07:09	07:35 (T-39)	07:40		08:00 (T-40)	07:15		07:49
	21:14	20:51		20:06	31 08:06 (T-39)	19:14	18	08:18 (T-40)	17:29		17:10
7	06:13	06:40		07:10	07:35 (T-39)	07:41		08:01 (T-40)	07:16		07:50
	21:14	20:50		20:04	31 08:06 (T-39)	19:12	16	08:17 (T-40)	17:28		17:10
8	06:14	06:41		07:11	07:35 (T-39)	07:42		08:02 (T-40)	07:17		07:50
	21:14	20:49		20:03	30 08:05 (T-39)	19:10	14	08:16 (T-40)	17:27		17:10
9	06:14	06:42		07:12	07:36 (T-39)	07:43		08:03 (T-40)	07:18		07:51
	21:13	20:47		20:01	28 08:04 (T-39)	19:09	12	08:15 (T-40)	17:26		17:10
10	06:15	06:43		07:13	07:36 (T-39)	07:44		08:04 (T-40)	07:20		07:52
	21:13	20:46		19:58	26 08:02 (T-39)	19:07	8	08:12 (T-40)	17:25		17:10
11	06:16	06:44		07:14	07:37 (T-39)	07:45		08:05 (T-40)	07:21		07:53
	21:13	20:45		19:56	23 08:00 (T-39)	19:05	3	08:08 (T-40)	17:24		17:10
12	06:16	06:45		07:15	07:38 (T-39)	07:46			07:22		07:54
	21:12	20:44		19:54	19 07:57 (T-39)	19:04			17:23		17:10
13	06:17	06:46		07:16	07:40 (T-39)	07:47			07:23		07:55
	21:12	20:42		19:52	15 07:55 (T-39)	19:02			17:22		17:10
14	06:18	06:47		07:17	07:44 (T-39)	07:48			07:24		07:55
	21:11	20:41		19:51	6 07:50 (T-39)	19:01			17:21		17:11
15	06:19	06:48		07:18		07:49			07:25		07:56
	21:11	20:40		19:49		18:59			17:20		17:11
16	06:19	06:49		07:19		07:50			07:27		07:57
	21:10	20:38		19:47		18:58			17:20		17:11
17	06:20	06:50		07:20		07:52			07:28		07:58
	21:09	20:37		19:46		18:56			17:19		17:11
18	06:21	06:51		07:21		07:53			07:29		07:58
	21:09	20:35		19:44		18:55			17:18		17:12
19	06:22	06:52		07:22		07:54			07:30		07:59
	21:08	20:34		19:42		18:53			17:17		17:12
20	06:23	06:53		07:23		07:55			07:31		07:59
	21:07	20:33		19:40		18:52			17:17		17:13
21	06:24	06:54		07:24		07:56			07:33		08:00
	21:07	20:31		19:39		18:50			17:16		17:13
22	06:24	06:55		07:25		07:57		08:28 (Alt-06)	07:34		08:00
	21:06	20:30		19:37		18:49	4	08:32 (Alt-06)	17:15		17:14
23	06:25	06:56		07:26		07:58		08:24 (Alt-06)	07:35		08:01
	21:05	20:28		19:35		18:47	11	08:35 (Alt-06)	17:15		17:14
24	06:26	06:57	07:47 (T-39)	07:27		07:59		08:23 (Alt-06)	07:36		08:01
	21:04	20:27	13 08:00 (T-39)	19:34		18:46	13	08:36 (Alt-06)	17:14		17:15
25	06:27	06:58	07:45 (T-39)	07:28		08:01		08:21 (Alt-06)	07:37		08:02
	21:03	20:25	17 08:02 (T-39)	19:32		18:44	15	08:36 (Alt-06)	17:14		17:15
26	06:28	06:59	07:43 (T-39)	07:29		08:02		08:23 (Alt-06)	07:38		08:02
	21:03	20:24	21 08:04 (T-39)	19:30		18:43	14	08:37 (Alt-06)	17:13		17:16
27	06:29	07:00	07:41 (T-39)	07:30		08:03		08:24 (Alt-06)	07:39		08:03
	21:02	20:22	24 08:05 (T-39)	19:29		18:42	13	08:37 (Alt-06)	17:13		17:16
28	06:30	07:01	07:40 (T-39)	07:31	08:05 (T-40)	08:04		08:25 (Alt-06)	07:40		08:03
	21:01	20:20	26 08:06 (T-39)	19:27	10 08:15 (T-40)	18:40	12	08:37 (Alt-06)	17:12		17:17
29	06:31	07:02	07:38 (T-39)	07:32		08:02 (T-40)	08:05	08:26 (Alt-06)	07:41	16:25 (Alt-10)	08:03
	21:00	20:19	29 08:07 (T-39)	19:25	15 08:17 (T-40)	18:39	11	08:37 (Alt-06)	17:12	6 16:31 (Alt-10)	17:18
30	06:32	07:03	07:37 (T-39)	07:33		08:01 (T-40)	08:06	08:28 (Alt-06)	07:43		16:24 (Alt-10)
	20:59	20:17	30 08:07 (T-39)	19:24	17 08:18 (T-40)	18:38	9	08:37 (Alt-06)	17:11	9 16:33 (Alt-10)	17:19
31	06:33	07:04	07:37 (T-39)			08:08		08:29 (Alt-06)			08:04
	20:58	20:16	31 08:08 (T-39)			18:37	7	08:36 (Alt-06)			17:19
Potential sun hours	459	428		375		345		298			288
Total, worst case		191		413		284		22			581
Sun reduction		0.74		0.68		0.62		0.42			0.38
Oper. time red.		0.97		0.97		0.97		0.97			0.97
Wind dir. red.		0.65		0.65		0.61		0.66			0.69
Total reduction		0.47		0.43		0.37		0.27			0.26
Total, real		90		177		105		6			148

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR218 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04		07:50		07:14		07:44 (Alt-06)		06:38		07:07 (T-39)
	17:20		17:55		18:29	3	07:47 (Alt-06)		20:02		07:39 (T-39)
2	08:04		07:49		07:13		07:22		20:34	32	07:08 (T-39)
	17:21		17:56		18:30		20:03		20:35	31	07:39 (T-39)
3	08:04	16:54 (Alt-10)	07:48		07:11		07:20		20:35		07:08 (T-39)
	17:22	2	16:56 (Alt-10)	17:57	18:31		20:04		20:36	31	07:39 (T-39)
4	08:04	16:53 (Alt-10)	07:47		07:09		07:18		20:34		07:09 (T-39)
	17:23	4	16:57 (Alt-10)	17:59	18:32		20:05		20:37	30	07:39 (T-39)
5	08:04	16:53 (Alt-10)	07:46		07:08		07:17		20:32		07:08 (T-39)
	17:24	5	16:58 (Alt-10)	18:00	18:33		20:06		20:38	29	07:37 (T-39)
6	08:04	16:53 (Alt-10)	07:45		07:06		07:15		20:31		07:09 (T-39)
	17:25	6	16:59 (Alt-10)	18:01	18:35		20:07		20:39	27	07:36 (T-39)
7	08:04	16:53 (Alt-10)	07:44		07:05		07:13		20:30		07:10 (T-39)
	17:26	7	17:00 (Alt-10)	18:02	18:36		20:08		20:40	26	07:36 (T-39)
8	08:04	16:53 (Alt-10)	07:43		08:03		07:12		20:29		07:11 (T-39)
	17:27	8	17:01 (Alt-10)	18:04	19:37		20:09		20:41	24	07:35 (T-39)
9	08:04	16:53 (Alt-10)	07:42		08:01		07:10		20:28		07:12 (T-39)
	17:28	9	17:02 (Alt-10)	18:05	19:38		20:10		20:42	21	07:33 (T-39)
10	08:03	16:52 (Alt-10)	07:40		08:00		07:09		20:27		07:14 (T-39)
	17:29	11	17:03 (Alt-10)	18:06	19:39		20:11		20:43	18	07:32 (T-39)
11	08:03	16:52 (Alt-10)	07:39		07:58		07:07		20:26		07:16 (T-39)
	17:30	12	17:04 (Alt-10)	18:07	19:40		20:12		20:44	14	07:30 (T-39)
12	08:03	16:52 (Alt-10)	07:38		07:57		07:05		20:24		07:18 (T-39)
	17:31	14	17:06 (Alt-10)	18:09	19:41		20:14		20:45	10	07:28 (T-39)
13	08:03	16:52 (Alt-10)	07:37		07:55		07:04		20:23		06:06
	17:32	14	17:06 (Alt-10)	18:10	19:42		20:15		20:46		21:11
14	08:02	16:52 (Alt-10)	07:35		07:53		07:02		20:22		06:06
	17:33	16	17:08 (Alt-10)	18:11	19:44		20:16		20:47		21:12
15	08:02	16:52 (Alt-10)	07:34		07:52		08:11 (T-40)		20:21		06:06
	17:34	16	17:08 (Alt-10)	18:12	19:45	7	08:18 (T-40)		20:17		21:12
16	08:02	16:52 (Alt-10)	07:33		07:50		08:09 (T-40)		20:59		06:06
	17:35	18	17:10 (Alt-10)	18:13	19:46	11	08:20 (T-40)		20:18		21:12
17	08:01	16:52 (Alt-10)	07:31		07:48		08:07 (T-40)		20:58		06:06
	17:37	19	17:11 (Alt-10)	18:15	19:47	14	08:21 (T-40)		20:19	7	07:30 (T-39)
18	08:01	16:53 (Alt-10)	07:30		07:47		08:06 (T-40)		20:56		06:06
	17:38	20	17:13 (Alt-10)	18:16	19:48	16	08:22 (T-40)		20:20	14	07:33 (T-39)
19	08:00	16:53 (Alt-10)	07:29		07:45		08:04 (T-40)		20:55		06:06
	17:39	20	17:13 (Alt-10)	18:17	4	07:52 (Alt-06)	18	08:22 (T-40)	20:21	19	07:36 (T-39)
20	07:59	16:54 (Alt-10)	07:27		07:47 (Alt-06)	07:43	08:02 (T-40)	06:53			07:14 (T-39)
	17:40	21	17:15 (Alt-10)	18:18	7	07:54 (Alt-06)	20	08:22 (T-40)	20:22	23	07:37 (T-39)
21	07:59	16:54 (Alt-10)	07:26		07:46 (Alt-06)	07:42	08:01 (T-40)	06:52			07:13 (T-39)
	17:41	21	17:15 (Alt-10)	18:19	9	07:55 (Alt-06)	21	08:22 (T-40)	20:23	25	07:38 (T-39)
22	07:58	16:54 (Alt-10)	07:24		07:44 (Alt-06)	07:40	08:00 (T-40)	06:50			07:11 (T-39)
	17:43	21	17:15 (Alt-10)	18:21	11	07:55 (Alt-06)	22	08:22 (T-40)	20:24	28	07:39 (T-39)
23	07:58	16:55 (Alt-10)	07:23		07:43 (Alt-06)	07:38	08:00 (T-40)	06:49			07:11 (T-39)
	17:44	19	17:14 (Alt-10)	18:22	13	07:56 (Alt-06)	21	08:21 (T-40)	20:25	29	07:40 (T-39)
24	07:57	16:56 (Alt-10)	07:22		07:41 (Alt-06)	07:37	08:01 (T-40)	06:47			07:09 (T-39)
	17:45	19	17:15 (Alt-10)	18:23	14	07:55 (Alt-06)	20	08:21 (T-40)	20:26	31	07:40 (T-39)
25	07:56	16:57 (Alt-10)	07:20		07:40 (Alt-06)	07:35	08:01 (T-40)	06:46			07:09 (T-39)
	17:46	17	17:14 (Alt-10)	18:24	15	07:55 (Alt-06)	18	08:19 (T-40)	20:27	31	07:40 (T-39)
26	07:55	16:58 (Alt-10)	07:19		07:39 (Alt-06)	07:33	08:01 (T-40)	06:44			07:09 (T-39)
	17:47	15	17:13 (Alt-10)	18:25	15	07:54 (Alt-06)	16	08:17 (T-40)	20:28	32	07:41 (T-39)
27	07:55	16:59 (Alt-10)	07:17		07:40 (Alt-06)	07:32	08:04 (T-40)	06:43			07:08 (T-39)
	17:49	13	17:12 (Alt-10)	18:27	13	07:53 (Alt-06)	12	08:16 (T-40)	20:29	32	07:40 (T-39)
28	07:54	17:01 (Alt-10)	07:16		07:41 (Alt-06)	07:30	08:06 (T-40)	06:42			07:08 (T-39)
	17:50	10	17:11 (Alt-10)	18:28	10	07:51 (Alt-06)	6	08:12 (T-40)	20:31	32	07:40 (T-39)
29	07:53	17:05 (Alt-10)			07:28		06:40				07:08 (T-39)
	17:51	2	17:07 (Alt-10)		20:00		20:32			33	07:41 (T-39)
30	07:52				07:27		06:39				07:07 (T-39)
	17:52				20:00		20:33			33	07:40 (T-39)
31	07:51				07:25						06:09
	17:54				20:01						21:03
Potential sun hours	298		297		370		398		448		452
Total, worst case	359		111		225		369		293		
Sun reduction	0.46		0.51		0.55		0.60		0.68		
Oper. time red.	0.97		0.97		0.97		0.97		0.97		
Wind dir. red.	0.69		0.60		0.64		0.65		0.65		
Total reduction	0.31		0.29		0.34		0.38		0.43		
Total, real	111		33		77		140		126		

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net

Calculated:

5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR218 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:34	07:28 (T-39)	07:05	07:35	07:09	07:44	16:34 (Alt-10)			
2	06:10	06:35	07:24 (T-39)	07:06	07:36	07:10	07:45	16:35 (Alt-10)			
3	06:11	06:36	07:23 (T-39)	07:06	07:37	07:11	07:46	16:36 (Alt-10)			
4	06:11	06:37	07:22 (T-39)	07:07	07:38	07:12	07:47	16:37 (Alt-10)			
5	06:12	06:38	07:20 (T-39)	07:08	07:39	07:14	07:48	16:38 (Alt-10)			
6	06:12	06:39	07:19 (T-39)	07:09	07:40	07:15	07:49	16:39 (Alt-10)			
7	06:13	06:40	07:19 (T-39)	07:10	07:41	07:16	07:50	16:40 (Alt-10)			
8	06:14	06:41	07:18 (T-39)	07:11	07:42	07:17	07:50	16:41 (Alt-10)			
9	06:14	06:42	07:17 (T-39)	07:12	07:43	07:18	07:51	16:42 (Alt-10)			
10	06:15	06:43	07:17 (T-39)	07:13	07:44	07:20	07:52	16:43 (Alt-10)			
11	06:16	06:44	07:16 (T-39)	07:14	07:45	07:21	07:53	16:44 (Alt-10)			
12	06:16	06:45	07:16 (T-39)	07:15	07:46	07:22	07:54	16:45 (Alt-10)			
13	06:17	06:46	07:16 (T-39)	07:16	07:47	07:23	07:55	16:46 (Alt-10)			
14	06:18	06:47	07:16 (T-39)	07:17	07:48	07:24	07:55	16:47 (Alt-10)			
15	06:19	06:48	07:15 (T-39)	07:18	07:49	07:25	07:56	16:48 (Alt-10)			
16	06:19	06:49	07:15 (T-39)	07:19	07:50	07:26	07:57	16:49 (Alt-10)			
17	06:20	06:50	07:16 (T-39)	07:20	07:51	07:27	07:58	16:50 (Alt-10)			
18	06:21	06:51	07:16 (T-39)	07:21	07:52	07:28	07:59	16:51 (Alt-10)			
19	06:22	06:52	07:16 (T-39)	07:22	07:53	07:29	08:00	16:52 (Alt-10)			
20	06:23	06:53	07:17 (T-39)	07:23	07:54	07:30	08:01	16:53 (Alt-10)			
21	06:24	06:54	07:17 (T-39)	07:24	07:55	07:31	08:02	16:54 (Alt-10)			
22	06:24	06:55	07:18 (T-39)	07:25	07:56	07:32	08:03	16:55 (Alt-10)			
23	06:25	06:56	07:18 (T-39)	07:26	07:57	07:33	08:04	16:56 (Alt-10)			
24	06:26	06:57	07:20 (T-39)	07:27	07:58	07:34	08:05	16:57 (Alt-10)			
25	06:27	06:58	07:22 (T-39)	07:28	07:59	07:35	08:06	16:58 (Alt-10)			
26	06:28	06:59	07:26 (T-39)	07:29	08:00	07:36	08:07	16:59 (Alt-10)			
27	06:29	07:00	07:31 (T-39)	07:30	08:01	07:37	08:08	17:00 (Alt-10)			
28	06:30	07:01		07:31	08:02	07:38	08:09	17:01 (Alt-10)			
29	06:31	07:02		07:32	08:03	07:39	08:10	17:02 (Alt-10)			
30	06:32	07:03		07:33	08:04	07:40	08:11	17:03 (Alt-10)			
31	06:33	07:04		07:34	08:05	07:41	08:12	17:04 (Alt-10)			
Potential sun hours	459	428		375	345		298	296		65	
Total, worst case	3	664		224	115		296	0.42		0.38	
Sun reduction	0.75	0.74		0.68	0.62		0.42	0.97		0.97	
Oper. time red.	0.97	0.97		0.97	0.97		0.97	0.69		0.69	
Wind dir. red.	0.65	0.65		0.64	0.60		0.69	0.28		0.26	
Total reduction	0.48	0.47		0.42	0.36		0.28				
Total, real	1	311		95	41		84			17	

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR219 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:05	07:35	07:09	07:44
	17:21	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:13	07:22	06:36	06:09	06:10	06:35	07:06	07:36	07:10	07:45
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:07	07:37	07:11	07:46
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7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
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	17:51		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
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	17:54		20:01		21:03		20:58	20:16		18:37		17:20
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR220 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January		February		March		April		May		June		July		August		September		October		November		December		
1	08:04		08:53 (BC051)	07:50		09:10 (BC051)	07:14	07:23	06:38	06:09	06:10	06:34	07:05	07:35	07:09								07:43	08:39 (BC051)	
	17:21	43	09:36 (BC051)	17:55	28	09:38 (BC051)	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35								17:11	45	09:24 (BC051)
2	08:04		08:53 (BC051)	07:49		09:11 (BC051)	07:12	07:22	06:36	06:09	06:10	06:35	07:06	07:36	07:10								07:45		08:39 (BC051)
	17:21	44	09:37 (BC051)	17:56	26	09:37 (BC051)	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34								17:11	45	09:24 (BC051)
3	08:04		08:54 (BC051)	07:48		09:14 (BC051)	07:11	07:20	06:35	06:08	06:11	06:36	07:07	07:37	07:11								07:46		08:39 (BC051)
	17:22	44	09:38 (BC051)	17:57	21	09:35 (BC051)	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:19	17:33								17:11	46	09:25 (BC051)
4	08:04		08:54 (BC051)	07:47		09:16 (BC051)	07:09	07:18	06:34	06:08	06:11	06:37	07:08	07:38	07:12								07:47		08:40 (BC051)
	17:23	44	09:38 (BC051)	17:59	17	09:33 (BC051)	18:32	20:05	20:37	21:06	21:14	20:53	20:09	19:17	17:32								17:11	45	09:25 (BC051)
5	08:04		08:55 (BC051)	07:46		09:21 (BC051)	07:08	07:17	06:33	06:07	06:12	06:38	07:09	07:39	07:13								07:48		08:40 (BC051)
	17:24	44	09:39 (BC051)	18:00	7	09:28 (BC051)	18:34	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31								17:10	45	09:25 (BC051)
6	08:04		08:55 (BC051)	07:45			07:06	07:15	06:31	06:07	06:13	06:39	07:10	07:40	07:15	08:50 (BC051)							07:48		08:41 (BC051)
	17:25	44	09:39 (BC051)	18:01			18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29	9	08:59 (BC051)						17:10	45	09:26 (BC051)
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	17:26	45	09:40 (BC051)	18:02			18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17	09:04 (BC051)						17:10	44	09:26 (BC051)
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Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR221 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January		February		March		April		May		June		July		August		September		October		November		December				
1	08:04		09:12 (BC051)	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:05	07:35	07:09									07:43	09:02 (BC051)				
	17:21	39	09:51 (BC051)	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35									17:11	32	09:34 (BC051)			
2	08:04		09:12 (BC051)	07:49	07:12	07:22	06:36	06:09	06:10	06:35	07:06	07:36	07:10									07:45		09:02 (BC051)			
	17:21	39	09:51 (BC051)	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34									17:11	32	09:34 (BC051)			
3	08:04		09:13 (BC051)	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:07	07:37	07:11									07:46		09:02 (BC051)			
	17:22	38	09:51 (BC051)	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:19	17:33									17:11	33	09:35 (BC051)			
4	08:04		09:14 (BC051)	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:08	07:38	07:12									07:47		09:02 (BC051)			
	17:23	37	09:51 (BC051)	17:59	18:32	20:05	20:37	21:06	21:14	20:53	20:09	19:17	17:32									17:11	34	09:36 (BC051)			
5	08:04		09:15 (BC051)	07:46	07:08	07:17	06:33	06:07	06:12	06:38	07:09	07:39	07:13									07:48		09:02 (BC051)			
	17:24	37	09:52 (BC051)	18:00	18:34	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31									17:10	35	09:37 (BC051)			
6	08:04		09:15 (BC051)	07:45	07:06	07:15	06:31	06:07	06:13	06:39	07:10	07:40	07:15									07:48		09:02 (BC051)			
	17:25	37	09:52 (BC051)	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29									17:10	36	09:38 (BC051)			
7	08:04		09:16 (BC051)	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:11	07:41	07:16									07:49		09:02 (BC051)			
	17:26	36	09:52 (BC051)	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28									17:10	37	09:39 (BC051)			
8	08:04		09:17 (BC051)	07:43	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17									07:50		09:02 (BC051)			
	17:27	35	09:52 (BC051)	18:04	19:37	20:09	20:41	21:08	21:14	20:49	20:03	19:10	17:27									17:10	37	09:39 (BC051)			
9	08:04		09:18 (BC051)	07:42	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18									07:51		09:02 (BC051)			
	17:28	33	09:51 (BC051)	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26									17:10	38	09:40 (BC051)			
10	08:03		09:19 (BC051)	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19									07:52		09:03 (BC051)			
	17:29	32	09:51 (BC051)	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25									17:10	38	09:41 (BC051)			
11	08:03		09:20 (BC051)	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21									07:53		09:02 (BC051)			
	17:30	32	09:52 (BC051)	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24									17:10	39	09:41 (BC051)			
12	08:03		09:20 (BC051)	07:38	07:57	07:05	06:25	06:06	06:17	06:45	07:15	07:46	07:22									07:54		09:02 (BC051)			
	17:31	31	09:51 (BC051)	18:09	19:41	20:14	20:45	21:10	21:12	20:44	19:54	19:04	17:23									17:10	40	09:42 (BC051)			
13	08:03		09:22 (BC051)	07:37	07:55	07:04	06:24	06:06	06:17	06:46	07:16	07:47	07:23									07:55		09:03 (BC051)			
	17:32	28	09:50 (BC051)	18:10	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22									17:11	39	09:42 (BC051)			
14	08:02		09:23 (BC051)	07:35	07:53	07:02	06:23	06:06	06:18	06:47	07:17	07:48	07:24									07:55		09:04 (BC051)			
	17:33	27	09:50 (BC051)	18:11	19:44	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21									17:11	39	09:43 (BC051)			
15	08:02		09:24 (BC051)	07:34	07:52	07:01	06:22	06:06	06:19	06:48	07:18	07:49	07:25									07:56		09:03 (BC051)			
	17:34	25	09:49 (BC051)	18:12	19:45	20:17	20:48	21:12	21:10	20:40	19:49	18:59	17:21									17:11	40	09:43 (BC051)			
16	08:01		09:26 (BC051)	07:33	07:50	06:59	06:21	06:06	06:20	06:49	07:19	07:50	07:27									07:57		09:04 (BC051)			
	17:36	23	09:49 (BC051)	18:14	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20									17:11	40	09:44 (BC051)			
17	08:01		09:27 (BC051)	07:31	07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:52	07:28									07:57		09:05 (BC051)			
	17:37	20	09:47 (BC051)	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19									17:12	40	09:45 (BC051)			
18	08:00		09:30 (BC051)	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29									07:58		09:04 (BC051)			
	17:38	16	09:46 (BC051)	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18									17:12	41	09:45 (BC051)			
19	08:00		09:33 (BC051)	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30									07:59		09:05 (BC051)			
	17:39	10	09:43 (BC051)	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17									17:12	41	09:46 (BC051)			
20	07:59			07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31									07:59		09:06 (BC051)			
	17:40			18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17									17:13	41	09:47 (BC051)			
21	07:59			07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32									08:00		09:06 (BC051)			
	17:41			18:20	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16									17:13	41	09:47 (BC051)			
22	07:58			07:24	07:40	06:50	06:15	06:07	06:25	06:55	07:25	07:57	07:34									08:00		09:06 (BC051)			
	17:43			18:21	19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15									17:14	41	09:47 (BC051)			
23	07:57			07:23	07:38	06:49	06:15	06:07	06:25	06:56	07:26	07:58	07:35											09:07 (BC051)			
	17:44			18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15									10	09:20 (BC051)	17:14	41	09:48 (BC051)	
24	07:57			07:22	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36											09:07 (BC051)	17:14	41	09:48 (BC051)
	17:45			18:23	19:54	20:26	20:57	21:15	21:04	20:27	19:34	18:46	17:14									16	09:23 (BC051)	17:15	41	09:48 (BC051)	
25	07:56			07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:01	07:37											09:06 (BC051)	17:15	41	09:48 (BC051)
	17:46			18:24	19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:45	17:14									19	09:25 (BC051)	17:15	41	09:49 (BC051)	
26	07:55			07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38											09:04 (BC051)	17:15	41	09:49 (BC051)
	17:47			18:25	19:57	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13									23	09:27 (BC051)	17:16	41	09:49 (BC051)	
27	07:54			07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39											09:03 (BC051)	17:16	41	09:49 (BC051)
	17:49			18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13									25	09:28 (BC051)	17:17	40	09:49 (BC051)	
28	07:54			07:16	07:30	06:42	06:11	06:08	06:30	07:01	07:31	08:04	07:40											09:03 (BC051)	17:17	40	09:49 (BC051)
	17:50			18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12									27	09:30 (BC051)	17:17	40	09:50 (BC051)	
29	07:53				07:28	06:40	06:11	06:09	06:31	07:02	07:32	08:05	07:41											09:03 (BC051)	17:17	40	09:50 (BC051)
	17:51				20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12									28	09:31 (BC051)	17:18	40	09:50 (BC051)	
30	07:52				07:27	06:39	06:10	06:09	06:32	07:03	07:33	08:06	07:42											09:02 (BC051)	17:18	40	09:51 (BC051)
	17:52				20:00	20:33	21:02																				

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR222 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:05	07:35	07:09	07:44
	17:21	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:09	06:10	06:35	07:06	07:36	07:10	07:45
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:07	07:37	07:11	07:46
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:19	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:08	07:38	07:12	07:47
	17:23	17:59	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:32	17:11
5	08:04	07:46	07:08	07:17	06:33	06:07	06:12	06:38	07:09	07:39	07:13	07:48
	17:24	18:00	18:34	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:13	06:39	07:10	07:40	07:15	07:48
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:14	20:49	20:03	19:10	17:27	17:10
9	08:04	07:42	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:57	07:05	06:25	06:06	06:17	06:45	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:14	20:45	21:10	21:12	20:44	19:54	19:04	17:23	17:10
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14	08:02	07:35	07:53	07:02	06:23	06:06	06:18	06:47	07:17	07:48	07:24	07:55
	17:33	18:11	19:44	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:22	06:06	06:19	06:48	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:40	19:49	18:59	17:21	17:11
16	08:01	07:33	07:50	06:59	06:21	06:06	06:20	06:49	07:19	07:50	07:27	07:57
	17:36	18:14	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:52	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:12
18	08:00	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32	08:00
	17:41	18:20	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:07	06:25	06:55	07:25	07:57	07:34	08:00
	17:43	18:21	19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15	17:14
23	07:57	07:23	07:38	06:49	06:15	06:07	06:25	06:56	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:22	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:27	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:01	07:37	08:02
	17:46	18:24	19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:45	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38	08:02
	17:47	18:25	19:57	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:55	07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39	08:02
	17:49	18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:17
28	07:54	07:16	07:30	06:42	06:11	06:08	06:30	07:01	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:11	06:09	06:31	07:02	07:32	08:05	07:41	08:03
	17:51		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:03	07:33	08:06	07:42	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:24	18:38	17:12	17:19
31	07:51		07:25		06:10		06:33	07:04		08:08		08:03
	17:54		20:01		21:03		20:58	20:16		18:37		17:20
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR223 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	07:50		07:14	07:48 (T-42)	07:23		06:38		06:09	06:31 (Alt-06)
	17:20	17:55		18:29	28 08:16 (T-42)	20:02		20:34		21:03	15 06:46 (Alt-06)
2	08:04	07:49		07:13	07:49 (T-42)	07:22		06:36		06:08	06:30 (Alt-06)
	17:21	17:56		18:30	27 08:16 (T-42)	20:03		20:35		21:04	16 06:46 (Alt-06)
3	08:04	07:48		07:11	07:49 (T-42)	07:20		06:35		06:08	06:30 (Alt-06)
	17:22	17:57		18:31	25 08:14 (T-42)	20:04		20:36		21:05	17 06:47 (Alt-06)
4	08:04	07:47		07:09	07:51 (T-42)	07:18		06:34		06:08	06:29 (Alt-06)
	17:23	17:59		18:32	22 08:13 (T-42)	20:05		20:37		21:06	18 06:47 (Alt-06)
5	08:04	07:46		07:08	07:52 (T-42)	07:17		06:32		06:07	06:29 (Alt-06)
	17:24	18:00		18:33	19 08:11 (T-42)	20:06		20:38		21:06	18 06:47 (Alt-06)
6	08:04	07:45		07:06	07:55 (T-42)	07:15		06:31		06:07	06:29 (Alt-06)
	17:25	18:01		18:35	13 08:08 (T-42)	20:07		20:39		21:07	19 06:48 (Alt-06)
7	08:04	07:44		07:05		07:13		06:30		06:07	06:29 (Alt-06)
	17:26	18:02		18:36		20:08		20:40		21:08	19 06:48 (Alt-06)
8	08:04	07:43		08:03		07:12		06:29		06:06	06:28 (Alt-06)
	17:27	18:04		19:37		20:09		20:41		21:08	20 06:48 (Alt-06)
9	08:04	07:42		08:01		07:10		06:28		06:06	06:28 (Alt-06)
	17:28	18:05		19:38		20:10		20:42		21:09	20 06:48 (Alt-06)
10	08:03	07:40		08:00		07:09		06:27		06:06	06:28 (Alt-06)
	17:29	18:06		19:39		20:11		20:43		21:09	20 06:48 (Alt-06)
11	08:03	07:39		07:58		07:07		06:26		06:06	06:28 (Alt-06)
	17:30	18:07		19:40		20:12		20:44		21:10	21 06:49 (Alt-06)
12	08:03	07:38		07:57		07:05		06:24		06:06	06:28 (Alt-06)
	17:31	18:09		19:41		20:14		20:45		21:11	21 06:49 (Alt-06)
13	08:03	07:37		07:55		07:04		06:23		06:06	06:28 (Alt-06)
	17:32	18:10		19:42		20:15		20:46		21:11	21 06:49 (Alt-06)
14	08:02	07:35	08:02 (T-42)	07:53		07:02		06:22		06:06	06:28 (Alt-06)
	17:33	18:11	4 08:06 (T-42)	19:44		20:16		20:47		21:12	22 06:50 (Alt-06)
15	08:02	07:34	07:57 (T-42)	07:52		07:01		06:21		06:06	06:28 (Alt-06)
	17:34	18:12	14 08:11 (T-42)	19:45		20:17		20:48		21:12	22 06:50 (Alt-06)
16	08:01	07:33	07:55 (T-42)	07:50		06:59	19:54 (Alt-10)	06:20		06:06	06:28 (Alt-06)
	17:36	18:13	18 08:13 (T-42)	19:46		20:18	2 19:56 (Alt-10)	20:49		21:12	22 06:50 (Alt-06)
17	08:01	07:31	07:53 (T-42)	07:48		06:58	19:52 (Alt-10)	06:20		06:06	06:28 (Alt-06)
	17:37	18:15	21 08:14 (T-42)	19:47		20:19	6 19:58 (Alt-10)	20:50		21:13	22 06:50 (Alt-06)
18	08:01	07:30	07:52 (T-42)	07:47		06:56	19:50 (Alt-10)	06:19		06:06	06:28 (Alt-06)
	17:38	18:16	24 08:16 (T-42)	19:48		20:20	8 19:58 (Alt-10)	20:51		21:13	22 06:50 (Alt-06)
19	08:00	07:29	07:50 (T-42)	07:45		06:55	19:50 (Alt-10)	06:18		06:06	06:28 (Alt-06)
	17:39	18:17	27 08:17 (T-42)	19:49		20:21	10 20:00 (Alt-10)	20:52		21:13	22 06:50 (Alt-06)
20	07:59	07:27	07:50 (T-42)	07:43		06:53	19:48 (Alt-10)	06:17		06:06	06:28 (Alt-06)
	17:40	18:18	28 08:18 (T-42)	19:50		20:22	12 20:00 (Alt-10)	20:53		21:14	22 06:50 (Alt-06)
21	07:59	07:26	07:48 (T-42)	07:42		06:52	19:48 (Alt-10)	06:16		06:06	06:29 (Alt-06)
	17:41	18:19	30 08:18 (T-42)	19:51		20:23	14 20:02 (Alt-10)	20:54		21:14	22 06:51 (Alt-06)
22	07:58	07:24	07:48 (T-42)	07:40		06:50	19:48 (Alt-10)	06:15		06:06	06:29 (Alt-06)
	17:43	18:21	31 08:19 (T-42)	19:52		20:24	14 20:02 (Alt-10)	20:55		21:14	22 06:51 (Alt-06)
23	07:58	07:23	07:48 (T-42)	07:38		06:49	19:48 (Alt-10)	06:14		06:07	06:29 (Alt-06)
	17:44	18:22	31 08:19 (T-42)	19:53		20:25	16 20:04 (Alt-10)	20:56		21:15	22 06:51 (Alt-06)
24	07:57	07:22	07:47 (T-42)	07:37		06:47	19:48 (Alt-10)	06:14	06:35 (Alt-06)	06:07	06:29 (Alt-06)
	17:45	18:23	32 08:19 (T-42)	19:54		20:26	16 20:04 (Alt-10)	20:57	4 06:39 (Alt-06)	21:15	22 06:51 (Alt-06)
25	07:56	07:20	07:48 (T-42)	07:35		06:46	19:48 (Alt-10)	06:13	06:34 (Alt-06)	06:07	06:30 (Alt-06)
	17:46	18:24	31 08:19 (T-42)	19:55		20:27	16 20:04 (Alt-10)	20:58	6 06:40 (Alt-06)	21:15	22 06:52 (Alt-06)
26	07:55	07:19	07:47 (T-42)	07:33		06:44	19:50 (Alt-10)	06:12	06:34 (Alt-06)	06:08	06:30 (Alt-06)
	17:47	18:25	31 08:18 (T-42)	19:57		20:28	13 20:03 (Alt-10)	20:58	8 06:42 (Alt-06)	21:15	22 06:52 (Alt-06)
27	07:55	07:17	07:48 (T-42)	07:32		06:43	19:50 (Alt-10)	06:12	06:33 (Alt-06)	06:08	06:30 (Alt-06)
	17:49	18:27	30 08:18 (T-42)	19:58		20:29	11 20:01 (Alt-10)	20:59	10 06:43 (Alt-06)	21:15	22 06:52 (Alt-06)
28	07:54	07:16	07:48 (T-42)	07:30		06:42	19:53 (Alt-10)	06:11	06:32 (Alt-06)	06:08	06:31 (Alt-06)
	17:50	18:28	29 08:17 (T-42)	19:59		20:31	6 19:59 (Alt-10)	21:00	11 06:43 (Alt-06)	21:15	22 06:53 (Alt-06)
29	07:53			07:28		06:40		06:10	06:32 (Alt-06)	06:09	06:31 (Alt-06)
	17:51			20:00		20:32		21:01	12 06:44 (Alt-06)	21:15	21 06:52 (Alt-06)
30	07:52			07:27		06:39		06:10	06:31 (Alt-06)	06:09	06:32 (Alt-06)
	17:52			20:00		20:33		21:02	13 06:44 (Alt-06)	21:15	21 06:53 (Alt-06)
31	07:51			07:25				06:09	06:31 (Alt-06)		
	17:54			20:01				21:03	14 06:45 (Alt-06)		
Potential sun hours	298	297		370		398		448		452	
Total, worst case			381		134		144		78		617
Sun reduction			0.51		0.55		0.60		0.68		0.74
Oper. time red.			0.97		0.97		0.97		0.97		0.97
Wind dir. red.			0.60		0.60		0.61		0.69		0.69
Total reduction			0.29		0.31		0.35		0.45		0.49
Total, real			111		42		51		35		301

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR223 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July				August				September				October				November				December			
1	06:10		06:32 (Alt-06)	06:34				07:05	07:34							07:09	07:44						
	21:15	21	06:53 (Alt-06)	20:57					20:14	19:22						17:35	17:11						
2	06:10		06:33 (Alt-06)	06:35				07:05	07:36							07:10	07:45						
	21:15	21	06:54 (Alt-06)	20:56					20:12	19:20						17:34	17:11						
3	06:11		06:33 (Alt-06)	06:36				07:06	07:37							07:11	07:46						
	21:15	20	06:53 (Alt-06)	20:55					20:11	19:18						17:33	17:11						
4	06:11		06:34 (Alt-06)	06:37				07:07	07:38							07:12	07:47						
	21:15	20	06:54 (Alt-06)	20:53					20:09	19:17						17:32	17:10						
5	06:12		06:34 (Alt-06)	06:38				07:08	07:39							07:13	07:48						
	21:14	19	06:53 (Alt-06)	20:52					20:07	19:15						17:31	17:10						
6	06:12		06:35 (Alt-06)	06:39				07:09	07:40							07:15	07:49						
	21:14	19	06:54 (Alt-06)	20:51					20:06	19:14						17:29	17:10						
7	06:13		06:35 (Alt-06)	06:40				07:10	07:41					08:33 (T-42)		07:16	07:49						
	21:14	18	06:53 (Alt-06)	20:50					20:04	19:12			9	08:42 (T-42)		17:28	17:10						
8	06:14		06:36 (Alt-06)	06:41				07:11	07:42					08:29 (T-42)		07:17	07:50						
	21:14	18	06:54 (Alt-06)	20:49					20:03	19:10			16	08:45 (T-42)		17:27	17:10						
9	06:14		06:37 (Alt-06)	06:42				07:12	07:43					08:27 (T-42)		07:18	07:51						
	21:13	17	06:54 (Alt-06)	20:47					20:01	19:09			20	08:47 (T-42)		17:26	17:10						
10	06:15		06:37 (Alt-06)	06:43				07:13	07:44					08:25 (T-42)		07:19	07:52						
	21:13	17	06:54 (Alt-06)	20:46					19:57	19:07			23	08:48 (T-42)		17:25	17:10						
11	06:16		06:38 (Alt-06)	06:44				07:14	07:45					08:23 (T-42)		07:21	07:53						
	21:13	16	06:54 (Alt-06)	20:45					19:56	19:05			26	08:49 (T-42)		17:24	17:10						
12	06:16		06:39 (Alt-06)	06:45				07:15	07:46					08:22 (T-42)		07:22	07:54						
	21:12	15	06:54 (Alt-06)	20:44					19:54	19:04			27	08:49 (T-42)		17:23	17:10						
13	06:17		06:39 (Alt-06)	06:46				07:16	07:47					08:21 (T-42)		07:23	07:55						
	21:12	14	06:53 (Alt-06)	20:42					19:52	19:02			29	08:50 (T-42)		17:22	17:10						
14	06:18		06:40 (Alt-06)	06:47				07:17	07:48					08:20 (T-42)		07:24	07:55						
	21:11	13	06:53 (Alt-06)	20:41					19:51	19:01			30	08:50 (T-42)		17:21	17:11						
15	06:19		06:41 (Alt-06)	06:48			20:00 (Alt-10)	07:18	07:49					08:19 (T-42)		07:25	07:56						
	21:11	12	06:53 (Alt-06)	20:40		7	20:07 (Alt-10)	19:49	18:59			31	08:50 (T-42)		17:20	17:11							
16	06:19		06:42 (Alt-06)	06:49			19:58 (Alt-10)	07:19	07:50					08:20 (T-42)		07:27	07:57						
	21:10	10	06:52 (Alt-06)	20:38		11	20:09 (Alt-10)	19:47	18:58			31	08:51 (T-42)		17:20	17:11							
17	06:20		06:43 (Alt-06)	06:50			19:56 (Alt-10)	07:20	07:52					08:19 (T-42)		07:28	07:58						
	21:09	9	06:52 (Alt-06)	20:37		14	20:10 (Alt-10)	19:46	18:56			32	08:51 (T-42)		17:19	17:11							
18	06:21		06:43 (Alt-06)	06:51			19:55 (Alt-10)	07:21	07:53					08:19 (T-42)		07:29	07:58						
	21:09	7	06:50 (Alt-06)	20:35		16	20:11 (Alt-10)	19:44	18:55			31	08:50 (T-42)		17:18	17:12							
19	06:22		06:44 (Alt-06)	06:52			19:54 (Alt-10)	07:22	07:54					08:19 (T-42)		07:30	07:59						
	21:08	5	06:49 (Alt-06)	20:34		17	20:11 (Alt-10)	19:42	18:53			31	08:50 (T-42)		17:17	17:12							
20	06:23		06:45 (Alt-06)	06:53			19:54 (Alt-10)	07:23	07:55					08:19 (T-42)		07:31	07:59						
	21:07	2	06:47 (Alt-06)	20:33		15	20:09 (Alt-10)	19:40	18:52			30	08:49 (T-42)		17:17	17:13							
21	06:24			06:54			19:53 (Alt-10)	07:24	07:56					08:19 (T-42)		07:32	08:00						
	21:07			20:31		15	20:08 (Alt-10)	19:39	18:50			29	08:48 (T-42)		17:16	17:13							
22	06:24			06:55			19:53 (Alt-10)	07:25	07:57					08:20 (T-42)		07:34	08:00						
	21:06			20:30		13	20:06 (Alt-10)	19:37	18:49			28	08:48 (T-42)		17:15	17:14							
23	06:25			06:56			19:52 (Alt-10)	07:26	07:58					08:21 (T-42)		07:35	08:01						
	21:05			20:28		12	20:04 (Alt-10)	19:35	18:47			26	08:47 (T-42)		17:15	17:14							
24	06:26			06:57			19:53 (Alt-10)	07:27	07:59					08:22 (T-42)		07:36	08:01						
	21:04			20:27		10	20:03 (Alt-10)	19:34	18:46			23	08:45 (T-42)		17:14	17:15							
25	06:27			06:58			19:53 (Alt-10)	07:28	08:01					08:23 (T-42)		07:37	08:02						
	21:03			20:25		8	20:01 (Alt-10)	19:32	18:44			21	08:44 (T-42)		17:14	17:15							
26	06:28			06:59			19:54 (Alt-10)	07:29	08:02					08:25 (T-42)		07:38	08:02						
	21:03			20:23		6	20:00 (Alt-10)	19:30	18:43			18	08:43 (T-42)		17:13	17:16							
27	06:29			07:00			19:56 (Alt-10)	07:30	08:03					08:28 (T-42)		07:39	08:03						
	21:02			20:22		2	19:58 (Alt-10)	19:29	18:42			12	08:40 (T-42)		17:13	17:16							
28	06:30			07:01				07:31	08:04							07:40	08:03						
	21:01			20:20				19:27	18:40							17:12	17:17						
29	06:31			07:02				07:32	08:05							07:41	08:03						
	21:00			20:19				19:25	18:39							17:12	17:18						
30	06:32			07:03				07:33	08:06							07:43	08:03						
	20:59			20:17				19:23	18:38							17:11	17:19						
31	06:33			07:04					08:08								08:04						
	20:58			20:16					18:37								17:19						
Potential sun hours	459			428					375			345				298		288					
Total, worst case		293			146							523											
Sun reduction		0.75			0.74							0.62											
Oper. time red.		0.97			0.97							0.97											
Wind dir. red.		0.69			0.61							0.60											
Total reduction		0.50			0.43							0.35											
Total, real		145			63							186											

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR224 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	08:42 (T-42)	07:50	08:32 (T-42)	07:14	07:23	06:38	06:09			
	17:20	3 08:45 (T-42)	17:55	43 09:15 (T-42)	18:29	20:02	20:34	21:03			
2	08:04	08:40 (T-42)	07:49	08:33 (T-42)	07:12	07:22	06:36	06:08			
	17:21	8 08:48 (T-42)	17:56	42 09:15 (T-42)	18:30	20:03	20:35	21:04			
3	08:04	08:38 (T-42)	07:48	08:33 (T-42)	07:11	07:20	06:35	06:08			
	17:22	12 08:50 (T-42)	17:57	41 09:14 (T-42)	18:31	20:04	20:36	21:05			
4	08:04	08:38 (T-42)	07:47	08:34 (T-42)	07:09	07:18	06:34	06:08			
	17:23	14 08:52 (T-42)	17:59	40 09:14 (T-42)	18:32	20:05	20:37	21:06			
5	08:04	08:37 (T-42)	07:46	08:34 (T-42)	07:08	07:17	06:32	06:07			
	17:24	17 08:54 (T-42)	18:00	40 09:14 (T-42)	18:33	20:06	20:38	21:06			
6	08:04	08:36 (T-42)	07:45	08:35 (T-42)	07:06	07:15	06:31	06:07			
	17:25	20 08:56 (T-42)	18:01	38 09:13 (T-42)	18:35	20:07	20:39	21:07			
7	08:04	08:36 (T-42)	07:44	08:36 (T-42)	07:05	07:13	06:30	06:07			
	17:26	21 08:57 (T-42)	18:02	37 09:13 (T-42)	18:36	20:08	20:40	21:08			
8	08:04	08:36 (T-42)	07:43	08:37 (T-42)	08:03	07:12	06:29	06:06			
	17:27	23 08:59 (T-42)	18:04	35 09:12 (T-42)	19:37	20:09	20:41	21:08			
9	08:04	08:34 (T-42)	07:42	08:39 (T-42)	08:01	07:10	06:28	06:06	06:32 (Alt-06)		
	17:28	25 08:59 (T-42)	18:05	32 09:11 (T-42)	19:38	20:10	20:42	21:09	1 06:33 (Alt-06)		
10	08:03	08:34 (T-42)	07:40	08:39 (T-42)	08:00	07:09	06:27	06:06	06:30 (Alt-06)		
	17:29	27 09:01 (T-42)	18:06	30 09:09 (T-42)	19:39	20:11	20:43	21:09	6 06:36 (Alt-06)		
11	08:03	08:34 (T-42)	07:39	08:41 (T-42)	07:58	07:07	06:26	06:06	06:29 (Alt-06)		
	17:30	28 09:02 (T-42)	18:07	27 09:08 (T-42)	19:40	20:12	20:44	21:10	9 06:38 (Alt-06)		
12	08:03	08:34 (T-42)	07:38	08:43 (T-42)	07:57	07:05	06:24	06:06	06:28 (Alt-06)		
	17:31	30 09:04 (T-42)	18:09	24 09:07 (T-42)	19:41	20:14	20:45	21:11	11 06:39 (Alt-06)		
13	08:03	08:33 (T-42)	07:37	08:44 (T-42)	07:55	07:04	06:23	06:06	06:28 (Alt-06)		
	17:32	31 09:04 (T-42)	18:10	20 09:04 (T-42)	19:42	20:15	20:46	21:11	12 06:40 (Alt-06)		
14	08:02	08:33 (T-42)	07:35	08:48 (T-42)	07:53	07:02	06:22	06:06	06:28 (Alt-06)		
	17:33	33 09:06 (T-42)	18:11	13 09:01 (T-42)	19:44	20:16	20:47	21:12	12 06:40 (Alt-06)		
15	08:02	08:23 (T-45)	07:34		07:52	07:01	06:21	06:06	06:28 (Alt-06)		
	17:34	35 09:06 (T-42)	18:12		19:45	20:17	20:48	21:12	13 06:41 (Alt-06)		
16	08:01	08:23 (T-45)	07:33		07:50	06:59	06:20	06:06	06:28 (Alt-06)		
	17:35	38 09:08 (T-42)	18:13		19:46	20:18	20:49	21:12	13 06:41 (Alt-06)		
17	08:01	08:22 (T-45)	07:31		07:48	06:58	06:19	06:06	06:28 (Alt-06)		
	17:37	41 09:08 (T-42)	18:15		19:47	20:19	20:50	21:13	14 06:42 (Alt-06)		
18	08:01	08:22 (T-45)	07:30		07:47	06:56	06:19	06:06	06:28 (Alt-06)		
	17:38	43 09:09 (T-42)	18:16		19:48	20:20	20:51	21:13	14 06:42 (Alt-06)		
19	08:00	08:21 (T-45)	07:29		07:45	06:55	06:18	06:06	06:28 (Alt-06)		
	17:39	46 09:10 (T-42)	18:17		19:49	20:21	20:52	21:13	14 06:42 (Alt-06)		
20	07:59	08:20 (T-45)	07:27		07:43	06:53	06:17	06:06	06:28 (Alt-06)		
	17:40	48 09:10 (T-42)	18:18		19:50	20:22	20:53	21:14	14 06:42 (Alt-06)		
21	07:59	08:20 (T-45)	07:26		07:42	06:52	06:16	06:06	06:29 (Alt-06)		
	17:41	51 09:12 (T-42)	18:19		19:51	20:23	20:54	21:14	14 06:43 (Alt-06)		
22	07:58	08:19 (T-45)	07:24		07:40	06:50	06:15	06:06	06:29 (Alt-06)		
	17:43	53 09:12 (T-42)	18:21		19:52	20:24	20:55	21:14	14 06:43 (Alt-06)		
23	07:58	08:18 (T-45)	07:23		07:38	06:49	06:14	06:07	06:29 (Alt-06)		
	17:44	54 09:12 (T-42)	18:22		19:53	20:25	20:56	21:14	14 06:43 (Alt-06)		
24	07:57	08:18 (T-45)	07:22		07:37	06:47	06:14	06:07	06:29 (Alt-06)		
	17:45	56 09:14 (T-42)	18:23		19:54	20:26	20:57	21:15	14 06:43 (Alt-06)		
25	07:56	08:17 (T-45)	07:20		07:35	06:46	06:13	06:07	06:30 (Alt-06)		
	17:46	57 09:14 (T-42)	18:24		19:55	20:27	20:58	21:15	14 06:44 (Alt-06)		
26	07:55	08:16 (T-45)	07:19		07:33	06:44	06:12	06:08	06:30 (Alt-06)		
	17:47	58 09:14 (T-42)	18:25		19:57	20:28	20:58	21:15	13 06:43 (Alt-06)		
27	07:55	08:15 (T-45)	07:17		07:32	06:43	06:12	06:08	06:30 (Alt-06)		
	17:49	59 09:14 (T-42)	18:27		19:58	20:29	20:59	21:15	13 06:43 (Alt-06)		
28	07:54	08:16 (T-45)	07:16		07:30	06:42	06:11	06:08	06:31 (Alt-06)		
	17:50	59 09:15 (T-42)	18:28		19:59	20:31	21:00	21:15	12 06:43 (Alt-06)		
29	07:53	08:17 (T-45)			07:28	06:40	06:10	06:09	06:31 (Alt-06)		
	17:51	58 09:15 (T-42)			20:00	20:32	21:01	21:15	12 06:43 (Alt-06)		
30	07:52	08:18 (T-45)			07:27	06:39	06:10	06:09	06:32 (Alt-06)		
	17:52	55 09:15 (T-42)			20:00	20:33	21:02	21:15	11 06:43 (Alt-06)		
31	07:51	08:20 (T-45)			07:25		06:09				
	17:54	51 09:15 (T-42)			20:01		21:03				
Potential sun hours	298		297		370	398	448	452	264		
Total, worst case	1154		462						264		
Sun reduction	0.46		0.51						0.74		
Oper. time red.	0.97		0.97						0.97		
Wind dir. red.	0.59		0.59						0.69		
Total reduction	0.26		0.29						0.49		
Total, real	302		134						130		

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

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

Project:

Northwest Ohio

Description:

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5/21/2013 8:55 AM / 304

Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR224 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:33 (Alt-06)	06:34	07:04	07:34			07:09	08:09 (T-42)	07:44	08:16 (T-42)
	21:15	9 06:42 (Alt-06)	20:57	20:14	19:22			17:35	31 08:40 (T-42)	17:11	28 08:44 (T-42)
2	06:10	06:34 (Alt-06)	06:35	07:05	07:36			07:10	08:07 (T-42)	07:45	08:17 (T-42)
	21:15	8 06:42 (Alt-06)	20:56	20:12	19:20			17:34	33 08:40 (T-42)	17:11	27 08:44 (T-42)
3	06:11	06:36 (Alt-06)	06:36	07:06	07:37			07:11	08:07 (T-42)	07:46	08:18 (T-42)
	21:15	4 06:40 (Alt-06)	20:55	20:11	19:18			17:33	35 08:42 (T-42)	17:11	25 08:43 (T-42)
4	06:11		06:37	07:07	07:38			07:12	08:06 (T-42)	07:47	08:20 (T-42)
	21:15		20:53	20:09	19:17			17:32	37 08:43 (T-42)	17:10	23 08:43 (T-42)
5	06:12		06:38	07:08	07:39			07:13	08:05 (T-42)	07:48	08:21 (T-42)
	21:14		20:52	20:07	19:15			17:31	38 08:43 (T-42)	17:10	21 08:42 (T-42)
6	06:12		06:39	07:09	07:40			07:15	08:04 (T-42)	07:49	08:22 (T-42)
	21:14		20:51	20:06	19:14			17:29	40 08:44 (T-42)	17:10	20 08:42 (T-42)
7	06:13		06:40	07:10	07:41			07:16	08:05 (T-42)	07:49	08:24 (T-42)
	21:14		20:50	20:04	19:12			17:28	40 08:45 (T-42)	17:10	17 08:41 (T-42)
8	06:14		06:41	07:11	07:42			07:17	08:04 (T-42)	07:50	08:25 (T-42)
	21:14		20:49	20:03	19:10			17:27	41 08:45 (T-42)	17:10	15 08:40 (T-42)
9	06:14		06:42	07:12	07:43			07:18	08:03 (T-42)	07:51	08:27 (T-42)
	21:13		20:47	20:01	19:09			17:26	43 08:46 (T-42)	17:10	13 08:40 (T-42)
10	06:15		06:43	07:13	07:44			07:19	08:03 (T-42)	07:52	08:29 (T-42)
	21:13		20:46	19:57	19:07			17:25	43 08:46 (T-42)	17:10	10 08:39 (T-42)
11	06:16		06:44	07:14	07:45			07:21	07:52 (T-45)	07:53	08:31 (T-42)
	21:12		20:45	19:56	19:05			17:24	51 08:47 (T-42)	17:10	5 08:36 (T-42)
12	06:16		06:45	07:15	07:46			07:22	07:50 (T-45)	07:54	
	21:12		20:44	19:54	19:04			17:23	55 08:47 (T-42)	17:10	
13	06:17		06:46	07:16	07:47			07:23	07:49 (T-45)	07:55	
	21:12		20:42	19:52	19:02			17:22	58 08:47 (T-42)	17:10	
14	06:18		06:47	07:17	07:48			07:24	07:49 (T-45)	07:55	
	21:11		20:41	19:51	19:01			17:21	58 08:47 (T-42)	17:11	
15	06:19		06:48	07:18	07:49			07:25	07:48 (T-45)	07:56	
	21:11		20:40	19:49	18:59			17:20	59 08:47 (T-42)	17:11	
16	06:19		06:49	07:19	07:50			07:27	07:49 (T-45)	07:57	
	21:10		20:38	19:47	18:58			17:20	58 08:47 (T-42)	17:11	
17	06:20		06:50	07:20	07:52			07:28	07:50 (T-45)	07:58	
	21:09		20:37	19:46	18:56			17:19	57 08:47 (T-42)	17:11	
18	06:21		06:51	07:21	07:53			07:29	07:52 (T-45)	07:58	
	21:09		20:35	19:44	18:55			17:18	56 08:48 (T-42)	17:12	
19	06:22		06:52	07:22	07:54			07:30	07:53 (T-45)	07:59	
	21:08		20:34	19:42	18:53			17:17	54 08:47 (T-42)	17:12	
20	06:23		06:53	07:23	07:55			07:31	07:54 (T-45)	07:59	
	21:07		20:32	19:40	18:52			17:17	53 08:47 (T-42)	17:13	
21	06:24		06:54	07:24	07:56			07:32	07:55 (T-45)	08:00	
	21:07		20:31	19:39	18:50			17:16	51 08:47 (T-42)	17:13	
22	06:24		06:55	07:25	07:57			07:34	07:57 (T-45)	08:00	
	21:06		20:30	19:37	18:49			17:15	48 08:47 (T-42)	17:14	
23	06:25		06:56	07:26	07:58			07:35	07:58 (T-45)	08:01	
	21:05		20:28	19:35	18:47			17:15	46 08:47 (T-42)	17:14	
24	06:26		06:57	07:27	07:59			07:36	07:59 (T-45)	08:01	
	21:04		20:27	19:34	18:46			17:14	45 08:47 (T-42)	17:15	
25	06:27		06:58	07:28	08:01			07:37	08:00 (T-45)	08:02	
	21:03		20:25	19:32	18:44			17:14	41 08:46 (T-42)	17:15	
26	06:28		06:59	07:29	08:02			07:38	08:01 (T-45)	08:02	
	21:03		20:23	19:30	18:43			17:13	38 08:46 (T-42)	17:16	
27	06:29		07:00	07:30	08:03			07:39	08:02 (T-45)	08:03	
	21:02		20:22	19:29	18:42			17:13	35 08:45 (T-42)	17:16	
28	06:30		07:01	07:31	08:04			07:40	08:13 (T-42)	08:03	
	21:01		20:20	19:27	18:40	14	09:17 (T-42)	17:12	33 08:46 (T-42)	17:17	
29	06:31		07:02	07:32	08:05		09:13 (T-42)	07:41	08:14 (T-42)	08:03	
	21:00		20:19	19:25	18:39	21	09:34 (T-42)	17:12	31 08:45 (T-42)	17:18	
30	06:32		07:02	07:33	08:06		09:11 (T-42)	07:43	08:15 (T-42)	08:03	
	20:59		20:17	19:23	18:38	25	09:36 (T-42)	17:11	30 08:45 (T-42)	17:19	
31	06:33		07:03		08:08		09:10 (T-42)			08:04	
	20:58		20:16		18:37	28	09:38 (T-42)			17:19	
Potential sun hours	459		428	375	345			298		288	
Total, worst case		21			88			1338		204	
Sun reduction		0.75			0.62			0.42		0.38	
Oper. time red.		0.97			0.97			0.97		0.97	
Wind dir. red.		0.69			0.59			0.59		0.59	
Total reduction		0.50			0.35			0.24		0.22	
Total, real		10			31			320		44	

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

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

Northwest Ohio

Description:

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5/21/2013 8:55 AM / 305

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EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR225 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	08:10 (T-43)	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:34	07:09
	17:21	17:55	26 08:36 (T-43)	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35
2	08:04	07:49	08:10 (T-43)	07:12	07:22	06:36	06:09	06:10	06:35	07:05	07:35	07:10
	17:21	17:56	26 08:36 (T-43)	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34
3	08:04	07:48	08:08 (T-47)	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11
	17:22	17:57	29 08:37 (T-43)	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33
4	08:04	07:47	08:07 (T-47)	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12
	17:23	17:59	30 08:37 (T-43)	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:32
5	08:04	07:46	08:06 (T-47)	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13
	17:24	18:00	32 08:38 (T-43)	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31
6	08:04	07:45	08:05 (T-47)	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15
	17:25	18:01	33 08:38 (T-43)	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29
7	08:04	07:44	08:04 (T-47)	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16
	17:26	18:02	34 08:38 (T-43)	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28
8	08:04	07:43	08:03 (T-47)	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17
	17:27	18:04	35 08:38 (T-43)	19:37	20:09	20:41	21:08	21:14	20:49	20:02	19:10	17:27
9	08:04	07:41	08:01 (T-47)	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18
	17:28	18:05	36 08:37 (T-43)	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26
10	08:03	07:40	08:00 (T-47)	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19
	17:29	18:06	36 08:36 (T-43)	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25
11	08:03	07:39	07:59 (T-47)	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21
	17:30	18:07	37 08:36 (T-43)	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24
12	08:03	07:38	07:59 (T-47)	07:57	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22
	17:31	18:09	36 08:35 (T-43)	19:41	20:13	20:45	21:10	21:12	20:44	19:54	19:04	17:23
13	08:03	07:37	07:59 (T-47)	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23
	17:32	18:10	33 08:33 (T-43)	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22
14	08:02	07:35	08:00 (T-47)	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24
	17:33	18:11	27 08:31 (T-43)	19:44	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21
15	08:02	07:34	08:03 (T-47)	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25
	17:34	18:12	17 08:29 (T-43)	19:45	20:17	20:48	21:12	21:10	20:40	19:49	18:59	17:20
16	08:01	07:33		07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:27
	17:36	18:13		19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20
17	08:01	07:31		07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:52	07:28
	17:37	18:15		19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19
18	08:00	07:30		07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29
	17:38	18:16		19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18
19	08:00	07:29		07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30
	17:39	18:17		19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17
20	07:59	07:27		07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31
	17:40	18:18		19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17
21	07:59	07:26		07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32
	17:41	18:19		19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16
22	07:58	07:24		07:40	06:50	06:15	06:06	06:24	06:55	07:25	07:57	07:34
	17:43	18:21		19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15
23	07:57	07:23		07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35
	17:44	18:22		19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15
24	07:57	07:22		07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36
	17:45	18:23		19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14
25	07:56		08:18 (T-43)	07:20		07:35	06:46	06:13	06:07	06:27	06:58	07:28
	17:46	9 08:27 (T-43)	18:24		19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:44
26	07:55		08:16 (T-43)	07:19		07:33	06:44	06:12	06:08	06:28	06:59	07:29
	17:47	13 08:29 (T-43)	18:25		19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43
27	07:54		08:15 (T-43)	07:17		07:32	06:43	06:12	06:08	06:29	07:00	07:30
	17:49	16 08:31 (T-43)	18:27		19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42
28	07:54		08:14 (T-43)	07:16		07:30	06:42	06:11	06:08	06:30	07:01	07:31
	17:50	18 08:32 (T-43)	18:28		19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40
29	07:53		08:13 (T-43)			07:28	06:40	06:11	06:09	06:31	07:01	07:32
	17:51	20 08:33 (T-43)			20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39
30	07:52		08:12 (T-43)			07:27	06:39	06:10	06:09	06:32	07:02	07:33
	17:52	22 08:34 (T-43)			20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38
31	07:51		08:11 (T-43)			07:25		06:09		06:33	07:03	08:08
	17:54	24 08:35 (T-43)			20:01		21:03		20:58	20:16	18:37	37 09:06 (T-43)
Potential sun hours	298		297		370	398	448	452	459	428	375	345
Total, worst case	122		467								159	435
Sun reduction	0.46		0.51								0.62	0.42
Oper. time red.	0.97		0.97								0.97	0.97
Wind dir. red.	0.60		0.60								0.60	0.60
Total reduction	0.27		0.30								0.36	0.24
Total, real	33		138								57	106

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

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

Project:

Northwest Ohio

Description:

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5/21/2013 8:55 AM / 306

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR226 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:10	06:34	07:04	07:34	07:09	07:44
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:08	06:10	06:35	07:05	07:35	07:10	07:45
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11	07:46
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:55	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:47
	17:23	17:59	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13	07:48
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:49
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:50
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:14	06:40	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:14	20:49	20:02	19:10	17:27	17:10
9	08:04	07:42	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:08	06:27	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:25	06:06	06:16	06:43	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:13	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:57	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:14	20:45	21:11	21:12	20:44	19:54	19:04	17:23	17:10
13	08:03	07:37	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:55
	17:32	18:10	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:12	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:11	20:40	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:48	07:19	07:50	07:27	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:52	07:28	07:58
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:01	07:30	07:47	06:56	06:19	06:06	06:21	06:50	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:54	06:18	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:14	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:12
21	07:59	07:26	07:42	06:51	06:16	06:06	06:24	06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:34	08:00
	17:42	18:21	19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15	17:13
23	07:58	07:23	07:38	06:49	06:14	06:07	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:15	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:22	07:37	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:27	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:01	07:37	08:02
	17:46	18:24	19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:03	20:23	19:30	18:43	17:13	17:16
27	07:55	07:17	07:32	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39	08:03
	17:49	18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:16
28	07:54	07:16	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:31	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:43	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:19
31	07:51		07:25		06:09		06:33	07:03		08:08		08:04
	17:54		20:01		21:03		20:58	20:16		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR227 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	08:10 (T-47)	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:34	07:09
	17:21	17:55	35 08:46 (T-43)	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35
2	08:04	07:49	08:09 (T-47)	07:12	07:22	06:36	06:09	06:10	06:35	07:05	07:35	07:10
	17:21	17:56	38 08:47 (T-43)	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34
3	08:04	07:48	08:08 (T-47)	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11
	17:22	17:57	39 08:47 (T-43)	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33
4	08:04	07:47	08:07 (T-47)	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12
	17:23	17:59	39 08:46 (T-43)	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:32
5	08:04	07:46	08:06 (T-47)	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13
	17:24	18:00	40 08:46 (T-43)	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31
6	08:04	07:45	08:05 (T-47)	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15
	17:25	18:01	41 08:46 (T-43)	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29
7	08:04	07:44	08:04 (T-47)	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16
	17:26	18:02	41 08:45 (T-43)	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28
8	08:04	07:43	08:03 (T-47)	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17
	17:27	18:04	42 08:45 (T-43)	19:37	20:09	20:41	21:08	21:14	20:49	20:02	19:10	17:27
9	08:04	07:41	08:02 (T-47)	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18
	17:28	18:05	39 08:43 (T-43)	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26
10	08:03	07:40	08:02 (T-47)	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19
	17:29	18:06	36 08:42 (T-43)	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25
11	08:03	07:39	08:04 (T-47)	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21
	17:30	18:07	29 08:40 (T-43)	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24
12	08:03	07:38	08:05 (T-47)	07:57	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22
	17:31	18:09	21 08:37 (T-43)	19:41	20:13	20:45	21:10	21:12	20:44	19:54	19:04	17:23
13	08:03	07:37	08:06 (T-47)	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23
	17:32	18:10	9 08:15 (T-47)	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22
14	08:02	07:35		07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24
	17:33	18:11		19:44	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21
15	08:02	07:34		07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25
	17:34	18:12		19:45	20:17	20:48	21:12	21:10	20:40	19:49	18:59	17:20
16	08:01	07:33		07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:27
	17:36	18:13		19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20
17	08:01	07:31		07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:51	07:28
	17:37	18:15		19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19
18	08:00	08:24 (T-43)	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29
	17:38	9 08:33 (T-43)	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18
19	08:00	08:22 (T-43)	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30
	17:39	13 08:35 (T-43)	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17
20	07:59	08:20 (T-43)	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31
	17:40	17 08:37 (T-43)	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17
21	07:59	08:20 (T-43)	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32
	17:41	19 08:39 (T-43)	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16
22	07:58	08:19 (T-43)	07:24	07:40	06:50	06:15	06:06	06:24	06:55	07:25	07:57	07:34
	17:43	21 08:40 (T-43)	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15
23	07:57	08:18 (T-43)	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35
	17:44	23 08:41 (T-43)	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15
24	07:57	08:18 (T-43)	07:22	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36
	17:45	25 08:43 (T-43)	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14
25	07:56	08:18 (T-43)	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:01	07:37
	17:46	26 08:44 (T-43)	18:24	19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:44	17:14
26	07:55	08:17 (T-43)	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38
	17:47	27 08:44 (T-43)	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13
27	07:54	08:17 (T-43)	07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39
	17:49	28 08:45 (T-43)	18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13
28	07:54	08:17 (T-43)	07:16	07:30	06:42	06:11	06:08	06:30	07:00	07:31	08:04	07:40
	17:50	28 08:45 (T-43)	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	2 08:42 (T-47)
29	07:53	08:16 (T-43)		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	08:36 (T-47)
	17:51	30 08:46 (T-43)		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	10 08:46 (T-47)
30	07:52	08:16 (T-43)		07:27	06:39	06:10	06:09	06:32	07:02	07:33	08:06	08:34 (T-47)
	17:52	30 08:46 (T-43)		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	22 09:06 (T-43)
31	07:51	08:11 (T-47)		07:25		06:09		06:33	07:03		08:08	08:33 (T-47)
	17:54	33 08:46 (T-43)		20:01		21:03		20:58	20:16		18:37	31 09:10 (T-43)
Potential sun hours	298	297		370	398	448	452	459	428	375	345	298
Total, worst case	329	449									65	720
Sun reduction	0.46	0.51									0.62	0.42
Oper. time red.	0.97	0.97									0.97	0.97
Wind dir. red.	0.60	0.60									0.60	0.60
Total reduction	0.27	0.30									0.36	0.24
Total, real	88	133									23	175

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

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

Project:

Northwest Ohio

Description:

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5/21/2013 8:55 AM / 308

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EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar**Calculation:** NwOH - Vestas Final Layout - valid 130520**Shadow receptor:** SR228 - Non-Participating**Assumptions for shadow calculations**

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	16:15 (T-38)	07:50	08:10 (T-47)	07:14	07:23	06:38			06:09	
	17:20	15	16:30 (T-38)	17:55	44	08:57 (T-43)	18:29	20:02	20:34	21:03	
2	08:04	16:16 (T-38)	07:49	08:09 (T-47)	07:12	07:22	06:36			06:08	
	17:21	14	16:30 (T-38)	17:56	44	08:57 (T-43)	18:30	20:03	20:35	21:04	
3	08:04	16:17 (T-38)	07:48	08:08 (T-47)	07:11	07:20	06:35			06:08	
	17:22	13	16:30 (T-38)	17:57	44	08:56 (T-43)	18:31	20:04	20:36	21:05	
4	08:04	16:18 (T-38)	07:47	08:07 (T-47)	07:09	07:18	06:34			06:08	
	17:23	11	16:29 (T-38)	17:59	43	08:55 (T-43)	18:32	20:05	20:37	21:06	
5	08:04	08:31 (T-43)	07:46	08:06 (T-47)	07:08	07:17	06:32			06:07	
	17:24	15	16:28 (T-38)	18:00	41	08:54 (T-43)	18:33	20:06	20:38	21:06	
6	08:04	08:30 (T-43)	07:45	08:07 (T-47)	07:06	07:15	06:31			06:07	
	17:25	16	16:27 (T-38)	18:01	38	08:53 (T-43)	18:35	20:07	20:39	21:07	
7	08:04	08:29 (T-43)	07:44	08:07 (T-47)	07:05	07:13	06:30			06:07	
	17:26	14	08:43 (T-43)	18:02	33	08:51 (T-43)	18:36	20:08	20:40	21:08	
8	08:04	08:28 (T-43)	07:43	08:09 (T-47)	08:03	07:12	06:29		06:49 (Alt-07)	06:07	
	17:27	16	08:44 (T-43)	18:04	22	08:47 (T-43)	19:37	20:09	20:41	21:08	
9	08:04	08:27 (T-43)	07:41	08:09 (T-47)	08:01	07:10	06:28		06:48 (Alt-07)	06:06	
	17:28	18	08:45 (T-43)	18:05	14	08:23 (T-47)	19:38	20:10	20:42	21:09	
10	08:03	08:27 (T-43)	07:40	08:11 (T-47)	08:00	07:09	06:27		06:47 (Alt-07)	06:06	
	17:29	19	08:46 (T-43)	18:06	11	08:22 (T-47)	19:39	20:11	20:43	21:09	
11	08:03	08:27 (T-43)	07:39	08:14 (T-47)	07:58	07:07	06:26		06:46 (Alt-07)	06:06	
	17:30	21	08:48 (T-43)	18:07	6	08:20 (T-47)	19:40	20:12	20:44	21:10	
12	08:03	08:26 (T-43)	07:38		07:57	07:05	06:24		06:45 (Alt-07)	06:06	
	17:31	22	08:48 (T-43)	18:09		19:41	20:13	20:45	9	06:54 (Alt-07)	21:10
13	08:03	08:26 (T-43)	07:37		07:55	07:04	06:23		06:44 (Alt-07)	06:06	
	17:32	24	08:50 (T-43)	18:10		19:42	20:15	20:46	10	06:54 (Alt-07)	21:11
14	08:02	08:26 (T-43)	07:35		07:53	07:02	06:22		06:43 (Alt-07)	06:06	
	17:33	25	08:51 (T-43)	18:11		19:44	20:16	20:47	11	06:54 (Alt-07)	21:11
15	08:02	08:25 (T-43)	07:34		07:52	07:01	06:21		06:42 (Alt-07)	06:06	
	17:34	27	08:52 (T-43)	18:12		19:45	20:17	20:48	12	06:54 (Alt-07)	21:12
16	08:01	08:25 (T-43)	07:33		07:50	06:59	06:20		06:41 (Alt-07)	06:06	
	17:36	28	08:53 (T-43)	18:13		19:46	20:18	20:49	13	06:54 (Alt-07)	21:12
17	08:01	08:25 (T-43)	07:31		07:48	06:58	06:20		06:40 (Alt-07)	06:06	
	17:37	29	08:54 (T-43)	18:15		19:47	20:19	20:50	13	06:53 (Alt-07)	21:13
18	08:00	08:25 (T-43)	07:30		07:47	06:56	06:19		06:39 (Alt-07)	06:06	
	17:38	30	08:55 (T-43)	18:16		19:48	20:20	20:51	14	06:53 (Alt-07)	21:13
19	08:00	08:25 (T-43)	07:29		07:45	06:54	06:18		06:39 (Alt-07)	06:06	
	17:39	30	08:55 (T-43)	18:17		19:49	20:21	20:52	13	06:52 (Alt-07)	21:13
20	07:59	08:24 (T-43)	07:27		07:43	06:53	06:17		06:40 (Alt-07)	06:06	
	17:40	31	08:55 (T-43)	18:18		19:50	20:22	20:53	12	06:52 (Alt-07)	21:14
21	07:59	08:25 (T-43)	07:26		07:42	06:52	06:16		06:41 (Alt-07)	06:06	
	17:41	32	08:57 (T-43)	18:19		19:51	20:23	20:54	10	06:51 (Alt-07)	21:14
22	07:58	08:25 (T-43)	07:24		07:40	06:50	06:15		06:42 (Alt-07)	06:06	
	17:43	32	08:57 (T-43)	18:21		19:52	20:24	20:55	7	06:49 (Alt-07)	21:14
23	07:57	08:25 (T-43)	07:23		07:38	06:49	06:14			06:07	
	17:44	32	08:57 (T-43)	18:22		19:53	20:25	20:56		21:14	
24	07:57	08:25 (T-43)	07:22		07:37	06:47	06:14			06:07	
	17:45	33	08:58 (T-43)	18:23		19:54	20:26	20:57		21:15	
25	07:56	08:25 (T-43)	07:20		07:35	06:46	06:13			06:07	
	17:46	33	08:58 (T-43)	18:24		19:55	20:27	20:58		21:15	
26	07:55	08:16 (T-47)	07:19		07:33	06:44	06:12			06:08	
	17:47	34	08:58 (T-43)	18:25		19:56	20:28	20:58		21:15	
27	07:54	08:15 (T-47)	07:17		07:32	06:43	06:12			06:08	
	17:49	37	08:58 (T-43)	18:27		19:58	20:29	20:59		21:15	
28	07:54	08:14 (T-47)	07:16		07:30	06:42	06:11			06:08	
	17:50	39	08:58 (T-43)	18:28		19:59	20:30	21:00		21:15	
29	07:53	08:13 (T-47)			07:28	06:40	06:10			06:09	
	17:51	41	08:58 (T-43)			20:00	20:32	21:01		21:15	
30	07:52	08:12 (T-47)			07:27	06:39	06:10			06:09	
	17:52	42	08:58 (T-43)			20:00	20:33	21:02		21:15	
31	07:51	08:11 (T-47)			07:25		06:09				
	17:54	44	08:58 (T-43)			20:01	21:03				
Potential sun hours	298		297		370	398	448			452	
Total, worst case	817		340				144				
Sun reduction	0.46		0.51				0.68				
Oper. time red.	0.97		0.97				0.97				
Wind dir. red.	0.60		0.60				0.68				
Total reduction	0.27		0.29				0.44				
Total, real	218		100				64				

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR228 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:34	06:56 (Alt-07)	07:04	07:34	07:09	07:40 (T-47)	07:43	08:09 (T-43)		
	21:15	20:57	8 07:04 (Alt-07)	20:14	19:22	17:35	12 07:52 (T-47)	17:11	21 08:30 (T-43)		
2	06:10	06:35	06:56 (Alt-07)	07:05	07:35	17:10	07:38 (T-47)	07:45	08:10 (T-43)		
	21:15	20:56	7 07:03 (Alt-07)	20:12	19:20	17:34	15 07:53 (T-47)	17:11	20 08:30 (T-43)		
3	06:11	06:36	06:57 (Alt-07)	07:06	07:37	17:11	07:37 (T-47)	07:46	08:11 (T-43)		
	21:15	20:54	5 07:02 (Alt-07)	20:11	19:18	17:33	25 08:17 (T-43)	17:11	18 08:29 (T-43)		
4	06:11	06:37	06:58 (Alt-07)	07:07	07:38	17:12	07:37 (T-47)	07:47	08:12 (T-43)		
	21:15	20:53	3 07:01 (Alt-07)	20:09	19:17	17:32	34 08:21 (T-43)	17:10	16 08:28 (T-43)		
5	06:12	06:38	06:59 (Alt-07)	07:08	07:39	17:13	07:37 (T-47)	07:48	08:14 (T-43)		
	21:14	20:52	1 07:00 (Alt-07)	20:07	19:15	17:31	38 08:23 (T-43)	17:10	14 08:28 (T-43)		
6	06:12	06:39		07:09	07:40	17:15	07:36 (T-47)	07:48	08:16 (T-43)		
	21:14	20:51		20:06	19:13	17:29	42 08:24 (T-43)	17:10	15 16:13 (T-38)		
7	06:13	06:40		07:10	07:41	17:16	07:38 (T-47)	07:49	08:18 (T-43)		
	21:14	20:50		20:04	19:12	17:28	43 08:26 (T-43)	17:10	16 16:15 (T-38)		
8	06:14	06:41		07:11	07:42	17:17	07:39 (T-47)	07:50	08:22 (T-43)		
	21:14	20:49		20:02	19:10	17:27	44 08:27 (T-43)	17:10	12 16:17 (T-38)		
9	06:14	06:42		07:12	07:43	17:18	07:40 (T-47)	07:51	16:06 (T-38)		
	21:13	20:47		20:01	19:09	17:26	44 08:28 (T-43)	17:10	13 16:19 (T-38)		
10	06:15	06:43		07:13	07:44	17:19	07:41 (T-47)	07:52	16:06 (T-38)		
	21:13	20:46		19:57	19:07	17:25	44 08:28 (T-43)	17:10	14 16:20 (T-38)		
11	06:16	06:44		07:14	07:45	17:21	07:43 (T-47)	07:53	16:05 (T-38)		
	21:12	20:45		19:56	19:05	17:24	44 08:30 (T-43)	17:10	15 16:20 (T-38)		
12	06:16	06:45		07:15	07:46	17:22	07:44 (T-47)	07:54	16:05 (T-38)		
	21:12	20:44		19:54	19:04	17:23	42 08:30 (T-43)	17:10	16 16:21 (T-38)		
13	06:17	06:46		07:16	07:47	17:23	07:45 (T-47)	07:55	16:05 (T-38)		
	21:12	20:42		19:52	19:02	17:22	41 08:30 (T-43)	17:10	17 16:22 (T-38)		
14	06:18	06:47		07:17	07:48	17:24	07:46 (T-47)	07:55	16:05 (T-38)		
	21:11	20:41		19:51	19:01	17:21	39 08:30 (T-43)	17:11	18 16:23 (T-38)		
15	06:19	06:48		07:18	07:49	17:25	07:48 (T-47)	07:56	16:05 (T-38)		
	21:10	20:40		19:49	18:59	17:20	36 08:31 (T-43)	17:11	18 16:23 (T-38)		
16	06:19	06:49		07:19	07:50	17:27	07:58 (T-43)	07:57	16:05 (T-38)		
	21:10	20:38		19:47	18:58	17:20	33 08:31 (T-43)	17:11	19 16:24 (T-38)		
17	06:20	06:50		07:20	07:51	17:28	07:58 (T-43)	07:57	16:06 (T-38)		
	21:09	20:37		19:46	18:56	17:19	33 08:31 (T-43)	17:11	19 16:25 (T-38)		
18	06:21	06:51		07:21	07:53	17:29	07:59 (T-43)	07:58	16:06 (T-38)		
	21:09	20:35		19:44	18:55	17:18	33 08:32 (T-43)	17:12	19 16:25 (T-38)		
19	06:22	06:52		07:22	07:54	17:30	08:00 (T-43)	07:59	16:06 (T-38)		
	21:08	20:34		19:42	18:53	17:17	32 08:32 (T-43)	17:12	20 16:26 (T-38)		
20	06:23	06:53		07:23	07:55	17:31	08:00 (T-43)	07:59	16:07 (T-38)		
	21:07	20:32		19:40	18:52	17:17	32 08:32 (T-43)	17:13	20 16:27 (T-38)		
21	06:24	06:54 (Alt-07)	06:54	07:24	07:56	17:32	08:00 (T-43)	08:00	16:07 (T-38)		
	21:07	4 06:58 (Alt-07)	20:31	19:39	18:50	17:16	32 08:32 (T-43)	17:13	20 16:27 (T-38)		
22	06:24	06:52 (Alt-07)	06:55	07:25	07:57	17:34	08:00 (T-43)	08:00	16:08 (T-38)		
	21:06	9 07:01 (Alt-07)	20:29	19:37	18:49	17:15	32 08:32 (T-43)	17:14	20 16:28 (T-38)		
23	06:25	06:50 (Alt-07)	06:56	07:26	07:58	17:35	08:02 (T-43)	08:01	16:08 (T-38)		
	21:05	11 07:01 (Alt-07)	20:28	19:35	18:47	17:15	30 08:32 (T-43)	17:14	20 16:28 (T-38)		
24	06:26	06:50 (Alt-07)	06:57	07:27	07:59	17:36	08:02 (T-43)	08:01	16:08 (T-38)		
	21:04	12 07:02 (Alt-07)	20:26	19:34	18:46	17:14	30 08:32 (T-43)	17:15	20 16:28 (T-38)		
25	06:27	06:49 (Alt-07)	06:58	07:28	08:01	17:37	08:03 (T-43)	08:02	16:10 (T-38)		
	21:03	14 07:03 (Alt-07)	20:25	19:32	18:44	17:14	29 08:32 (T-43)	17:15	19 16:29 (T-38)		
26	06:28	06:50 (Alt-07)	06:58	07:29	08:02	17:38	08:03 (T-43)	08:02	16:10 (T-38)		
	21:02	13 07:03 (Alt-07)	20:23	19:30	18:43	17:13	28 08:31 (T-43)	17:16	19 16:29 (T-38)		
27	06:29	06:51 (Alt-07)	06:59	07:30	08:03	17:39	08:04 (T-43)	08:02	16:10 (T-38)		
	21:02	13 07:04 (Alt-07)	20:22	19:29	18:42	17:13	27 08:31 (T-43)	17:16	19 16:29 (T-38)		
28	06:30	06:52 (Alt-07)	07:00	07:31	08:04	17:40	08:06 (T-43)	08:03	16:12 (T-38)		
	21:01	12 07:04 (Alt-07)	20:20	19:27	18:40	17:12	25 08:31 (T-43)	17:17	18 16:30 (T-38)		
29	06:31	06:53 (Alt-07)	07:01	07:32	08:05	17:41	08:07 (T-43)	08:03	16:12 (T-38)		
	21:00	12 07:05 (Alt-07)	20:19	19:25	18:39	17:12	24 08:31 (T-43)	17:18	18 16:30 (T-38)		
30	06:32	06:54 (Alt-07)	07:02	07:33	08:06	17:42	08:08 (T-43)	08:03	16:13 (T-38)		
	20:59	11 07:05 (Alt-07)	20:17	19:23	18:38	17:11	23 08:31 (T-43)	17:19	17 16:30 (T-38)		
31	06:33	06:55 (Alt-07)	07:03		08:08	08:08	08:43 (T-47)		08:03		
	20:58	10 07:05 (Alt-07)	20:16		18:37	7 08:50 (T-47)		17:19	17 16:30 (T-38)		
Potential sun hours	459	428		375	345	298		288			
Total, worst case	121	24			7	986		547			
Sun reduction	0.75	0.74			0.62	0.42		0.38			
Oper. time red.	0.97	0.97			0.97	0.97		0.97			
Wind dir. red.	0.68	0.68			0.60	0.60		0.67			
Total reduction	0.49	0.48			0.36	0.24		0.24			
Total, real	59	12			3	238		133			

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

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

Project:

Northwest Ohio

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR229 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:34	07:09	07:43
	17:21	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:09	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11	07:46
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:47
	17:23	17:59	18:32	20:05	20:37	21:06	21:14	20:53	20:09	19:17	17:32	17:11
5	08:04	07:46	07:08	07:17	06:33	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:48
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:14	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:04	07:41	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:57	07:05	06:25	06:06	06:16	06:45	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:13	20:45	21:10	21:12	20:44	19:54	19:04	17:23	17:10
13	08:03	07:37	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:15	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:55
	17:33	18:11	19:44	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:21	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:27	07:57
	17:36	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:00	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:07	06:25	06:55	07:25	07:57	07:34	08:00
	17:43	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:14
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39	08:02
	17:49	18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:17
28	07:54	07:16	07:30	06:42	06:11	06:08	06:30	07:01	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:11	06:09	06:31	07:02	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:03	07:33	08:06	07:42	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:12	17:19
31	07:51		07:25		06:09		06:33	07:04		08:07		08:03
	17:54		20:01		21:02		20:58	20:16		18:37		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR230 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:34	07:04	07:34	07:09	07:44
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:08	06:10	06:35	07:05	07:35	07:10	07:45
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11	07:46
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:55	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:36	07:07	07:38	07:12	07:47
	17:23	17:58	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:37	07:08	07:39	07:14	07:48
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:40	07:15	07:49
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:50
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:13	06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21:14	20:49	20:02	19:10	17:27	17:10
9	08:04	07:42	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:08	06:27	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:10	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:25	06:06	06:16	06:43	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:13	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:57	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:14	20:45	21:11	21:12	20:44	19:54	19:04	17:23	17:10
13	08:03	07:37	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:55
	17:32	18:10	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:12	21:11	20:41	19:51	19:01	17:21	17:10
15	08:02	07:34	07:52	07:01	06:21	06:06	06:18	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:11	20:40	19:49	18:59	17:20	17:11
16	08:02	07:33	07:50	06:59	06:20	06:06	06:19	06:48	07:19	07:50	07:27	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:52	07:28	07:58
	17:36	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:01	07:30	07:47	06:56	06:18	06:06	06:21	06:50	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:29	07:45	06:54	06:18	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:14	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:16	17:12
21	07:59	07:26	07:42	06:51	06:16	06:06	06:23	06:53	07:24	07:56	07:33	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:34	08:00
	17:42	18:21	19:52	20:24	20:55	21:14	21:06	20:30	19:37	18:49	17:15	17:13
23	07:58	07:23	07:38	06:48	06:14	06:07	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:15	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:22	07:37	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:27	19:34	18:46	17:14	17:14
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:01	07:37	08:02
	17:46	18:24	19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:44	17:13	17:15
26	07:55	07:19	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:59	21:15	21:03	20:23	19:30	18:43	17:13	17:16
27	07:55	07:17	07:32	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39	08:03
	17:48	18:26	19:58	20:29	20:59	21:15	21:02	20:22	19:28	18:42	17:12	17:16
28	07:54	07:16	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:31	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:43	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:18
31	07:51		07:25		06:09		06:33	07:03		08:08		08:04
	17:53		20:01		21:03		20:58	20:16		18:36		17:19
Potential sun hours	298	297	370	399	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR231 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	08:26 (T-47)	07:50	07:14	07:23	06:38				06:09	06:30 (Alt-07)
	17:20	48 09:58 (T-43)	17:55	18:29	20:02	20:34				21:03	13 06:43 (Alt-07)
2	08:04	08:26 (T-47)	07:49	07:12	07:22	06:36				06:08	06:30 (Alt-07)
	17:21	48 09:58 (T-43)	17:56	18:30	20:03	20:35				21:04	13 06:43 (Alt-07)
3	08:04	08:26 (T-47)	07:48	07:11	07:20	06:35				06:08	06:30 (Alt-07)
	17:22	48 09:58 (T-43)	17:57	18:31	20:04	20:36				21:05	14 06:44 (Alt-07)
4	08:04	08:26 (T-47)	07:47	07:09	07:18	06:34				06:08	06:29 (Alt-07)
	17:23	47 09:58 (T-43)	17:59	18:32	20:05	20:37				21:06	15 06:44 (Alt-07)
5	08:04	08:26 (T-47)	07:46	07:08	07:17	06:32				06:07	06:29 (Alt-07)
	17:24	45 09:57 (T-43)	18:00	18:33	20:06	20:38				21:06	15 06:44 (Alt-07)
6	08:04	08:26 (T-47)	07:45	07:06	07:15	06:31				06:07	06:29 (Alt-07)
	17:25	45 09:57 (T-43)	18:01	18:35	20:07	20:39				21:07	16 06:45 (Alt-07)
7	08:04	08:26 (T-47)	07:44	07:05	07:13	06:30				06:07	06:29 (Alt-07)
	17:26	44 17:00 (T-38)	18:02	18:36	20:08	20:40				21:08	16 06:45 (Alt-07)
8	08:04	08:26 (T-47)	07:43	08:03	07:12	06:29				06:06	06:28 (Alt-07)
	17:27	46 17:01 (T-38)	18:04	19:37	20:09	20:41				21:08	17 06:45 (Alt-07)
9	08:04	08:25 (T-47)	07:41	08:01	07:10	06:28				06:06	06:28 (Alt-07)
	17:28	46 17:02 (T-38)	18:05	19:38	20:10	20:42				21:09	17 06:45 (Alt-07)
10	08:03	08:25 (T-47)	07:40	08:00	07:09	06:27				06:06	06:28 (Alt-07)
	17:29	44 17:03 (T-38)	18:06	19:39	20:11	20:43				21:09	18 06:46 (Alt-07)
11	08:03	08:25 (T-47)	07:39	07:58	07:07	06:26				06:06	06:28 (Alt-07)
	17:30	38 17:04 (T-38)	18:07	19:40	20:12	20:44				21:10	18 06:46 (Alt-07)
12	08:03	08:25 (T-47)	07:38	07:56	07:05	06:24				06:06	06:28 (Alt-07)
	17:31	36 17:05 (T-38)	18:09	19:41	20:13	20:45				21:10	18 06:46 (Alt-07)
13	08:03	08:25 (T-47)	07:37	07:55	07:04	06:23				06:06	06:28 (Alt-07)
	17:32	37 17:06 (T-38)	18:10	19:42	20:15	20:46				21:11	18 06:46 (Alt-07)
14	08:02	08:26 (T-47)	07:35	07:53	07:02	06:22				06:06	06:28 (Alt-07)
	17:33	38 17:08 (T-38)	18:11	19:43	20:16	20:47				21:11	19 06:47 (Alt-07)
15	08:02	08:26 (T-47)	07:34	07:52	07:01	06:21				06:06	06:28 (Alt-07)
	17:34	40 17:09 (T-38)	18:12	19:45	20:17	20:48				21:12	19 06:47 (Alt-07)
16	08:01	08:27 (T-47)	07:33	07:50	06:59	06:20				06:06	06:28 (Alt-07)
	17:35	41 17:10 (T-38)	18:13	19:46	20:18	20:49				21:12	19 06:47 (Alt-07)
17	08:01	08:26 (T-47)	07:31	07:48	06:58	06:19				06:06	06:28 (Alt-07)
	17:37	43 17:11 (T-38)	18:15	19:47	20:19	20:50				21:13	19 06:47 (Alt-07)
18	08:00	08:27 (T-47)	07:30	07:47	06:56	06:19				06:06	06:28 (Alt-07)
	17:38	44 17:13 (T-38)	18:16	19:48	20:20	20:51				21:13	19 06:47 (Alt-07)
19	08:00	08:27 (T-47)	07:29	07:45	06:54	06:18				06:06	06:28 (Alt-07)
	17:39	45 17:14 (T-38)	18:17	19:49	20:21	20:52				21:13	19 06:47 (Alt-07)
20	07:59	08:28 (T-47)	07:27	07:43	06:53	06:17				06:06	06:28 (Alt-07)
	17:40	44 17:14 (T-38)	18:18	19:50	20:22	20:53				21:14	19 06:47 (Alt-07)
21	07:59	08:29 (T-47)	07:26	07:42	06:52	06:16				06:06	06:29 (Alt-07)
	17:41	45 17:16 (T-38)	18:19	19:51	20:23	20:54				21:14	19 06:48 (Alt-07)
22	07:58	08:29 (T-47)	07:24	07:40	06:50	06:15				06:06	06:29 (Alt-07)
	17:43	45 17:17 (T-38)	18:21	19:52	20:24	20:55				21:14	19 06:48 (Alt-07)
23	07:57	08:30 (T-47)	07:23	07:38	06:49	06:14				06:07	06:29 (Alt-07)
	17:44	44 17:17 (T-38)	18:22	19:53	20:25	20:56				21:14	19 06:48 (Alt-07)
24	07:57	08:31 (T-47)	07:21	07:37	06:47	06:14				06:07	06:29 (Alt-07)
	17:45	42 17:18 (T-38)	18:23	19:54	20:26	20:57				21:15	19 06:48 (Alt-07)
25	07:56	08:32 (T-47)	07:20	07:35	06:46	06:13	06:34 (Alt-07)			06:07	06:30 (Alt-07)
	17:46	41 17:18 (T-38)	18:24	19:55	20:27	20:57	3 06:37 (Alt-07)			21:15	19 06:49 (Alt-07)
26	07:55	08:33 (T-47)	07:19	07:33	06:44	06:12	06:34 (Alt-07)			06:08	06:30 (Alt-07)
	17:47	37 17:17 (T-38)	18:25	19:56	20:28	20:58	5 06:39 (Alt-07)			21:15	19 06:49 (Alt-07)
27	07:54	08:35 (T-47)	07:17	07:32	06:43	06:12	06:33 (Alt-07)			06:08	06:30 (Alt-07)
	17:49	33 17:17 (T-38)	18:27	19:58	20:29	20:59	7 06:40 (Alt-07)			21:15	19 06:49 (Alt-07)
28	07:54	08:36 (T-47)	07:16	07:30	06:42	06:11	06:32 (Alt-07)			06:08	06:31 (Alt-07)
	17:50	29 17:16 (T-38)	18:28	19:59	20:30	21:00	8 06:40 (Alt-07)			21:15	19 06:50 (Alt-07)
29	07:53	08:39 (T-47)		07:28	06:40	06:10	06:32 (Alt-07)			06:09	06:31 (Alt-07)
	17:51	20 17:15 (T-38)		20:00	20:31	21:01	10 06:42 (Alt-07)			21:15	19 06:50 (Alt-07)
30	07:52	17:04 (T-38)		07:27	06:39	06:10	06:31 (Alt-07)			06:09	06:32 (Alt-07)
	17:52	9 17:13 (T-38)		20:00	20:33	21:02	11 06:42 (Alt-07)			21:15	18 06:50 (Alt-07)
31	07:51	17:08 (T-38)		07:25		06:09	06:31 (Alt-07)				
	17:54	2 17:10 (T-38)		20:01		21:03	12 06:43 (Alt-07)				
Potential sun hours	298		297		370	398	448			452	
Total, worst case	1214					56				530	
Sun reduction	0.46					0.68				0.74	
Oper. time red.	0.97					0.97				0.97	
Wind dir. red.	0.62					0.69				0.69	
Total reduction	0.27					0.45				0.49	
Total, real	327					25				257	

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR231 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:32 (Alt-07)	06:34	07:04	07:34	07:09				07:43	08:07 (T-47)
	21:15	18 06:50 (Alt-07)	20:57	20:14	19:22	17:35				17:11	38 16:46 (T-38)
2	06:10	06:33 (Alt-07)	06:35	07:05	07:35	07:10				07:45	08:08 (T-47)
	21:15	18 06:51 (Alt-07)	20:56	20:12	19:20	17:34				17:11	44 16:46 (T-38)
3	06:11	06:33 (Alt-07)	06:36	07:06	07:37	07:11				07:46	08:09 (T-47)
	21:15	17 06:50 (Alt-07)	20:54	20:11	19:18	17:33				17:11	45 16:46 (T-38)
4	06:11	06:34 (Alt-07)	06:37	07:07	07:38	07:12				07:47	08:10 (T-47)
	21:14	17 06:51 (Alt-07)	20:53	20:09	19:17	17:32				17:10	46 16:45 (T-38)
5	06:12	06:34 (Alt-07)	06:38	07:08	07:39	07:13				07:48	08:11 (T-47)
	21:14	17 06:51 (Alt-07)	20:52	20:07	19:15	17:30				17:10	44 16:45 (T-38)
6	06:12	06:35 (Alt-07)	06:39	07:09	07:40	07:15				07:48	08:12 (T-47)
	21:14	16 06:51 (Alt-07)	20:51	20:06	19:13	17:29				17:10	45 09:43 (T-43)
7	06:13	06:35 (Alt-07)	06:40	07:10	07:41	07:16				07:49	08:13 (T-47)
	21:14	16 06:51 (Alt-07)	20:50	20:04	19:12	17:28				17:10	45 09:44 (T-43)
8	06:14	06:36 (Alt-07)	06:41	07:11	07:42	07:17				07:50	08:14 (T-47)
	21:14	15 06:51 (Alt-07)	20:49	20:02	19:10	17:27				17:10	48 09:46 (T-43)
9	06:14	06:37 (Alt-07)	06:42	07:12	07:43	07:18				07:51	08:15 (T-47)
	21:13	14 06:51 (Alt-07)	20:47	20:01	19:09	17:26				17:10	48 09:47 (T-43)
10	06:15	06:37 (Alt-07)	06:43	07:13	07:44	07:19				07:52	08:16 (T-47)
	21:13	14 06:51 (Alt-07)	20:46	19:57	19:07	17:25				17:10	48 09:48 (T-43)
11	06:16	06:38 (Alt-07)	06:44	07:14	07:45	07:21	16:39 (T-38)			07:53	08:16 (T-47)
	21:12	13 06:51 (Alt-07)	20:45	19:56	19:05	17:24	3 16:42 (T-38)			17:10	48 09:48 (T-43)
12	06:16	06:39 (Alt-07)	06:45	07:15	07:46	07:22	16:35 (T-38)			07:54	08:17 (T-47)
	21:12	12 06:51 (Alt-07)	20:44	19:54	19:04	17:23	11 16:46 (T-38)			17:10	48 09:49 (T-43)
13	06:17	06:39 (Alt-07)	06:46	07:16	07:47	07:23	08:11 (T-47)			07:55	08:18 (T-47)
	21:12	11 06:50 (Alt-07)	20:42	19:52	19:02	17:22	20 16:47 (T-38)			17:10	48 09:50 (T-43)
14	06:18	06:40 (Alt-07)	06:47	07:17	07:48	07:24	08:08 (T-47)			07:55	08:19 (T-47)
	21:11	10 06:50 (Alt-07)	20:41	19:51	19:01	17:21	29 16:48 (T-38)			17:11	48 09:51 (T-43)
15	06:19	06:41 (Alt-07)	06:47	07:18	07:49	07:25	08:07 (T-47)			07:56	08:19 (T-47)
	21:10	9 06:50 (Alt-07)	20:40	19:49	18:59	17:20	34 16:50 (T-38)			17:11	48 09:51 (T-43)
16	06:19	06:42 (Alt-07)	06:48	07:19	07:50	07:27	08:06 (T-47)			07:57	08:20 (T-47)
	21:10	8 06:50 (Alt-07)	20:38	19:47	18:58	17:20	37 16:50 (T-38)			17:11	48 09:52 (T-43)
17	06:20	06:43 (Alt-07)	06:49	07:20	07:51	07:28	08:05 (T-47)			07:57	08:21 (T-47)
	21:09	6 06:49 (Alt-07)	20:37	19:46	18:56	17:19	41 16:51 (T-38)			17:11	48 09:53 (T-43)
18	06:21	06:43 (Alt-07)	06:50	07:21	07:53	07:29	08:05 (T-47)			07:58	08:21 (T-47)
	21:09	4 06:47 (Alt-07)	20:35	19:44	18:55	17:18	42 16:52 (T-38)			17:12	48 09:53 (T-43)
19	06:22	06:44 (Alt-07)	06:51	07:22	07:54	07:30	08:05 (T-47)			07:59	08:22 (T-47)
	21:08	2 06:46 (Alt-07)	20:34	19:42	18:53	17:17	44 16:52 (T-38)			17:12	48 09:54 (T-43)
20	06:23		06:52	07:23	07:55	07:31	08:04 (T-47)			07:59	08:23 (T-47)
	21:07		20:32	19:40	18:52	17:17	45 16:52 (T-38)			17:13	48 09:55 (T-43)
21	06:24		06:53	07:24	07:56	07:32	08:04 (T-47)			08:00	08:23 (T-47)
	21:07		20:31	19:39	18:50	17:16	45 16:51 (T-38)			17:13	48 09:55 (T-43)
22	06:24		06:54	07:25	07:57	07:34	08:04 (T-47)			08:00	08:23 (T-47)
	21:06		20:29	19:37	18:49	17:15	44 16:50 (T-38)			17:14	48 09:55 (T-43)
23	06:25		06:55	07:26	07:58	07:35	08:04 (T-47)			08:01	08:24 (T-47)
	21:05		20:28	19:35	18:47	17:15	45 16:51 (T-38)			17:14	48 09:56 (T-43)
24	06:26		06:56	07:27	07:59	07:36	08:04 (T-47)			08:01	08:24 (T-47)
	21:04		20:26	19:34	18:46	17:14	44 16:50 (T-38)			17:15	48 09:56 (T-43)
25	06:27		06:57	07:28	08:01	07:37	08:04 (T-47)			08:02	08:25 (T-47)
	21:03		20:25	19:32	18:44	17:14	43 16:49 (T-38)			17:15	47 09:57 (T-43)
26	06:28		06:58	07:29	08:02	07:38	08:05 (T-47)			08:02	08:25 (T-47)
	21:02		20:23	19:30	18:43	17:13	41 16:48 (T-38)			17:16	48 09:57 (T-43)
27	06:29		06:59	07:30	08:03	07:39	08:05 (T-47)			08:02	08:25 (T-47)
	21:02		20:22	19:29	18:42	17:13	40 16:48 (T-38)			17:16	48 09:57 (T-43)
28	06:30		07:00	07:31	08:04	07:40	08:05 (T-47)			08:03	08:26 (T-47)
	21:01		20:20	19:27	18:40	17:12	38 16:47 (T-38)			17:17	48 09:58 (T-43)
29	06:31		07:01	07:32	08:05	07:41	08:06 (T-47)			08:03	08:26 (T-47)
	21:00		20:19	19:25	18:39	17:12	37 16:47 (T-38)			17:18	48 09:58 (T-43)
30	06:32		07:02	07:33	08:06	07:42	08:07 (T-47)			08:03	08:26 (T-47)
	20:59		20:17	19:23	18:38	17:11	36 16:47 (T-38)			17:19	48 09:58 (T-43)
31	06:33		07:03		08:07					08:03	08:26 (T-47)
	20:58		20:16		18:36					17:19	48 09:58 (T-43)
Potential sun hours	459		428	375	345	298				288	
Total, worst case		237				719				1458	
Sun reduction		0.75				0.42				0.38	
Oper. time red.		0.97				0.97				0.97	
Wind dir. red.		0.69				0.64				0.58	
Total reduction		0.49				0.25				0.21	
Total, real		117				183				307	

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

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

Project:

Northwest Ohio

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR232 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:34	07:09	07:43
	17:21	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:09	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:37	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:46
	17:23	17:59	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:11
5	08:04	07:46	07:08	07:17	06:33	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:48
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:25	06:06	06:16	06:45	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:13	20:45	21:10	21:12	20:44	19:54	19:04	17:23	17:10
13	08:02	07:37	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:15	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:26	07:57
	17:36	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:00	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:07	06:24	06:55	07:25	07:57	07:34	08:00
	17:43	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:14
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:32	06:43	06:12	06:08	06:29	07:00	07:30	08:03	07:39	08:02
	17:49	18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:17
28	07:54	07:15	07:30	06:42	06:11	06:08	06:30	07:01	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:11	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:12	17:19
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:54		20:01		21:02		20:58	20:16		18:37		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR233 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	08:26 (Alt-07)	07:50	07:14		07:23	18:59 (T-42)	06:38	06:09		
	17:20	41	10:26 (T-45)	17:55	18:29		20:02	34	19:33 (T-42)	20:34	21:03
2	08:04	08:26 (Alt-07)	07:49	07:12		07:22	18:58 (T-42)	06:36	06:08		
	17:21	39	10:26 (T-45)	17:56	18:30		20:03	35	19:33 (T-42)	20:35	21:04
3	08:04	08:27 (Alt-07)	07:48	07:11		07:20	18:57 (T-42)	06:35	06:08		
	17:22	36	10:25 (T-45)	17:57	18:31		20:04	38	19:35 (T-42)	20:36	21:05
4	08:04	08:27 (Alt-07)	07:47	07:09		07:18	18:55 (T-42)	06:34	06:08		
	17:23	32	10:23 (T-45)	17:59	18:32		20:05	40	19:35 (T-42)	20:37	21:06
5	08:04	08:28 (Alt-07)	07:46	07:08		07:17	18:55 (T-42)	06:32	06:07		
	17:24	25	10:21 (T-45)	18:00	18:33		20:06	41	19:36 (T-42)	20:38	21:06
6	08:04	08:28 (Alt-07)	07:45	07:06		07:15	18:54 (T-42)	06:31	06:07		
	17:25	20	08:48 (Alt-07)	18:01	18:35		20:07	42	19:36 (T-42)	20:39	21:07
7	08:04	08:29 (Alt-07)	07:44	07:05		07:13	18:53 (T-42)	06:30	06:07		
	17:26	19	08:48 (Alt-07)	18:02	18:36		20:08	43	19:36 (T-42)	20:40	21:08
8	08:04	08:30 (Alt-07)	07:43	08:03		07:12	18:53 (T-42)	06:29	06:06		
	17:27	18	08:48 (Alt-07)	18:04	19:37		20:09	43	19:36 (T-42)	20:41	21:08
9	08:04	08:30 (Alt-07)	07:41	08:01		07:10	18:52 (T-42)	06:28	06:06		
	17:28	18	08:48 (Alt-07)	18:05	19:38		20:10	44	19:36 (T-42)	20:42	21:09
10	08:03	08:31 (Alt-07)	07:40	08:00		07:08	18:51 (T-42)	06:27	06:06		
	17:29	17	08:48 (Alt-07)	18:06	19:39		20:11	44	19:35 (T-42)	20:43	21:09
11	08:03	08:32 (Alt-07)	07:39	07:58		07:07	18:52 (T-42)	06:26	06:06		
	17:30	16	08:48 (Alt-07)	18:07	19:40		20:12	43	19:35 (T-42)	20:44	21:10
12	08:03	08:33 (Alt-07)	07:38	07:56		07:05	18:51 (T-42)	06:24	06:06		
	17:31	14	08:47 (Alt-07)	18:08	19:41		20:13	44	19:35 (T-42)	20:45	21:11
13	08:03	08:34 (Alt-07)	07:37	07:55		07:04	18:51 (T-42)	06:23	06:06		
	17:32	13	08:47 (Alt-07)	18:10	19:42		20:15	44	19:35 (T-42)	20:46	21:11
14	08:02	08:36 (Alt-07)	07:35	07:53		07:02	18:51 (T-42)	06:22	06:06		
	17:33	11	08:47 (Alt-07)	18:11	19:43		20:16	43	19:34 (T-42)	20:47	21:11
15	08:02	08:37 (Alt-07)	07:34	07:52		07:01	18:52 (T-42)	06:21	06:06		
	17:34	9	08:46 (Alt-07)	18:12	19:45		20:17	42	19:34 (T-42)	20:48	21:12
16	08:01	08:41 (Alt-07)	07:33	07:50		06:59	18:52 (T-42)	06:20	06:06		
	17:35	3	08:44 (Alt-07)	18:13	19:46		20:18	40	19:32 (T-42)	20:49	21:12
17	08:01		07:31	07:48		06:58	18:53 (T-42)	06:19	06:06		
	17:37		18:15	19:47		20:19	19:32 (T-42)	20:50	21:13		
18	08:00		07:30	07:47		06:56	18:53 (T-42)	06:19	06:06		
	17:38		18:16	19:48		20:20	19:31 (T-42)	20:51	21:13		
19	08:00		07:29	07:45		06:54	18:54 (T-42)	06:18	06:06		
	17:39		18:17	19:49		20:21	19:30 (T-42)	20:52	21:13		
20	07:59		07:27	07:43		06:53	18:54 (T-42)	06:17	06:06		
	17:40		18:18	19:50		20:22	19:28 (T-42)	20:53	21:14		
21	07:59		07:26	07:42		06:51	18:56 (T-42)	06:16	06:06		
	17:41		18:19	19:51		20:23	19:27 (T-42)	20:54	21:14		
22	07:58		07:24	07:40		06:50	18:56 (T-42)	06:15	06:06		
	17:42		18:21	19:52		20:24	19:25 (T-42)	20:55	21:14		
23	07:57		07:23	07:38		06:49	18:58 (T-42)	06:14	06:07		
	17:44		18:22	19:53		20:25	19:24 (T-42)	20:56	21:14		
24	07:57		07:22	07:37		06:47	18:59 (T-42)	06:14	06:07		
	17:45		18:23	19:54		20:26	19:21 (T-42)	20:57	21:15		
25	07:56		07:20	07:35		06:46	19:02 (T-42)	06:13	06:07		
	17:46		18:24	19:55		20:27	19:19 (T-42)	20:58	21:15		
26	07:55		07:19	07:33		06:44	19:07 (T-42)	06:12	06:08		
	17:47		18:25	19:56		20:28	19:14 (T-42)	20:58	21:15		
27	07:55		07:17	07:32		06:43		06:12	06:08		
	17:49		18:27	19:58		20:29		20:59	21:15		
28	07:54		07:16	07:30	19:10 (T-42)	06:42		06:11	06:08		
	17:50		18:28	19:59	15	19:25 (T-42)	20:30	21:00	21:15		
29	07:53			07:28	19:06 (T-42)	06:40		06:10	06:09		
	17:51			20:00	22	19:28 (T-42)	20:32	21:01	21:15		
30	07:52			07:27	19:03 (T-42)	06:39		06:10	06:09		
	17:52			20:00	27	19:30 (T-42)	20:33	21:02	21:15		
31	07:51			07:25	19:02 (T-42)			06:09			
	17:54			20:01	30	19:32 (T-42)		21:03			
Potential sun hours	298		297	370		398		448	452		
Total, worst case	331			94		939					
Sun reduction	0.46			0.55		0.60					
Oper. time red.	0.97			0.97		0.97					
Wind dir. red.	0.59			0.64		0.64					
Total reduction	0.26			0.34		0.37					
Total, real	86			32		347					

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

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

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
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wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR233 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:34		07:04	18:50 (T-42)	07:34	07:09			07:44	08:14 (Alt-07)
	21:15	20:57		20:14	44 19:34 (T-42)	19:22	17:35			17:11	16 08:30 (Alt-07)
2	06:10	06:35		07:05	18:50 (T-42)	07:35	07:10			07:45	08:14 (Alt-07)
	21:15	20:56		20:12	44 19:34 (T-42)	19:20	17:34			17:11	17 08:31 (Alt-07)
3	06:11	06:36		07:06	18:50 (T-42)	07:37	07:11			07:46	08:14 (Alt-07)
	21:15	20:54		20:11	44 19:34 (T-42)	19:18	17:33			17:11	18 08:32 (Alt-07)
4	06:11	06:37		07:07	18:50 (T-42)	07:38	07:12			07:47	08:14 (Alt-07)
	21:15	20:53		20:09	43 19:33 (T-42)	19:17	17:32			17:10	19 08:33 (Alt-07)
5	06:12	06:38		07:08	18:50 (T-42)	07:39	07:13			07:48	08:14 (Alt-07)
	21:14	20:52		20:07	43 19:33 (T-42)	19:15	17:30			17:10	19 08:33 (Alt-07)
6	06:12	06:39		07:09	18:50 (T-42)	07:40	07:15			07:48	08:15 (Alt-07)
	21:14	20:51		20:06	42 19:32 (T-42)	19:13	17:29			17:10	19 08:34 (Alt-07)
7	06:13	06:40		07:10	18:50 (T-42)	07:41	07:16			07:49	08:15 (Alt-07)
	21:14	20:50		20:04	41 19:31 (T-42)	19:12	17:28			17:10	24 10:07 (T-45)
8	06:14	06:41		07:11	18:50 (T-42)	07:42	07:17			07:50	08:15 (Alt-07)
	21:14	20:49		20:02	40 19:30 (T-42)	19:10	17:27			17:10	32 10:11 (T-45)
9	06:14	06:41		07:12	18:51 (T-42)	07:43	07:18			07:51	08:16 (Alt-07)
	21:13	20:47		20:01	38 19:29 (T-42)	19:09	17:26			17:10	36 10:14 (T-45)
10	06:15	06:42		07:13	18:52 (T-42)	07:44	07:19			07:52	08:16 (Alt-07)
	21:13	20:46		19:57	35 19:27 (T-42)	19:07	17:25			17:10	39 10:16 (T-45)
11	06:16	06:43		07:14	18:51 (T-42)	07:45	07:21			07:53	08:16 (Alt-07)
	21:12	20:45		19:56	34 19:25 (T-42)	19:05	17:24			17:10	40 10:16 (T-45)
12	06:16	06:44		07:15	18:53 (T-42)	07:46	07:22			07:54	08:17 (Alt-07)
	21:12	20:44		19:54	30 19:23 (T-42)	19:04	17:23			17:10	43 10:18 (T-45)
13	06:17	06:45		07:16	18:54 (T-42)	07:47	07:23			07:55	08:18 (Alt-07)
	21:12	20:42		19:52	27 19:21 (T-42)	19:02	17:22			17:10	43 10:19 (T-45)
14	06:18	06:46		07:17	18:56 (T-42)	07:48	07:24			07:55	08:19 (Alt-07)
	21:11	20:41		19:51	22 19:18 (T-42)	19:01	17:21			17:11	45 10:21 (T-45)
15	06:19	06:47		07:18	18:59 (T-42)	07:49	07:25			07:56	08:19 (Alt-07)
	21:10	20:40		19:49	16 19:15 (T-42)	18:59	17:20			17:11	45 10:21 (T-45)
16	06:19	06:48		07:19	19:06 (T-42)	07:50	07:27			07:57	08:20 (Alt-07)
	21:10	20:38		19:47	1 19:07 (T-42)	18:58	17:20			17:11	46 10:22 (T-45)
17	06:20	06:49		19:12 (T-42)	07:20	07:51	07:28			07:57	08:21 (Alt-07)
	21:09	20:37	10	19:22 (T-42)	19:46	18:56	17:19			17:11	46 10:23 (T-45)
18	06:21	06:50		19:08 (T-42)	07:21	07:53	07:29			07:58	08:21 (Alt-07)
	21:09	20:35	18	19:26 (T-42)	19:44	18:55	17:18			17:12	47 10:24 (T-45)
19	06:22	06:51		19:06 (T-42)	07:22	07:54	07:30			07:59	08:22 (Alt-07)
	21:08	20:34	22	19:28 (T-42)	19:42	18:53	17:17			17:12	47 10:25 (T-45)
20	06:23	06:52		19:04 (T-42)	07:23	07:55	07:31			07:59	08:23 (Alt-07)
	21:07	20:32	26	19:30 (T-42)	19:40	18:52	17:17			17:13	48 10:26 (T-45)
21	06:24	06:53		19:01 (T-42)	07:24	07:56	07:32			08:00	08:23 (Alt-07)
	21:07	20:31	29	19:30 (T-42)	19:39	18:50	17:16			17:13	48 10:26 (T-45)
22	06:24	06:54		18:59 (T-42)	07:25	07:57	07:34			08:00	08:24 (Alt-07)
	21:06	20:29	32	19:31 (T-42)	19:37	18:49	17:15			17:13	48 10:27 (T-45)
23	06:25	06:55		18:58 (T-42)	07:26	07:58	07:35			08:01	08:24 (Alt-07)
	21:05	20:28	34	19:32 (T-42)	19:35	18:47	17:15			17:14	48 10:27 (T-45)
24	06:26	06:56		18:57 (T-42)	07:27	07:59	07:36			08:01	08:24 (Alt-07)
	21:04	20:26	36	19:33 (T-42)	19:34	18:46	17:14			17:15	47 10:27 (T-45)
25	06:27	06:57		18:55 (T-42)	07:28	08:01	07:37			08:02	08:25 (Alt-07)
	21:03	20:25	39	19:34 (T-42)	19:32	18:44	17:14			17:15	47 10:28 (T-45)
26	06:28	06:58		18:54 (T-42)	07:29	08:02	07:38		08:19 (Alt-07)	08:02	08:25 (Alt-07)
	21:03	20:23	40	19:34 (T-42)	19:30	18:43	17:13	2	08:21 (Alt-07)	17:16	46 10:27 (T-45)
27	06:29	06:59		18:54 (T-42)	07:30	08:03	07:39		08:16 (Alt-07)	08:02	08:25 (Alt-07)
	21:02	20:22	40	19:34 (T-42)	19:29	18:42	17:13	8	08:24 (Alt-07)	17:16	45 10:27 (T-45)
28	06:30	07:00		18:53 (T-42)	07:31	08:04	07:40		08:16 (Alt-07)	08:03	08:26 (Alt-07)
	21:01	20:20	42	19:35 (T-42)	19:27	18:40	17:12	11	08:27 (Alt-07)	17:17	46 10:28 (T-45)
29	06:31	07:01		18:52 (T-42)	07:32	08:05	07:41		08:15 (Alt-07)	08:03	08:26 (Alt-07)
	21:00	20:19	43	19:35 (T-42)	19:25	18:39	17:12	13	08:28 (Alt-07)	17:18	45 10:28 (T-45)
30	06:32	07:02		18:51 (T-42)	07:33	08:06	07:42		08:15 (Alt-07)	08:03	08:26 (Alt-07)
	20:59	20:17	44	19:35 (T-42)	19:23	18:38	17:11	14	08:29 (Alt-07)	17:19	43 10:27 (T-45)
31	06:33	07:03		18:51 (T-42)		08:08				08:03	08:26 (Alt-07)
	20:58	20:16	44	19:35 (T-42)		18:36				17:19	43 10:27 (T-45)
Potential sun hours	459	428		375		345	298			288	
Total, worst case		499		544			48			1195	
Sun reduction		0.74		0.68			0.42			0.38	
Oper. time red.		0.97		0.97			0.97			0.97	
Wind dir. red.		0.64		0.64			0.59			0.59	
Total reduction		0.46		0.42			0.24			0.21	
Total, real		228		228			11			256	

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR234 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June
1	08:04	07:50	07:14	07:23	06:38	06:09
	17:21	17:55	18:29	20:02	20:34	21:03
2	08:04	07:49	07:12	07:22	06:36	06:09
	17:21	17:56	18:30	20:03	20:35	21:04
3	08:04	07:48	07:11	07:20	06:35	06:08
	17:22	17:57	18:31	20:04	20:36	21:05
4	08:04	07:47	07:09	07:18	19:31 (T-41)	06:34
	17:23	17:59	18:32	20:05	19:43 (T-41)	20:37
5	08:04	07:46	07:08	07:17	19:28 (T-41)	06:32
	17:24	18:00	18:33	20:06	19:46 (T-41)	20:38
6	08:04	07:45	07:06	07:15	19:26 (T-41)	06:31
	17:25	18:01	18:35	20:07	19:47 (T-41)	20:39
7	08:04	07:44	07:05	07:13	19:24 (T-41)	06:30
	17:26	18:02	18:36	20:08	19:47 (T-41)	20:40
8	08:04	07:43	08:03	07:12	19:23 (T-41)	06:29
	17:27	18:04	19:37	20:09	19:49 (T-41)	20:41
9	08:03	07:41	08:01	07:10	19:22 (T-41)	06:28
	17:28	18:05	19:38	20:10	19:49 (T-41)	20:42
10	08:03	07:40	08:00	07:09	19:21 (T-41)	06:27
	17:29	18:06	19:39	20:11	19:49 (T-41)	20:43
11	08:03	07:39	07:58	07:07	19:21 (T-41)	06:26
	17:30	18:07	19:40	20:12	19:49 (T-41)	20:44
12	08:03	07:38	07:56	07:05	19:20 (T-41)	06:24
	17:31	18:09	19:41	20:13	19:49 (T-41)	20:45
13	08:03	07:37	07:55	07:04	19:20 (T-41)	06:23
	17:32	18:10	19:42	20:15	19:49 (T-41)	20:46
14	08:02	07:35	07:53	07:02	19:19 (T-41)	06:22
	17:33	18:11	19:43	20:16	19:48 (T-41)	20:47
15	08:02	07:34	07:52	07:01	19:20 (T-41)	06:21
	17:34	18:12	19:45	20:17	19:48 (T-41)	20:48
16	08:01	07:33	07:50	06:59	19:20 (T-41)	06:20
	17:36	18:13	19:46	20:18	19:47 (T-41)	20:49
17	08:01	07:31	07:48	06:58	19:20 (T-41)	06:20
	17:37	18:15	19:47	20:19	19:47 (T-41)	20:50
18	08:00	07:30	07:47	06:56	19:20 (T-41)	06:19
	17:38	18:16	19:48	20:20	19:46 (T-41)	20:51
19	08:00	07:29	07:45	06:54	19:22 (T-41)	06:18
	17:39	18:17	19:49	20:21	19:45 (T-41)	20:52
20	07:59	07:27	07:43	06:53	19:22 (T-41)	06:17
	17:40	18:18	19:50	20:22	19:43 (T-41)	20:53
21	07:59	07:26	07:42	06:52	19:24 (T-41)	06:16
	17:41	18:19	19:51	20:23	19:42 (T-41)	20:54
22	07:58	07:24	07:40	06:50	19:25 (T-41)	06:15
	17:43	18:21	19:52	20:24	19:39 (T-41)	20:55
23	07:57	07:23	07:38	06:49	19:29 (T-41)	06:14
	17:44	18:22	19:53	20:25	19:35 (T-41)	20:56
24	07:57	07:21	07:37	06:47		06:14
	17:45	18:23	19:54	20:26		20:57
25	07:56	07:20	07:35	06:46		06:13
	17:46	18:24	19:55	20:27		20:57
26	07:55	07:19	07:33	06:44		06:12
	17:47	18:25	19:56	20:28		20:58
27	07:54	07:17	07:32	06:43		06:12
	17:49	18:27	19:58	20:29		20:59
28	07:54	07:15	07:30	06:42		06:11
	17:50	18:28	19:59	20:30		21:00
29	07:53		07:28	06:40		06:11
	17:51		20:00	20:31		21:01
30	07:52		07:27	06:39		06:10
	17:52		20:00	20:33		21:02
31	07:51		07:25			06:09
	17:54		20:01			21:02
Potential sun hours	298	297	370	398	448	452
Total, worst case				460		309
Sun reduction				0.60		0.68
Oper. time red.				0.97		0.97
Wind dir. red.				0.63		0.60
Total reduction				0.37		0.39
Total, real				169		122

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

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

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR234 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:34	20:18 (T-38)	07:04	19:20 (T-41)	07:34	07:09	07:43			
	21:15	20:57	15 20:33 (T-38)	20:14	28 19:48 (T-41)	19:22	17:35	17:11			
2	06:10	06:35	20:17 (T-38)	07:05	19:20 (T-41)	07:35	07:10	07:44			
	21:15	20:56	14 20:31 (T-38)	20:12	28 19:48 (T-41)	19:20	17:34	17:11			
3	06:11	06:36	20:18 (T-38)	07:06	19:20 (T-41)	07:36	07:11	07:45			
	21:15	20:54	12 20:30 (T-38)	20:11	27 19:47 (T-41)	19:18	17:33	17:11			
4	06:11	06:37	20:19 (T-38)	07:07	19:20 (T-41)	07:38	07:12	07:46			
	21:14	20:53	10 20:29 (T-38)	20:09	26 19:46 (T-41)	19:17	17:32	17:10			
5	06:12	06:38	20:20 (T-38)	07:08	19:21 (T-41)	07:39	07:13	07:47			
	21:14	20:52	8 20:28 (T-38)	20:07	23 19:44 (T-41)	19:15	17:31	17:10			
6	06:12	06:39	20:22 (T-38)	07:09	19:22 (T-41)	07:40	07:15	07:48			
	21:14	20:51	5 20:27 (T-38)	20:06	21 19:43 (T-41)	19:13	17:29	17:10			
7	06:13	06:40		07:10	19:23 (T-41)	07:41	07:16	07:49			
	21:14	20:50		20:04	18 19:41 (T-41)	19:12	17:28	17:10			
8	06:14	06:41		07:11	19:25 (T-41)	07:42	07:17	07:50			
	21:13	20:49		20:02	13 19:38 (T-41)	19:10	17:27	17:10			
9	06:14	06:42		07:12	19:31 (T-41)	07:43	07:18	07:51			
	21:13	20:47		20:01	1 19:32 (T-41)	19:09	17:26	17:10			
10	06:15	06:43		07:13		07:44	07:19	07:52			
	21:13	20:46		19:57		19:07	17:25	17:10			
11	06:16	06:44		07:14		07:45	07:21	07:53			
	21:12	20:45		19:56		19:05	17:24	17:10			
12	06:16	06:45		07:15		07:46	07:22	07:54			
	21:12	20:44		19:54		19:04	17:23	17:10			
13	06:17	06:46		07:16		07:47	07:23	07:54			
	21:11	20:42		19:52		19:02	17:22	17:10			
14	06:18	06:47		07:17		07:48	07:24	07:55			
	21:11	20:41		19:51		19:01	17:21	17:11			
15	06:19	06:48		07:18		07:49	07:25	07:56			
	21:10	20:39		19:49		18:59	17:20	17:11			
16	06:19	06:49		07:19		07:50	07:27	07:57			
	21:10	20:38		19:47		18:58	17:20	17:11			
17	06:20	20:24 (T-38)	06:50	07:20		07:51	07:28	07:57			
	21:09	7 20:31 (T-38)	20:37	19:46		18:56	17:19	17:11			
18	06:21	20:21 (T-38)	06:51	07:21		07:53	07:29	07:58			
	21:09	11 20:32 (T-38)	20:35	19:44		18:55	17:18	17:12			
19	06:22	20:20 (T-38)	06:52	07:22		07:54	07:30	07:59			
	21:08	13 20:33 (T-38)	20:34	19:42		18:53	17:17	17:12			
20	06:23	20:20 (T-38)	06:53	19:34 (T-41)	07:23	07:55	07:31	07:59			
	21:07	14 20:34 (T-38)	20:32	8 19:42 (T-41)	19:40	18:52	17:17	17:13			
21	06:24	20:19 (T-38)	06:54	19:31 (T-41)	07:24	07:56	07:32	08:00			
	21:07	16 20:35 (T-38)	20:31	14 19:45 (T-41)	19:39	18:50	17:16	17:13			
22	06:24	20:19 (T-38)	06:54	19:28 (T-41)	07:25	07:57	07:34	08:00			
	21:06	17 20:36 (T-38)	20:29	18 19:46 (T-41)	19:37	18:49	17:15	17:14			
23	06:25	20:17 (T-38)	06:55	19:26 (T-41)	07:26	07:58	07:35	08:01			
	21:05	19 20:36 (T-38)	20:28	21 19:47 (T-41)	19:35	18:47	17:15	17:14			
24	06:26	20:17 (T-38)	06:56	19:24 (T-41)	07:27	07:59	07:36	08:01			
	21:04	19 20:36 (T-38)	20:26	24 19:48 (T-41)	19:34	18:46	17:14	17:15			
25	06:27	20:17 (T-38)	06:57	19:23 (T-41)	07:28	08:00	07:37	08:02			
	21:03	20 20:37 (T-38)	20:25	26 19:49 (T-41)	19:32	18:44	17:14	17:15			
26	06:28	20:17 (T-38)	06:58	19:22 (T-41)	07:29	08:02	07:38	08:02			
	21:02	20 20:37 (T-38)	20:23	27 19:49 (T-41)	19:30	18:43	17:13	17:16			
27	06:29	20:17 (T-38)	06:59	19:21 (T-41)	07:30	08:03	07:39	08:02			
	21:02	20 20:37 (T-38)	20:22	28 19:49 (T-41)	19:29	18:42	17:13	17:16			
28	06:30	20:17 (T-38)	07:00	19:21 (T-41)	07:31	08:04	07:40	08:03			
	21:01	19 20:36 (T-38)	20:20	28 19:49 (T-41)	19:27	18:40	17:12	17:17			
29	06:31	20:17 (T-38)	07:01	19:20 (T-41)	07:32	08:05	07:41	08:03			
	21:00	18 20:35 (T-38)	20:19	29 19:49 (T-41)	19:25	18:39	17:12	17:18			
30	06:32	20:17 (T-38)	07:02	19:20 (T-41)	07:33	08:06	07:42	08:03			
	20:59	17 20:34 (T-38)	20:17	29 19:49 (T-41)	19:23	18:38	17:11	17:19			
31	06:33	20:17 (T-38)	07:03	19:20 (T-41)		08:07		08:03			
	20:58	17 20:34 (T-38)	20:16	29 19:49 (T-41)		18:37		17:19			
Potential sun hours	459	428		375		345	298	288			
Total, worst case	247		345	185							
Sun reduction	0.75		0.74	0.68							
Oper. time red.	0.97		0.97	0.97							
Wind dir. red.	0.60		0.63	0.63							
Total reduction	0.43		0.45	0.42							
Total, real	107		155	77							

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

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

Project:

Northwest Ohio

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR235 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	08:43 (T-47)	07:50	17:12 (T-38)	07:14	07:23		06:38	06:57 (Alt-05)	06:09	
	17:20	29 09:12 (T-47)	17:55	18 17:30 (T-38)	18:29	20:02		20:34	15 07:12 (Alt-05)	21:03	
2	08:04	08:44 (T-47)	07:49	17:13 (T-38)	07:12	07:22		06:36	06:57 (Alt-05)	06:08	20:33 (Alt-03)
	17:21	28 09:12 (T-47)	17:56	17 17:30 (T-38)	18:30	20:03		20:35	14 07:11 (Alt-05)	21:04	7 20:40 (Alt-03)
3	08:04	08:45 (T-47)	07:48	17:14 (T-38)	07:11	07:20		06:35	06:58 (Alt-05)	06:08	20:32 (Alt-03)
	17:22	27 09:12 (T-47)	17:57	16 17:30 (T-38)	18:31	20:04		20:36	12 07:10 (Alt-05)	21:05	9 20:41 (Alt-03)
4	08:04	08:45 (T-47)	07:47	17:15 (T-38)	07:09	07:18		06:34	06:59 (Alt-05)	06:08	20:31 (Alt-03)
	17:23	27 09:12 (T-47)	17:59	14 17:29 (T-38)	18:32	20:05		20:37	9 07:08 (Alt-05)	21:06	10 20:41 (Alt-03)
5	08:04	08:46 (T-47)	07:46	17:17 (T-38)	07:08	07:17		06:32	07:01 (Alt-05)	06:07	20:30 (Alt-03)
	17:24	26 09:12 (T-47)	18:00	11 17:28 (T-38)	18:33	20:06		20:38	4 07:05 (Alt-05)	21:06	12 20:42 (Alt-03)
6	08:04	08:47 (T-47)	07:45	17:20 (T-38)	07:06	07:15		06:31		06:07	20:30 (Alt-03)
	17:25	26 09:13 (T-47)	18:01	5 17:25 (T-38)	18:35	20:07		20:39		21:07	12 20:42 (Alt-03)
7	08:04	08:48 (T-47)	07:44		07:05	07:13		06:30		06:07	20:30 (Alt-03)
	17:26	25 09:13 (T-47)	18:02		18:36	20:08		20:40		21:08	13 20:43 (Alt-03)
8	08:04	08:49 (T-47)	07:43		08:03	07:12		06:29		06:06	20:29 (Alt-03)
	17:27	24 09:13 (T-47)	18:04		19:37	20:09		20:41		21:08	14 20:43 (Alt-03)
9	08:04	08:49 (T-47)	07:41		08:01	07:10		06:28		06:06	20:29 (Alt-03)
	17:28	23 09:12 (T-47)	18:05		19:38	20:10		20:42		21:09	15 20:44 (Alt-03)
10	08:03	08:51 (T-47)	07:40		08:00	07:08		06:27		06:06	20:29 (Alt-03)
	17:29	21 09:12 (T-47)	18:06		19:39	20:11		20:43		21:09	15 20:44 (Alt-03)
11	08:03	08:52 (T-47)	07:39		07:58	07:07		06:26		06:06	20:29 (Alt-03)
	17:30	20 09:12 (T-47)	18:07		19:40	20:12		20:44		21:10	16 20:45 (Alt-03)
12	08:03	08:53 (T-47)	07:38		07:56	07:05		06:24		06:06	20:29 (Alt-03)
	17:31	18 09:11 (T-47)	18:09		19:41	20:13		20:45		21:10	17 20:46 (Alt-03)
13	08:03	08:54 (T-47)	07:37		07:55	07:04		06:23		06:06	20:29 (Alt-03)
	17:32	16 09:10 (T-47)	18:10		19:42	20:15		20:46		21:11	17 20:46 (Alt-03)
14	08:02	08:57 (T-47)	07:35		07:53	07:02		06:22		06:06	20:29 (Alt-03)
	17:33	13 09:10 (T-47)	18:11		19:43	20:16		20:47		21:11	18 20:47 (Alt-03)
15	08:02	08:58 (T-47)	07:34		07:52	07:01		06:21		06:06	20:29 (Alt-03)
	17:34	10 09:08 (T-47)	18:12		19:45	20:17		20:48		21:12	18 20:47 (Alt-03)
16	08:01		07:33		07:50	06:59		06:20		06:06	20:29 (Alt-03)
	17:35		18:13		19:46	20:18		20:49		21:12	18 20:47 (Alt-03)
17	08:01		07:31		07:48	06:58		06:19		06:06	20:29 (Alt-03)
	17:37		18:15		19:47	20:19		20:50		21:13	18 20:47 (Alt-03)
18	08:00		07:30		07:47	06:56		06:19		06:06	20:29 (Alt-03)
	17:38		18:16		19:48	20:20		20:51		21:13	19 20:48 (Alt-03)
19	08:00		07:29		07:45	06:54		06:18		06:06	20:29 (Alt-03)
	17:39		18:17		19:49	20:21		20:52		21:13	19 20:48 (Alt-03)
20	07:59		07:27		07:43	06:53		06:17		06:06	20:29 (Alt-03)
	17:40		18:18		19:50	20:22		20:53		21:14	19 20:48 (Alt-03)
21	07:59		07:26		07:42	06:51		06:16		06:06	20:30 (Alt-03)
	17:41		18:19		19:51	20:23		20:54		21:14	19 20:49 (Alt-03)
22	07:58	17:14 (T-38)	07:24		07:40	06:50		06:15		06:06	20:30 (Alt-03)
	17:42	3 17:17 (T-38)	18:21		19:52	20:24		20:55		21:14	19 20:49 (Alt-03)
23	07:57	17:13 (T-38)	07:23		07:38	06:49	07:08 (Alt-05)	06:14		06:07	20:30 (Alt-03)
	17:44	5 17:18 (T-38)	18:22		19:53	20:25	2 07:10 (Alt-05)	20:56		21:14	19 20:49 (Alt-03)
24	07:57	17:13 (T-38)	07:21		07:37	06:47	07:06 (Alt-05)	06:14		06:07	20:30 (Alt-03)
	17:45	7 17:20 (T-38)	18:23		19:54	20:26	5 07:11 (Alt-05)	20:57		21:15	19 20:49 (Alt-03)
25	07:56	17:13 (T-38)	07:20		07:35	06:46	07:05 (Alt-05)	06:13		06:07	20:31 (Alt-03)
	17:46	9 17:22 (T-38)	18:24		19:55	20:27	7 07:12 (Alt-05)	20:57		21:15	19 20:50 (Alt-03)
26	07:55	17:12 (T-38)	07:19		07:33	06:44	07:04 (Alt-05)	06:12		06:08	20:31 (Alt-03)
	17:47	11 17:23 (T-38)	18:25		19:56	20:28	9 07:13 (Alt-05)	20:58		21:15	18 20:49 (Alt-03)
27	07:54	17:12 (T-38)	07:17		07:32	06:43	07:02 (Alt-05)	06:12		06:08	20:31 (Alt-03)
	17:49	12 17:24 (T-38)	18:27		19:58	20:29	11 07:13 (Alt-05)	20:59		21:15	18 20:49 (Alt-03)
28	07:54	17:11 (T-38)	07:16		07:30	06:42	07:01 (Alt-05)	06:11		06:08	20:32 (Alt-03)
	17:50	14 17:25 (T-38)	18:28		19:59	20:30	12 07:13 (Alt-05)	21:00		21:15	18 20:50 (Alt-03)
29	07:53	17:11 (T-38)			07:28	06:40	07:00 (Alt-05)	06:10		06:09	20:32 (Alt-03)
	17:51	15 17:26 (T-38)			20:00	20:31	13 07:13 (Alt-05)	21:01		21:15	17 20:49 (Alt-03)
30	07:52	17:12 (T-38)			07:27	06:39	06:58 (Alt-05)	06:10		06:09	20:33 (Alt-03)
	17:52	16 17:28 (T-38)			20:00	20:33	14 07:12 (Alt-05)	21:02		21:15	17 20:50 (Alt-03)
31	07:51	17:12 (T-38)			07:25			06:09			
	17:54	17 17:29 (T-38)			20:01			21:03			
Potential sun hours	298		297		370	398		448		452	
Total, worst case	442		81			73		54		469	
Sun reduction	0.46		0.51			0.60		0.68		0.74	
Oper. time red.	0.97		0.97			0.97		0.97		0.97	
Wind dir. red.	0.61		0.69			0.66		0.66		0.60	
Total reduction	0.27		0.34			0.38		0.43		0.43	
Total, real	118		27			28		23		200	

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR235 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	July		August		September		October		November		December		
1	06:10	20:33 (Alt-03)	06:34		07:04	07:34	07:09		07:43	08:34 (T-47)			
	21:15	16	20:49 (Alt-03)	20:57	20:14	19:22	17:35		17:11	20	08:54 (T-47)		
2	06:10	20:34 (Alt-03)	06:35		07:05	07:35	07:10		07:45	08:34 (T-47)			
	21:15	16	20:50 (Alt-03)	20:56	20:12	19:20	17:34		17:11	21	08:55 (T-47)		
3	06:11	20:34 (Alt-03)	06:36		07:06	07:36	07:11		07:46	08:33 (T-47)			
	21:15	15	20:49 (Alt-03)	20:54	20:11	19:18	17:33		17:11	23	08:56 (T-47)		
4	06:11	20:35 (Alt-03)	06:37		07:07	07:38	07:12		07:47	08:33 (T-47)			
	21:14	14	20:49 (Alt-03)	20:53	20:09	19:17	17:32		17:10	24	08:57 (T-47)		
5	06:12	20:35 (Alt-03)	06:38		07:08	07:39	07:13	16:49 (T-38)	07:48	08:33 (T-47)			
	21:14	14	20:49 (Alt-03)	20:52	20:07	19:15	17:30	7	16:56 (T-38)	25	08:58 (T-47)		
6	06:12	20:36 (Alt-03)	06:39		07:09	07:40	07:15	16:46 (T-38)	07:48	08:33 (T-47)			
	21:14	13	20:49 (Alt-03)	20:51	20:06	19:13	17:29	12	16:58 (T-38)	26	08:59 (T-47)		
7	06:13	20:36 (Alt-03)	06:40		07:10	07:41	07:16	16:46 (T-38)	07:49	08:33 (T-47)			
	21:14	12	20:48 (Alt-03)	20:50	20:04	19:12	17:28	14	17:00 (T-38)	26	08:59 (T-47)		
8	06:14	20:37 (Alt-03)	06:41	07:10 (Alt-05)	07:11	07:42	07:17	16:45 (T-38)	07:50	08:34 (T-47)			
	21:13	11	20:48 (Alt-03)	20:49	6	07:16 (Alt-05)	20:02	19:10	17:27	16	17:01 (T-38)	26	09:00 (T-47)
9	06:14	20:39 (Alt-03)	06:42	07:08 (Alt-05)	07:12	07:43	07:18	16:44 (T-38)	07:51	08:34 (T-47)			
	21:13	9	20:48 (Alt-03)	20:47	10	07:18 (Alt-05)	20:01	19:09	17:26	17	17:01 (T-38)	27	09:01 (T-47)
10	06:15	20:40 (Alt-03)	06:43	07:06 (Alt-05)	07:13	07:44	07:19	16:43 (T-38)	07:52	08:34 (T-47)			
	21:13	7	20:47 (Alt-03)	20:46	13	07:19 (Alt-05)	19:57	19:07	17:25	18	17:01 (T-38)	28	09:02 (T-47)
11	06:16	20:42 (Alt-03)	06:44	07:05 (Alt-05)	07:14	07:45	07:21	16:44 (T-38)	07:53	08:33 (T-47)			
	21:12	5	20:47 (Alt-03)	20:45	15	07:20 (Alt-05)	19:56	19:05	17:24	17	17:01 (T-38)	29	09:02 (T-47)
12	06:16		06:44	07:06 (Alt-05)	07:15	07:46	07:22	16:44 (T-38)	07:54	08:34 (T-47)			
	21:12		20:44	14	07:20 (Alt-05)	19:54	19:04	17:23	15	16:59 (T-38)	28	09:02 (T-47)	
13	06:17		06:45	07:07 (Alt-05)	07:16	07:47	07:23	16:43 (T-38)	07:55	08:34 (T-47)			
	21:11		20:42	14	07:21 (Alt-05)	19:52	19:02	17:22	15	16:58 (T-38)	29	09:03 (T-47)	
14	06:18		06:46	07:08 (Alt-05)	07:17	07:48	07:24	16:43 (T-38)	07:55	08:35 (T-47)			
	21:11		20:41	13	07:21 (Alt-05)	19:51	19:01	17:21	14	16:57 (T-38)	29	09:04 (T-47)	
15	06:19		06:47	07:09 (Alt-05)	07:18	07:49	07:25	16:45 (T-38)	07:56	08:35 (T-47)			
	21:10		20:39	12	07:21 (Alt-05)	19:49	18:59	17:20	12	16:57 (T-38)	29	09:04 (T-47)	
16	06:19		06:48	07:10 (Alt-05)	07:19	07:50	07:27	16:45 (T-38)	07:57	08:35 (T-47)			
	21:10		20:38	10	07:20 (Alt-05)	19:47	18:58	17:20	11	16:56 (T-38)	30	09:05 (T-47)	
17	06:20		06:49	07:11 (Alt-05)	07:20	07:51	07:28	16:46 (T-38)	07:57	08:36 (T-47)			
	21:09		20:37	9	07:20 (Alt-05)	19:46	18:56	17:19	8	16:54 (T-38)	30	09:06 (T-47)	
18	06:21		06:50	07:12 (Alt-05)	07:21	07:53	07:29	16:47 (T-38)	07:58	08:36 (T-47)			
	21:09		20:35	7	07:19 (Alt-05)	19:44	18:55	17:18	7	16:54 (T-38)	30	09:06 (T-47)	
19	06:22		06:51	07:13 (Alt-05)	07:22	07:54	07:30	16:48 (T-38)	07:59	08:37 (T-47)			
	21:08		20:34	4	07:17 (Alt-05)	19:42	18:53	17:17	5	16:53 (T-38)	29	09:06 (T-47)	
20	06:23		06:52	07:14 (Alt-05)	07:23	07:55	07:31	16:49 (T-38)	07:59	08:37 (T-47)			
	21:07		20:32	1	07:15 (Alt-05)	19:40	18:52	17:17	3	16:52 (T-38)	29	09:06 (T-47)	
21	06:24		06:53		07:24	07:56	07:32			08:00	08:38 (T-47)		
	21:07		20:31		19:39	18:50	17:16			17:13	29	09:07 (T-47)	
22	06:24		06:54		07:25	07:57	07:34			08:00	08:38 (T-47)		
	21:06		20:29		19:37	18:49	17:15			17:14	29	09:07 (T-47)	
23	06:25		06:55		07:26	07:58	07:35			08:01	08:39 (T-47)		
	21:05		20:28		19:35	18:47	17:15			17:14	29	09:08 (T-47)	
24	06:26		06:56		07:27	07:59	07:36			08:01	08:39 (T-47)		
	21:04		20:26		19:34	18:46	17:14			17:15	29	09:08 (T-47)	
25	06:27		06:57		07:28	08:00	07:37			08:02	08:40 (T-47)		
	21:03		20:25		19:32	18:44	17:14			17:15	30	09:10 (T-47)	
26	06:28		06:58		07:29	08:02	07:38			08:02	08:40 (T-47)		
	21:02		20:23		19:30	18:43	17:13			17:16	30	09:10 (T-47)	
27	06:29		06:59		07:30	08:03	07:39	08:38 (T-47)	08:02	08:40 (T-47)			
	21:02		20:22		19:28	18:42	17:13	9	08:47 (T-47)	17:16	30	09:10 (T-47)	
28	06:30		07:00		07:31	08:04	07:40	08:36 (T-47)	08:03	08:42 (T-47)			
	21:01		20:20		19:27	18:40	17:12	13	08:49 (T-47)	17:17	29	09:11 (T-47)	
29	06:31		07:01		07:32	08:05	07:41	08:36 (T-47)	08:03	08:42 (T-47)			
	21:00		20:19		19:25	18:39	17:12	15	08:51 (T-47)	17:18	29	09:11 (T-47)	
30	06:32		07:02		07:33	08:06	07:42	08:35 (T-47)	08:03	08:42 (T-47)			
	20:59		20:17		19:23	18:38	17:11	18	08:53 (T-47)	17:19	29	09:11 (T-47)	
31	06:33		07:03			08:07				08:03	08:43 (T-47)		
	20:58		20:16			18:36				17:19	28	09:11 (T-47)	
Potential sun hours	459		428		375	345	298		288				
Total, worst case		132		128			246			859			
Sun reduction		0.75		0.74			0.42			0.38			
Oper. time red.		0.97		0.97			0.97			0.97			
Wind dir. red.		0.60		0.66			0.67			0.58			
Total reduction		0.43		0.47			0.27			0.21			
Total, real		57		60			66			181			

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

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

Project:

Northwest Ohio

Description:

EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR236 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	08:43 (T-47)	07:50	17:12 (T-38)	07:14	07:23		06:38	06:57 (Alt-05)	06:09	
	17:20	29 09:12 (T-47)	17:55	18 17:30 (T-38)	18:29	20:02		20:34	15 07:12 (Alt-05)	21:03	
2	08:04	08:44 (T-47)	07:49	17:13 (T-38)	07:12	07:22		06:36	06:57 (Alt-05)	06:08	20:33 (Alt-03)
	17:21	28 09:12 (T-47)	17:56	17 17:30 (T-38)	18:30	20:03		20:35	14 07:11 (Alt-05)	21:04	7 20:40 (Alt-03)
3	08:04	08:45 (T-47)	07:48	17:14 (T-38)	07:11	07:20		06:35	06:58 (Alt-05)	06:08	20:32 (Alt-03)
	17:22	27 09:12 (T-47)	17:57	16 17:30 (T-38)	18:31	20:04		20:36	12 07:10 (Alt-05)	21:05	9 20:41 (Alt-03)
4	08:04	08:45 (T-47)	07:47	17:15 (T-38)	07:09	07:18		06:34	06:59 (Alt-05)	06:08	20:31 (Alt-03)
	17:23	27 09:12 (T-47)	17:59	14 17:29 (T-38)	18:32	20:05		20:37	9 07:08 (Alt-05)	21:06	10 20:41 (Alt-03)
5	08:04	08:46 (T-47)	07:46	17:17 (T-38)	07:08	07:17		06:32	07:01 (Alt-05)	06:07	20:30 (Alt-03)
	17:24	26 09:12 (T-47)	18:00	11 17:28 (T-38)	18:33	20:06		20:38	4 07:05 (Alt-05)	21:06	12 20:42 (Alt-03)
6	08:04	08:47 (T-47)	07:45	17:20 (T-38)	07:06	07:15		06:31		06:07	20:30 (Alt-03)
	17:25	26 09:13 (T-47)	18:01	5 17:25 (T-38)	18:35	20:07		20:39		21:07	12 20:42 (Alt-03)
7	08:04	08:48 (T-47)	07:44		07:05	07:13		06:30		06:07	20:30 (Alt-03)
	17:26	25 09:13 (T-47)	18:02		18:36	20:08		20:40		21:08	13 20:43 (Alt-03)
8	08:04	08:49 (T-47)	07:43		08:03	07:12		06:29		06:06	20:29 (Alt-03)
	17:27	24 09:13 (T-47)	18:04		19:37	20:09		20:41		21:08	14 20:43 (Alt-03)
9	08:04	08:49 (T-47)	07:41		08:01	07:10		06:28		06:06	20:29 (Alt-03)
	17:28	23 09:12 (T-47)	18:05		19:38	20:10		20:42		21:09	15 20:44 (Alt-03)
10	08:03	08:51 (T-47)	07:40		08:00	07:08		06:27		06:06	20:29 (Alt-03)
	17:29	21 09:12 (T-47)	18:06		19:39	20:11		20:43		21:09	15 20:44 (Alt-03)
11	08:03	08:52 (T-47)	07:39		07:58	07:07		06:26		06:06	20:29 (Alt-03)
	17:30	20 09:12 (T-47)	18:07		19:40	20:12		20:44		21:10	16 20:45 (Alt-03)
12	08:03	08:53 (T-47)	07:38		07:56	07:05		06:24		06:06	20:29 (Alt-03)
	17:31	18 09:11 (T-47)	18:09		19:41	20:13		20:45		21:10	17 20:46 (Alt-03)
13	08:03	08:54 (T-47)	07:37		07:55	07:04		06:23		06:06	20:29 (Alt-03)
	17:32	16 09:10 (T-47)	18:10		19:42	20:15		20:46		21:11	17 20:46 (Alt-03)
14	08:02	08:57 (T-47)	07:35		07:53	07:02		06:22		06:06	20:29 (Alt-03)
	17:33	13 09:10 (T-47)	18:11		19:43	20:16		20:47		21:11	18 20:47 (Alt-03)
15	08:02	08:58 (T-47)	07:34		07:52	07:01		06:21		06:06	20:29 (Alt-03)
	17:34	10 09:08 (T-47)	18:12		19:45	20:17		20:48		21:12	18 20:47 (Alt-03)
16	08:01		07:33		07:50	06:59		06:20		06:06	20:29 (Alt-03)
	17:35		18:13		19:46	20:18		20:49		21:12	18 20:47 (Alt-03)
17	08:01		07:31		07:48	06:58		06:19		06:06	20:29 (Alt-03)
	17:37		18:15		19:47	20:19		20:50		21:13	18 20:47 (Alt-03)
18	08:00		07:30		07:47	06:56		06:19		06:06	20:29 (Alt-03)
	17:38		18:16		19:48	20:20		20:51		21:13	19 20:48 (Alt-03)
19	08:00		07:29		07:45	06:54		06:18		06:06	20:29 (Alt-03)
	17:39		18:17		19:49	20:21		20:52		21:13	19 20:48 (Alt-03)
20	07:59		07:27		07:43	06:53		06:17		06:06	20:29 (Alt-03)
	17:40		18:18		19:50	20:22		20:53		21:14	19 20:48 (Alt-03)
21	07:59		07:26		07:42	06:51		06:16		06:06	20:30 (Alt-03)
	17:41		18:19		19:51	20:23		20:54		21:14	19 20:49 (Alt-03)
22	07:58	17:14 (T-38)	07:24		07:40	06:50		06:15		06:06	20:30 (Alt-03)
	17:42	3 17:17 (T-38)	18:21		19:52	20:24		20:55		21:14	19 20:49 (Alt-03)
23	07:57	17:13 (T-38)	07:23		07:38	06:49	07:08 (Alt-05)	06:14		06:07	20:30 (Alt-03)
	17:44	5 17:18 (T-38)	18:22		19:53	20:25	2 07:10 (Alt-05)	20:56		21:14	19 20:49 (Alt-03)
24	07:57	17:13 (T-38)	07:21		07:37	06:47	07:06 (Alt-05)	06:14		06:07	20:30 (Alt-03)
	17:45	7 17:20 (T-38)	18:23		19:54	20:26	5 07:11 (Alt-05)	20:57		21:15	19 20:49 (Alt-03)
25	07:56	17:13 (T-38)	07:20		07:35	06:46	07:05 (Alt-05)	06:13		06:07	20:31 (Alt-03)
	17:46	9 17:22 (T-38)	18:24		19:55	20:27	7 07:12 (Alt-05)	20:57		21:15	19 20:50 (Alt-03)
26	07:55	17:12 (T-38)	07:19		07:33	06:44	07:04 (Alt-05)	06:12		06:08	20:31 (Alt-03)
	17:47	11 17:23 (T-38)	18:25		19:56	20:28	9 07:13 (Alt-05)	20:58		21:15	18 20:49 (Alt-03)
27	07:54	17:12 (T-38)	07:17		07:32	06:43	07:02 (Alt-05)	06:12		06:08	20:31 (Alt-03)
	17:49	12 17:24 (T-38)	18:27		19:58	20:29	11 07:13 (Alt-05)	20:59		21:15	18 20:49 (Alt-03)
28	07:54	17:11 (T-38)	07:16		07:30	06:42	07:01 (Alt-05)	06:11		06:08	20:32 (Alt-03)
	17:50	14 17:25 (T-38)	18:28		19:59	20:30	12 07:13 (Alt-05)	21:00		21:15	18 20:50 (Alt-03)
29	07:53	17:11 (T-38)			07:28	06:40	07:00 (Alt-05)	06:10		06:09	20:32 (Alt-03)
	17:51	15 17:26 (T-38)			20:00	20:31	13 07:13 (Alt-05)	21:01		21:15	17 20:49 (Alt-03)
30	07:52	17:12 (T-38)			07:27	06:39	06:58 (Alt-05)	06:10		06:09	20:33 (Alt-03)
	17:52	16 17:28 (T-38)			20:00	20:33	14 07:12 (Alt-05)	21:02		21:15	17 20:50 (Alt-03)
31	07:51	17:12 (T-38)			07:25			06:09			
	17:54	17 17:29 (T-38)			20:01			21:03			
Potential sun hours	298		297		370	398		448		452	
Total, worst case	442		81			73		54		469	
Sun reduction	0.46		0.51			0.60		0.68		0.74	
Oper. time red.	0.97		0.97			0.97		0.97		0.97	
Wind dir. red.	0.61		0.69			0.66		0.66		0.60	
Total reduction	0.27		0.34			0.38		0.43		0.43	
Total, real	118		27			28		23		200	

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR236 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July			August			September			October			November			December		
1	06:10	20:33 (Alt-03)	06:34			07:04	07:34	07:09				07:43			08:34 (T-47)		
	21:15	16	20:49 (Alt-03)	20:57		20:14	19:22	17:35				17:11	20		08:54 (T-47)		
2	06:10	20:34 (Alt-03)	06:35			07:05	07:35	07:10				07:45			08:34 (T-47)		
	21:15	16	20:50 (Alt-03)	20:56		20:12	19:20	17:34				17:11	21		08:55 (T-47)		
3	06:11	20:34 (Alt-03)	06:36			07:06	07:36	07:11				07:46			08:33 (T-47)		
	21:15	15	20:49 (Alt-03)	20:54		20:11	19:18	17:33				17:11	23		08:56 (T-47)		
4	06:11	20:35 (Alt-03)	06:37			07:07	07:38	07:12				07:47			08:33 (T-47)		
	21:14	14	20:49 (Alt-03)	20:53		20:09	19:17	17:32				17:10	24		08:57 (T-47)		
5	06:12	20:35 (Alt-03)	06:38			07:08	07:39	07:13				16:49 (T-38)			08:33 (T-47)		
	21:14	14	20:49 (Alt-03)	20:52		20:07	19:15	17:30	7			16:56 (T-38)	17:10	25	08:58 (T-47)		
6	06:12	20:36 (Alt-03)	06:39			07:09	07:40	07:15				16:46 (T-38)	07:48		08:33 (T-47)		
	21:14	13	20:49 (Alt-03)	20:51		20:06	19:13	17:29	12			16:58 (T-38)	17:10	26	08:59 (T-47)		
7	06:13	20:36 (Alt-03)	06:40			07:10	07:41	07:16				16:46 (T-38)	07:49		08:33 (T-47)		
	21:14	12	20:48 (Alt-03)	20:50		20:04	19:12	17:28	14			17:00 (T-38)	17:10	26	08:59 (T-47)		
8	06:14	20:37 (Alt-03)	06:41			07:11	07:42	07:17				16:45 (T-38)	07:50		08:34 (T-47)		
	21:13	11	20:48 (Alt-03)	20:49	6	07:16 (Alt-05)	20:02	19:10	16			17:01 (T-38)	17:10	26	09:00 (T-47)		
9	06:14	20:39 (Alt-03)	06:42			07:08 (Alt-05)	07:12	07:43				16:44 (T-38)	07:51		08:34 (T-47)		
	21:13	9	20:48 (Alt-03)	20:47	10	07:18 (Alt-05)	20:01	19:09	17			17:01 (T-38)	17:10	27	09:01 (T-47)		
10	06:15	20:40 (Alt-03)	06:43			07:06 (Alt-05)	07:13	07:44				16:43 (T-38)	07:52		08:34 (T-47)		
	21:13	7	20:47 (Alt-03)	20:46	13	07:19 (Alt-05)	19:57	19:07	18			17:01 (T-38)	17:10	28	09:02 (T-47)		
11	06:16	20:42 (Alt-03)	06:44			07:05 (Alt-05)	07:14	07:45				16:44 (T-38)	07:53		08:33 (T-47)		
	21:12	5	20:47 (Alt-03)	20:45	15	07:20 (Alt-05)	19:56	19:05	17			17:01 (T-38)	17:10	29	09:02 (T-47)		
12	06:16		06:44			07:06 (Alt-05)	07:15	07:46				16:44 (T-38)	07:54		08:34 (T-47)		
	21:12		20:44	14		07:20 (Alt-05)	19:54	19:04	15			16:59 (T-38)	17:10	28	09:02 (T-47)		
13	06:17		06:45			07:07 (Alt-05)	07:16	07:47				16:43 (T-38)	07:55		08:34 (T-47)		
	21:11		20:42	14		07:21 (Alt-05)	19:52	19:02	15			16:58 (T-38)	17:10	29	09:03 (T-47)		
14	06:18		06:46			07:08 (Alt-05)	07:17	07:48				16:43 (T-38)	07:55		08:35 (T-47)		
	21:11		20:41	13		07:21 (Alt-05)	19:51	19:01	14			16:57 (T-38)	17:11	29	09:04 (T-47)		
15	06:19		06:47			07:09 (Alt-05)	07:18	07:49				16:45 (T-38)	07:56		08:35 (T-47)		
	21:10		20:39	12		07:21 (Alt-05)	19:49	18:59	12			16:57 (T-38)	17:11	29	09:04 (T-47)		
16	06:19		06:48			07:10 (Alt-05)	07:19	07:50				16:45 (T-38)	07:57		08:35 (T-47)		
	21:10		20:38	10		07:20 (Alt-05)	19:47	18:58	11			16:56 (T-38)	17:11	30	09:05 (T-47)		
17	06:20		06:49			07:11 (Alt-05)	07:20	07:51				16:46 (T-38)	07:57		08:36 (T-47)		
	21:09		20:37	9		07:20 (Alt-05)	19:46	18:56	8			16:54 (T-38)	17:11	30	09:06 (T-47)		
18	06:21		06:50			07:12 (Alt-05)	07:21	07:53				16:47 (T-38)	07:58		08:36 (T-47)		
	21:09		20:35	7		07:19 (Alt-05)	19:44	18:55	7			16:54 (T-38)	17:12	30	09:06 (T-47)		
19	06:22		06:51			07:13 (Alt-05)	07:22	07:54				16:48 (T-38)	07:59		08:37 (T-47)		
	21:08		20:34	4		07:17 (Alt-05)	19:42	18:53	5			16:53 (T-38)	17:12	29	09:06 (T-47)		
20	06:23		06:52			07:14 (Alt-05)	07:23	07:55				16:49 (T-38)	07:59		08:37 (T-47)		
	21:07		20:32	1		07:15 (Alt-05)	19:40	18:52	3			16:52 (T-38)	17:13	29	09:06 (T-47)		
21	06:24		06:53				07:24	07:56					08:00		08:38 (T-47)		
	21:07		20:31				19:39	18:50					17:13	29	09:07 (T-47)		
22	06:24		06:54				07:25	07:57					08:00		08:38 (T-47)		
	21:06		20:29				19:37	18:49					17:14	29	09:07 (T-47)		
23	06:25		06:55				07:26	07:58					08:01		08:39 (T-47)		
	21:05		20:28				19:35	18:47					17:14	29	09:08 (T-47)		
24	06:26		06:56				07:27	07:59					08:01		08:39 (T-47)		
	21:04		20:26				19:34	18:46					17:15	29	09:08 (T-47)		
25	06:27		06:57				07:28	08:00					08:02		08:40 (T-47)		
	21:03		20:25				19:32	18:44					17:15	30	09:10 (T-47)		
26	06:28		06:58				07:29	08:02					08:02		08:40 (T-47)		
	21:02		20:23				19:30	18:43					17:16	30	09:10 (T-47)		
27	06:29		06:59				07:30	08:03					08:02		08:40 (T-47)		
	21:02		20:22				19:28	18:42	9			08:47 (T-47)	17:16	30	09:10 (T-47)		
28	06:30		07:00				07:31	08:04					08:36 (T-47)	08:03	08:42 (T-47)		
	21:01		20:20				19:27	18:40	13			08:49 (T-47)	17:17	29	09:11 (T-47)		
29	06:31		07:01				07:32	08:05					08:36 (T-47)	08:03	08:42 (T-47)		
	21:00		20:19				19:25	18:39	15			08:51 (T-47)	17:18	29	09:11 (T-47)		
30	06:32		07:02				07:33	08:06					08:35 (T-47)	08:03	08:42 (T-47)		
	20:59		20:17				19:23	18:38	18			08:53 (T-47)	17:19	29	09:11 (T-47)		
31	06:33		07:03					08:07					08:03		08:43 (T-47)		
	20:58		20:16					18:36					17:19	28	09:11 (T-47)		
Potential sun hours	459		428			375	345	298				288					
Total, worst case		132		128				246					859				
Sun reduction		0.75		0.74				0.42					0.38				
Oper. time red.		0.97		0.97				0.97					0.97				
Wind dir. red.		0.60		0.66				0.67					0.58				
Total reduction		0.43		0.47				0.27					0.21				
Total, real		57		60				66					181				

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR237 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:34	07:09	07:43
	17:21	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:09	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:46
	17:23	17:59	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:48
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:37	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:15	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:26	07:57
	17:36	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:00	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:07	06:24	06:55	07:25	07:57	07:34	08:00
	17:43	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:14
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:59	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:32	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:49	18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:17
28	07:54	07:15	07:30	06:42	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:11	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:12	17:19
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:54		20:01		21:02		20:58	20:16		18:37		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
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Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR238 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January			February			March			April			May			June		
1	08:04	07:50	07:14						07:23		07:42 (Alt-05)	06:38			07:08 (Alt-07)	06:09	
	17:20	17:55	18:29						20:02	16	07:58 (Alt-05)	20:34	20		07:28 (Alt-07)	21:03	
2	08:04	07:49	07:12						07:22		07:42 (Alt-05)	06:36			07:09 (Alt-07)	06:08	
	17:21	17:56	18:30						20:03	14	07:56 (Alt-05)	20:35	18		07:27 (Alt-07)	21:04	
3	08:04	07:48	07:11						07:20		07:44 (Alt-05)	06:35			07:11 (Alt-07)	06:08	
	17:22	17:57	18:31						20:04	11	07:55 (Alt-05)	20:36	15		07:26 (Alt-07)	21:05	
4	08:04	07:47	07:09						07:18		07:46 (Alt-05)	06:34			07:12 (Alt-07)	06:08	
	17:23	17:59	18:32						20:05	6	07:52 (Alt-05)	20:37	11		07:23 (Alt-07)	21:06	
5	08:04	07:46	07:08						07:17			06:32			07:15 (Alt-07)	06:07	
	17:24	18:00	18:33						20:06			20:38	5		07:20 (Alt-07)	21:06	
6	08:04	07:45	07:06						07:15		19:36 (Alt-03)	06:31				06:07	
	17:25	18:01	18:35						20:07	10	19:46 (Alt-03)	20:39				21:07	
7	08:04	07:44	07:05						07:13		19:32 (Alt-03)	06:30				06:07	
	17:26	18:02	18:36						20:08	15	19:47 (Alt-03)	20:40				21:08	
8	08:04	07:43	08:03						07:12		19:31 (Alt-03)	06:29				06:06	
	17:27	18:04	19:37						20:09	18	19:49 (Alt-03)	20:41				21:08	
9	08:04	07:41	08:01						07:10		19:29 (Alt-03)	06:28				06:06	
	17:28	18:05	19:38						20:10	20	19:49 (Alt-03)	20:42				21:09	
10	08:03	07:40	08:00						07:08		19:27 (Alt-03)	06:27				06:06	
	17:29	18:06	19:39						20:11	23	19:50 (Alt-03)	20:43				21:09	
11	08:03	07:39	07:58						07:07		19:27 (Alt-03)	06:26				06:06	
	17:30	18:07	19:40						20:12	25	19:52 (Alt-03)	20:44				21:10	
12	08:03	07:38	07:56						07:05		19:26 (Alt-03)	06:24				06:06	
	17:31	18:08	19:41						20:13	26	19:52 (Alt-03)	20:45				21:10	
13	08:03	07:37	07:55						07:04		19:26 (Alt-03)	06:23				06:06	
	17:32	18:10	19:42						20:15	27	19:53 (Alt-03)	20:46				21:11	
14	08:02	07:35	07:53						07:02		19:25 (Alt-03)	06:22				06:06	
	17:33	18:11	19:43						20:16	27	19:52 (Alt-03)	20:47				21:11	
15	08:02	07:34	07:52						07:01		19:25 (Alt-03)	06:21				06:06	
	17:34	18:12	19:45						20:17	27	19:52 (Alt-03)	20:48				21:12	
16	08:01	07:33	07:50						06:59		19:24 (Alt-03)	06:20				06:06	
	17:35	18:13	19:46						20:18	27	19:51 (Alt-03)	20:49				21:12	
17	08:01	07:31	07:48						06:58		07:17 (Alt-07)	06:19				06:06	
	17:37	18:15	19:47						20:19	36	19:51 (Alt-03)	20:50				21:13	
18	08:00	07:30	07:47						06:56		07:15 (Alt-07)	06:19				06:06	
	17:38	18:16	19:48						20:20	38	19:50 (Alt-03)	20:51				21:13	
19	08:00	07:29	07:45						06:54		07:14 (Alt-07)	06:18				06:06	
	17:39	18:17	19:49						20:21	40	19:50 (Alt-03)	20:52				21:13	
20	07:59	07:27	07:43						06:53		07:12 (Alt-07)	06:17				06:06	
	17:40	18:18	19:50						20:22	41	19:48 (Alt-03)	20:53				21:14	
21	07:59	07:26	07:42						06:51		07:11 (Alt-07)	06:16				06:06	
	17:41	18:19	19:51						20:23	41	19:47 (Alt-03)	20:54				21:14	
22	07:58	07:24	07:40						06:50		07:09 (Alt-07)	06:15				06:06	
	17:42	18:21	19:52						20:24	39	19:45 (Alt-03)	20:55				21:14	
23	07:57	07:23	07:38						06:49		07:08 (Alt-07)	06:14				06:07	
	17:44	18:22	19:53						20:25	37	19:43 (Alt-03)	20:56				21:14	
24	07:57	07:21	07:37						06:47		07:06 (Alt-07)	06:14				06:07	
	17:45	18:23	19:54						20:26	31	19:39 (Alt-03)	20:57				21:15	
25	07:56	07:20	07:35						07:54 (Alt-05)		07:07 (Alt-07)	06:13				06:07	
	17:46	18:24	19:55	3					07:57 (Alt-05)	25	07:32 (Alt-07)	20:57				21:15	
26	07:55	07:19	07:33						07:52 (Alt-05)		07:07 (Alt-07)	06:12				06:08	
	17:47	18:25	19:56	6					07:58 (Alt-05)	25	07:32 (Alt-07)	20:58				21:15	
27	07:54	07:17	07:32						07:50 (Alt-05)		07:06 (Alt-07)	06:12				06:08	
	17:49	18:27	19:58	9					07:59 (Alt-05)	25	07:31 (Alt-07)	20:59				21:15	
28	07:54	07:16	07:30						07:49 (Alt-05)		07:07 (Alt-07)	06:11				06:08	
	17:50	18:28	19:59	11					08:00 (Alt-05)	24	07:31 (Alt-07)	21:00				21:15	
29	07:53		07:28						07:47 (Alt-05)		07:07 (Alt-07)	06:10				06:09	
	17:51		20:00	12					07:59 (Alt-05)	23	07:30 (Alt-07)	21:01				21:15	
30	07:52		07:27						07:45 (Alt-05)		07:07 (Alt-07)	06:10				06:09	
	17:52		20:00	14					07:59 (Alt-05)	22	07:29 (Alt-07)	21:02				21:15	
31	07:51		07:25						07:44 (Alt-05)			06:09					
	17:54		20:01	15					07:59 (Alt-05)			21:03					
Potential sun hours	298	297	370						398			448				452	
Total, worst case									70		739					69	
Sun reduction									0.55		0.60					0.68	
Oper. time red.									0.97		0.97					0.97	
Wind dir. red.									0.65		0.64					0.65	
Total reduction									0.35		0.37					0.43	
Total, real									24		275					30	

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
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SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR238 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:34		07:04		19:26 (Alt-03)	07:34	07:09	07:43		
	21:15	20:57		20:14	25	19:51 (Alt-03)	19:22	17:35	17:11		
2	06:10	06:35		07:05		19:26 (Alt-03)	07:35	07:10	07:45		
	21:15	20:56		20:12	23	19:49 (Alt-03)	19:20	17:34	17:11		
3	06:11	06:36		07:06		19:27 (Alt-03)	07:37	07:11	07:46		
	21:15	20:54		20:11	20	19:47 (Alt-03)	19:18	17:33	17:11		
4	06:11	06:37		07:07		19:28 (Alt-03)	07:38	07:12	07:47		
	21:14	20:53		20:09	18	19:46 (Alt-03)	19:17	17:32	17:10		
5	06:12	06:38		07:08		19:29 (Alt-03)	07:39	07:13	07:48		
	21:14	20:52		20:07	15	19:44 (Alt-03)	19:15	17:30	17:10		
6	06:12	06:39		07:09		19:32 (Alt-03)	07:40	07:15	07:48		
	21:14	20:51		20:06	10	19:42 (Alt-03)	19:13	17:29	17:10		
7	06:13	06:40		07:10			07:41	07:16	07:49		
	21:14	20:50		20:04			19:12	17:28	17:10		
8	06:14	06:41		07:11		07:42 (Alt-05)	07:42	07:17	07:50		
	21:14	20:49	8	07:31 (Alt-07)	20:02	4	07:46 (Alt-05)	19:10	17:27	17:10	
9	06:14	06:42		07:12		07:38 (Alt-05)	07:43	07:18	07:51		
	21:13	20:47	12	07:33 (Alt-07)	20:01	11	07:49 (Alt-05)	19:09	17:26	17:10	
10	06:15	06:43		07:13		07:37 (Alt-05)	07:44	07:19	07:52		
	21:13	20:46	16	07:35 (Alt-07)	19:57	13	07:50 (Alt-05)	19:07	17:25	17:10	
11	06:16	06:43		07:14		07:34 (Alt-05)	07:45	07:21	07:53		
	21:12	20:45	18	07:36 (Alt-07)	19:56	16	07:50 (Alt-05)	19:05	17:24	17:10	
12	06:16	06:44		07:15		07:35 (Alt-05)	07:46	07:22	07:54		
	21:12	20:44	21	07:37 (Alt-07)	19:54	15	07:50 (Alt-05)	19:04	17:23	17:10	
13	06:17	06:45		07:16		07:36 (Alt-05)	07:47	07:23	07:55		
	21:12	20:42	22	07:38 (Alt-07)	19:52	14	07:50 (Alt-05)	19:02	17:22	17:10	
14	06:18	06:46		07:17		07:37 (Alt-05)	07:48	07:24	07:55		
	21:11	20:41	23	07:38 (Alt-07)	19:51	13	07:50 (Alt-05)	19:01	17:21	17:11	
15	06:19	06:47		07:18		07:38 (Alt-05)	07:49	07:25	07:56		
	21:10	20:40	24	07:38 (Alt-07)	19:49	11	07:49 (Alt-05)	18:59	17:20	17:11	
16	06:19	06:48		07:19		07:39 (Alt-05)	07:50	07:27	07:57		
	21:10	20:38	25	07:39 (Alt-07)	19:47	9	07:48 (Alt-05)	18:58	17:20	17:11	
17	06:20	06:49		07:20		07:40 (Alt-05)	07:51	07:28	07:57		
	21:09	20:37	26	07:39 (Alt-07)	19:46	7	07:47 (Alt-05)	18:56	17:19	17:11	
18	06:21	06:50		07:21		07:41 (Alt-05)	07:53	07:29	07:58		
	21:09	20:35	25	07:38 (Alt-07)	19:44	3	07:44 (Alt-05)	18:55	17:18	17:12	
19	06:22	06:51		07:22			07:54	07:30	07:59		
	21:08	20:34	33	19:47 (Alt-03)	19:42		18:53	17:17	17:12		
20	06:23	06:52		07:23			07:55	07:31	07:59		
	21:07	20:32	38	19:49 (Alt-03)	19:40		18:52	17:17	17:13		
21	06:24	06:53		07:24			07:56	07:32	08:00		
	21:07	20:31	40	19:50 (Alt-03)	19:39		18:50	17:16	17:13		
22	06:24	06:54		07:25			07:57	07:34	08:00		
	21:06	20:29	40	19:51 (Alt-03)	19:37		18:49	17:15	17:13		
23	06:25	06:55		07:26			07:58	07:35	08:01		
	21:05	20:28	41	19:52 (Alt-03)	19:35		18:47	17:15	17:14		
24	06:26	06:56		07:27			07:59	07:36	08:01		
	21:04	20:26	41	19:53 (Alt-03)	19:34		18:46	17:14	17:15		
25	06:27	06:57		07:28			08:01	07:37	08:02		
	21:03	20:25	38	19:53 (Alt-03)	19:32		18:44	17:14	17:15		
26	06:28	06:58		07:29			08:02	07:38	08:02		
	21:02	20:23	35	19:53 (Alt-03)	19:30		18:43	17:13	17:16		
27	06:29	06:59		07:30			08:03	07:39	08:02		
	21:02	20:22	27	19:53 (Alt-03)	19:28		18:42	17:13	17:16		
28	06:30	07:00		07:31			08:04	07:40	08:03		
	21:01	20:20	27	19:53 (Alt-03)	19:27		18:40	17:12	17:17		
29	06:31	07:01		07:32			08:05	07:41	08:03		
	21:00	20:19	27	19:53 (Alt-03)	19:25		18:39	17:12	17:18		
30	06:32	07:02		07:33			08:06	07:42	08:03		
	20:59	20:17	27	19:52 (Alt-03)	19:23		18:38	17:11	17:19		
31	06:33	07:03		07:34			08:07		08:03		
	20:58	20:16	26	19:52 (Alt-03)			18:36		17:19		
Potential sun hours	459	428		375			345	298	288		
Total, worst case		660		227							
Sun reduction		0.74		0.68							
Oper. time red.		0.97		0.97							
Wind dir. red.		0.64		0.64							
Total reduction		0.46		0.42							
Total, real		304		96							

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR239 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04		07:50		07:14		07:23		06:38		06:09
	17:21		17:55		18:29		20:02		20:34		21:03
2	08:04		07:49		07:12		07:22		06:36		06:09
	17:21		17:56		18:30		20:03		20:35		21:04
3	08:04		07:48		07:11		07:20		06:35		06:08
	17:22		17:57		18:31		20:04		20:36		21:05
4	08:04		07:47		07:09		07:18		06:34		06:08
	17:23		17:59		18:32		20:05		20:37		21:05
5	08:04		07:46		07:08		07:17		06:33		06:07
	17:24		18:00		18:33		20:06		20:38		21:06
6	08:04		07:45		07:06		07:15		06:31		06:07
	17:25		18:01		18:35		20:07		20:39		21:07
7	08:04		07:44		07:05		07:13		06:30		06:07
	17:26		18:02		18:36		20:08		20:40		21:07
8	08:04	16:59 (BC059)	07:43		08:03		07:12		06:29		06:07
	17:27	2 17:01 (BC059)	18:04		19:37		20:09		20:41		21:08
9	08:03	16:57 (BC059)	07:41		08:01		07:10		06:28		06:06
	17:28	5 17:02 (BC059)	18:05		19:38		20:10		20:42		21:09
10	08:03	16:57 (BC059)	07:40		08:00		07:09		06:27		06:06
	17:29	6 17:03 (BC059)	18:06		19:39		20:11		20:43		21:09
11	08:03	16:57 (BC059)	07:39		07:58		07:07		06:26		06:06
	17:30	7 17:04 (BC059)	18:07		19:40		20:12		20:44		21:10
12	08:03	16:56 (BC059)	07:38		07:56		07:05		06:25		06:06
	17:31	9 17:05 (BC059)	18:09		19:41		20:13		20:45		21:10
13	08:02	16:56 (BC059)	07:37		07:55		07:04		06:23		06:06
	17:32	10 17:06 (BC059)	18:10		19:42		20:14		20:46		21:11
14	08:02	16:56 (BC059)	07:35		07:53		07:02		06:22		06:06
	17:33	12 17:08 (BC059)	18:11		19:43		20:16		20:47		21:11
15	08:02	16:56 (BC059)	07:34		07:52		07:01		06:21		06:06
	17:34	13 17:09 (BC059)	18:12		19:45		20:17		20:48		21:12
16	08:01	16:56 (BC059)	07:33		07:50		06:59		06:20		06:06
	17:36	14 17:10 (BC059)	18:13		19:46		20:18		20:49		21:12
17	08:01	16:56 (BC059)	07:31	17:50 (BC051)	07:48		06:58		06:20		06:06
	17:37	15 17:11 (BC059)	18:15	2 17:52 (BC051)	19:47		20:19		20:50		21:13
18	08:00	16:57 (BC059)	07:30	17:48 (BC051)	07:47		06:56		06:19		06:06
	17:38	16 17:13 (BC059)	18:16	6 17:54 (BC051)	19:48		20:20		20:51		21:13
19	08:00	16:57 (BC059)	07:29	17:45 (BC051)	07:45		06:55		06:18		06:06
	17:39	17 17:14 (BC059)	18:17	9 17:54 (BC051)	19:49		20:21		20:52		21:13
20	07:59	16:57 (BC059)	07:27	17:45 (BC051)	07:43		06:53		06:17		06:06
	17:40	17 17:14 (BC059)	18:18	11 17:56 (BC051)	19:50		20:22		20:53		21:14
21	07:59	16:58 (BC059)	07:26	17:44 (BC051)	07:42		06:52		06:16		06:06
	17:41	17 17:15 (BC059)	18:19	13 17:57 (BC051)	19:51		20:23		20:54		21:14
22	07:58	16:58 (BC059)	07:24	17:44 (BC051)	07:40		06:50		06:15		06:07
	17:43	17 17:15 (BC059)	18:21	15 17:59 (BC051)	19:52		20:24		20:55		21:14
23	07:57	16:58 (BC059)	07:23	17:43 (BC051)	07:38		06:49		06:14		06:07
	17:44	16 17:14 (BC059)	18:22	16 17:59 (BC051)	19:53		20:25		20:56		21:14
24	07:57	16:59 (BC059)	07:21	17:44 (BC051)	07:37		06:47		06:14		06:07
	17:45	15 17:14 (BC059)	18:23	15 17:59 (BC051)	19:54		20:26		20:57		21:14
25	07:56	17:01 (BC059)	07:20	17:44 (BC051)	07:35		06:46		06:13		06:07
	17:46	13 17:14 (BC059)	18:24	14 17:58 (BC051)	19:55		20:27		20:57		21:15
26	07:55	17:02 (BC059)	07:19	17:46 (BC051)	07:33		06:44		06:12		06:08
	17:47	11 17:13 (BC059)	18:25	11 17:57 (BC051)	19:56		20:28		20:58		21:15
27	07:54	17:04 (BC059)	07:17	17:47 (BC051)	07:32		06:43		06:12		06:08
	17:49	7 17:11 (BC059)	18:27	8 17:55 (BC051)	19:58		20:29		20:59		21:15
28	07:54		07:15		07:30		06:42		06:11		06:08
	17:50		18:28		19:59		20:30		21:00		21:15
29	07:53				07:28		06:40		06:11		06:09
	17:51				20:00		20:31		21:01		21:15
30	07:52				07:27		06:39		06:10		06:09
	17:52				20:00		20:33		21:02		21:15
31	07:51				07:25		06:37		06:09		
	17:54				20:01		21:02				
Potential sun hours	298		298		370		398		448		452
Total, worst case	239		120								
Sun reduction	0.46		0.51								
Oper. time red.	0.97		0.97								
Wind dir. red.	0.69		0.67								
Total reduction	0.31		0.33								
Total, real	74		40								

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

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

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR239 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:34	07:04	07:34				07:09		07:43	16:39 (BC059)
	21:15	20:57	20:14	19:22				17:35		17:11	8 16:47 (BC059)
2	06:10	06:35	07:05	07:35				07:10		07:44	16:40 (BC059)
	21:15	20:55	20:12	19:20				17:34		17:11	6 16:46 (BC059)
3	06:11	06:36	07:06	07:36				07:11		07:45	16:41 (BC059)
	21:15	20:54	20:11	19:18				17:33		17:11	5 16:46 (BC059)
4	06:11	06:37	07:07	07:38				07:12		07:46	16:43 (BC059)
	21:14	20:53	20:09	19:17				17:32		17:11	3 16:46 (BC059)
5	06:12	06:38	07:08	07:39				07:13		07:47	
	21:14	20:52	20:07	19:15				17:31		17:10	
6	06:12	06:39	07:09	07:40				07:15		07:48	
	21:14	20:51	20:06	19:13				17:29		17:10	
7	06:13	06:40	07:10	07:41				07:16		07:49	
	21:14	20:50	20:04	19:12				17:28		17:10	
8	06:14	06:41	07:11	07:42				07:17		07:50	
	21:13	20:49	20:02	19:10				17:27		17:10	
9	06:14	06:42	07:12	07:43				07:18		07:51	
	21:13	20:47	20:01	19:09				17:26		17:10	
10	06:15	06:43	07:13	07:44				07:19		07:52	
	21:13	20:46	19:57	19:07				17:25		17:10	
11	06:16	06:44	07:14	07:45				07:21		07:53	
	21:12	20:45	19:56	19:05				17:24		17:10	
12	06:16	06:45	07:15	07:46				07:22		07:54	
	21:12	20:43	19:54	19:04				17:23		17:10	
13	06:17	06:46	07:16	07:47				07:23		07:54	
	21:11	20:42	19:52	19:02				17:22		17:10	
14	06:18	06:47	07:17	07:48	18:23 (BC051)			07:24		07:55	
	21:11	20:41	19:51	19:01	2 18:25 (BC051)			17:21		17:11	
15	06:19	06:48	07:18	07:49	18:19 (BC051)			07:25	16:37 (BC059)	07:56	
	21:10	20:39	19:49	18:59	9 18:28 (BC051)			17:21	7 16:44 (BC059)	17:11	
16	06:19	06:49	07:19	07:50	18:18 (BC051)			07:26	16:35 (BC059)	07:57	
	21:10	20:38	19:47	18:58	12 18:30 (BC051)			17:20	11 16:46 (BC059)	17:11	
17	06:20	06:50	07:20	07:51	18:16 (BC051)			07:28	16:34 (BC059)	07:57	
	21:09	20:37	19:46	18:56	15 18:31 (BC051)			17:19	13 16:47 (BC059)	17:11	
18	06:21	06:51	07:21	07:53	18:16 (BC051)			07:29	16:33 (BC059)	07:58	
	21:09	20:35	19:44	18:55	15 18:31 (BC051)			17:18	15 16:48 (BC059)	17:12	
19	06:22	06:52	07:22	07:54	18:15 (BC051)			07:30	16:33 (BC059)	07:59	
	21:08	20:34	19:42	18:53	15 18:30 (BC051)			17:17	16 16:49 (BC059)	17:12	
20	06:23	06:53	07:23	07:55	18:15 (BC051)			07:31	16:33 (BC059)	07:59	
	21:07	20:32	19:40	18:52	14 18:29 (BC051)			17:17	17 16:50 (BC059)	17:13	
21	06:24	06:54	07:24	07:56	18:15 (BC051)			07:32	16:33 (BC059)	08:00	
	21:07	20:31	19:39	18:50	12 18:27 (BC051)			17:16	17 16:50 (BC059)	17:13	
22	06:25	06:55	07:25	07:57	18:16 (BC051)			07:33	16:33 (BC059)	08:00	
	21:06	20:29	19:37	18:49	10 18:26 (BC051)			17:15	17 16:50 (BC059)	17:14	
23	06:25	06:56	07:26	07:58	18:16 (BC051)			07:35	16:34 (BC059)	08:01	
	21:05	20:28	19:35	18:47	9 18:25 (BC051)			17:15	17 16:51 (BC059)	17:14	
24	06:26	06:57	07:27	07:59	18:18 (BC051)			07:36	16:34 (BC059)	08:01	
	21:04	20:26	19:34	18:46	5 18:23 (BC051)			17:14	16 16:50 (BC059)	17:15	
25	06:27	06:58	07:28	08:00				07:37	16:34 (BC059)	08:02	
	21:03	20:25	19:32	18:44				17:14	15 16:49 (BC059)	17:15	
26	06:28	06:59	07:29	08:02				07:38	16:34 (BC059)	08:02	
	21:02	20:23	19:30	18:43				17:13	14 16:48 (BC059)	17:16	
27	06:29	07:00	07:30	08:03				07:39	16:35 (BC059)	08:02	
	21:02	20:22	19:29	18:42				17:13	13 16:48 (BC059)	17:17	
28	06:30	07:01	07:31	08:04				07:40	16:35 (BC059)	08:03	
	21:01	20:20	19:27	18:40				17:12	12 16:47 (BC059)	17:17	
29	06:31	07:01	07:32	08:05				07:41	16:37 (BC059)	08:03	
	21:00	20:19	19:25	18:39				17:12	11 16:48 (BC059)	17:18	
30	06:32	07:02	07:33	08:06				07:42	16:38 (BC059)	08:03	
	20:59	20:17	19:23	18:38				17:12	9 16:47 (BC059)	17:19	
31	06:33	07:03		08:07						08:03	
	20:58	20:16		18:37						17:19	
Potential sun hours	459	428	375	345				298		288	
Total, worst case					118			220			22
Sun reduction					0.62			0.42			0.38
Oper. time red.					0.97			0.97			0.97
Wind dir. red.					0.67			0.69			0.69
Total reduction					0.40			0.28			0.25
Total, real					47			62			6

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

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

Northwest Ohio

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar**Calculation:** NwOH - Vestas Final Layout - valid 130520**Shadow receptor:** SR240 - Non-Participating**Assumptions for shadow calculations**

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January			February			March			April			May			June		
1	08:04	07:50	07:14						07:23			06:38			19:52 (T-38)	06:09	
	17:20	17:55	18:29						20:02			20:34			6 19:58 (T-38)	21:03	
2	08:04	07:49	07:12						07:22			06:36				06:09	
	17:21	17:56	18:30						20:03			20:35				21:04	
3	08:04	07:48	07:11						07:20			06:35				06:08	
	17:22	17:57	18:31						20:04			20:36				21:05	
4	08:04	07:47	07:09						07:18			06:34				06:08	
	17:23	17:59	18:32						20:05			20:37				21:05	
5	08:04	07:46	07:08						07:17			06:32				06:07	
	17:24	18:00	18:33						20:06			20:38				21:06	
6	08:04	07:45	07:06						07:15			06:31				06:07	
	17:25	18:01	18:35						20:07			20:39				21:07	
7	08:04	07:44	07:05						07:13			06:30				06:07	
	17:26	18:02	18:36						20:08			20:40				21:08	
8	08:04	07:43	08:03						07:12			06:29				06:07	
	17:27	18:04	19:37						20:09			20:41				21:08	
9	08:04	07:41	08:01						07:10			06:28				06:06	
	17:28	18:05	19:38						20:10			20:42				21:09	
10	08:03	07:40	08:00						07:09			06:27				06:06	
	17:29	18:06	19:39						20:11			20:43				21:09	
11	08:03	07:39	07:58						07:07			06:26				06:06	06:38 (T-47)
	17:30	18:07	19:40						20:12			20:44				21:10	3 06:41 (T-47)
12	08:03	07:38	07:56						07:05			06:24				06:06	06:36 (T-47)
	17:31	18:09	19:41						20:13			20:45				21:10	7 06:43 (T-47)
13	08:03	07:37	07:55					19:14 (T-41)	07:04			06:23				06:06	06:35 (T-47)
	17:32	18:10	19:42					19:19 (T-41)	20:15			20:46				21:11	10 06:45 (T-47)
14	08:02	07:35	07:53					19:09 (T-41)	07:02			06:22				06:06	06:34 (T-47)
	17:33	18:11	19:43					19:22 (T-41)	20:16			20:47				21:11	12 06:46 (T-47)
15	08:02	07:34	07:52					19:07 (T-41)	07:01			06:21				06:06	06:34 (T-47)
	17:34	18:12	19:45					19:24 (T-41)	20:17			20:48				21:12	12 06:46 (T-47)
16	08:01	07:33	07:50					19:05 (T-41)	06:59			06:20				06:06	06:34 (T-47)
	17:36	18:13	19:46					19:24 (T-41)	20:18			20:49				21:12	13 06:47 (T-47)
17	08:01	07:31	07:48					19:03 (T-41)	06:58			19:54 (T-38)	06:20			06:06	06:34 (T-47)
	17:37	18:15	19:47					19:25 (T-41)	20:19			19:58 (T-38)	20:50			21:13	13 06:47 (T-47)
18	08:00	07:30	07:47					19:03 (T-41)	06:56			19:51 (T-38)	06:19			06:06	06:33 (T-47)
	17:38	18:16	19:48					19:27 (T-41)	20:20			19:58 (T-38)	20:51			21:13	15 06:48 (T-47)
19	08:00	07:29	07:45					19:02 (T-41)	06:54			19:50 (T-38)	06:18			06:06	06:33 (T-47)
	17:39	18:17	19:49					19:28 (T-41)	20:21			20:00 (T-38)	20:52			21:13	15 06:48 (T-47)
20	07:59	07:27	07:43					19:01 (T-41)	06:53			19:48 (T-38)	06:17			06:06	06:33 (T-47)
	17:40	18:18	19:50					19:27 (T-41)	20:22			20:00 (T-38)	20:53			21:14	15 06:48 (T-47)
21	07:59	07:26	07:42					19:01 (T-41)	06:52			19:48 (T-38)	06:16			06:06	06:34 (T-47)
	17:41	18:19	19:51					19:28 (T-41)	20:23			20:02 (T-38)	20:54			21:14	15 06:49 (T-47)
22	07:58	07:24	07:40					19:00 (T-41)	06:50			19:47 (T-38)	06:15			06:06	06:34 (T-47)
	17:43	18:21	19:52					19:27 (T-41)	20:24			20:02 (T-38)	20:55			21:14	15 06:49 (T-47)
23	07:57	07:23	07:38					19:00 (T-41)	06:49			19:47 (T-38)	06:14			06:07	06:34 (T-47)
	17:44	18:22	19:53					19:26 (T-41)	20:25			20:04 (T-38)	20:56			21:14	15 06:49 (T-47)
24	07:57	07:21	07:37					19:01 (T-41)	06:47			19:46 (T-38)	06:14			06:07	06:34 (T-47)
	17:45	18:23	19:54					19:26 (T-41)	20:26			20:04 (T-38)	20:57			21:15	15 06:49 (T-47)
25	07:56	07:20	07:35					19:01 (T-41)	06:46			19:46 (T-38)	06:13			06:07	06:35 (T-47)
	17:46	18:24	19:55					19:25 (T-41)	20:27			20:05 (T-38)	20:57			21:15	15 06:50 (T-47)
26	07:55	07:19	07:33					19:01 (T-41)	06:44			19:47 (T-38)	06:12			06:08	06:36 (T-47)
	17:47	18:25	19:56					19:24 (T-41)	20:28			20:06 (T-38)	20:58			21:15	13 06:49 (T-47)
27	07:54	07:17	07:32					19:02 (T-41)	06:43			19:46 (T-38)	06:12			06:08	06:36 (T-47)
	17:49	18:27	19:58					19:22 (T-41)	20:29			20:04 (T-38)	20:59			21:15	13 06:49 (T-47)
28	07:54	07:15	07:30					19:03 (T-41)	06:42			19:47 (T-38)	06:11			06:08	06:37 (T-47)
	17:50	18:28	19:59					19:21 (T-41)	20:30			20:04 (T-38)	21:00			21:15	12 06:49 (T-47)
29	07:53		07:28					19:05 (T-41)	06:40			19:49 (T-38)	06:10			06:09	06:38 (T-47)
	17:51		20:00					19:18 (T-41)	20:31			20:03 (T-38)	21:01			21:15	10 06:48 (T-47)
30	07:52		07:27					19:10 (T-41)	06:39			19:49 (T-38)	06:10			06:09	06:40 (T-47)
	17:52		20:00					19:12 (T-41)	20:33			20:00 (T-38)	21:02			21:15	8 06:48 (T-47)
31	07:51		07:25										06:09				
	17:54		20:01										21:02				
Potential sun hours	298	297	370					398	195			6			452	246	
Total, worst case								0.55	0.60			0.68				0.74	
Sun reduction								0.97	0.97			0.97				0.97	
Oper. time red.								0.65	0.61			0.61				0.69	
Wind dir. red.								0.35	0.35			0.40				0.49	
Total reduction								124	69			2				121	
Total, real																	

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR240 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	06:41 (T-47)	06:34		07:04	07:34	07:09	07:43			
	21:15	5 06:46 (T-47)	20:57		20:14	19:22	17:35	17:11			
2	06:10		06:35		07:05	07:35	07:10	07:44			
	21:15		20:56		20:12	19:20	17:34	17:11			
3	06:11		06:36		07:06	07:36	07:11	07:46			
	21:15		20:54		20:11	19:18	17:33	17:11			
4	06:11		06:37		07:07	07:38	07:12	07:46			
	21:14		20:53		20:09	19:17	17:32	17:10			
5	06:12		06:38		07:08	07:39	07:13	07:47			
	21:14		20:52		20:07	19:15	17:30	17:10			
6	06:12		06:39		07:09	07:40	07:15	07:48			
	21:14		20:51		20:06	19:13	17:29	17:10			
7	06:13		06:40		07:10	07:41	07:16	07:49			
	21:14		20:50		20:04	19:12	17:28	17:10			
8	06:14		06:41		07:11	07:42	07:17	07:50			
	21:13		20:49		20:02	19:10	17:27	17:10			
9	06:14		06:42		07:12	07:43	07:18	07:51			
	21:13		20:47		20:01	19:09	17:26	17:10			
10	06:15		06:43		07:13	07:44	07:19	07:52			
	21:13		20:46		19:57	19:07	17:25	17:10			
11	06:16		06:44		07:14	07:45	07:21	07:53			
	21:12		20:45		19:56	19:05	17:24	17:10			
12	06:16		06:45	20:00 (T-38)	07:15	07:46	07:22	07:54			
	21:12		20:44	7 20:07 (T-38)	19:54	19:04	17:23	17:10			
13	06:17		06:46	19:58 (T-38)	07:16	07:47	07:23	07:54			
	21:11		20:42	11 20:09 (T-38)	19:52	19:02	17:22	17:10			
14	06:18		06:47	19:56 (T-38)	07:17	18:56 (T-41)	07:48	07:24	07:55		
	21:11		20:41	15 20:11 (T-38)	19:51	19:08 (T-41)	19:01	17:21	17:11		
15	06:19		06:48	19:55 (T-38)	07:18	18:53 (T-41)	07:49	07:25	07:56		
	21:10		20:39	17 20:12 (T-38)	19:49	19:10 (T-41)	18:59	17:20	17:11		
16	06:19		06:49	19:54 (T-38)	07:19	18:51 (T-41)	07:50	07:27	07:57		
	21:10		20:38	18 20:12 (T-38)	19:47	19:11 (T-41)	18:58	17:20	17:11		
17	06:20		06:50	19:53 (T-38)	07:20	18:50 (T-41)	07:51	07:28	07:57		
	21:09		20:37	20 20:13 (T-38)	19:46	19:12 (T-41)	18:56	17:19	17:11		
18	06:21		06:50	19:53 (T-38)	07:21	18:48 (T-41)	07:53	07:29	07:58		
	21:09		20:35	19 20:12 (T-38)	19:44	19:12 (T-41)	18:55	17:18	17:12		
19	06:22		06:51	19:53 (T-38)	07:22	18:47 (T-41)	07:54	07:30	07:59		
	21:08		20:34	18 20:11 (T-38)	19:42	19:13 (T-41)	18:53	17:17	17:12		
20	06:23		06:52	19:52 (T-38)	07:23	18:46 (T-41)	07:55	07:31	07:59		
	21:07		20:32	17 20:09 (T-38)	19:40	19:13 (T-41)	18:52	17:17	17:13		
21	06:24		06:53	19:52 (T-38)	07:24	18:46 (T-41)	07:56	07:32	08:00		
	21:07		20:31	16 20:08 (T-38)	19:39	19:13 (T-41)	18:50	17:16	17:13		
22	06:24		06:54	19:52 (T-38)	07:25	18:45 (T-41)	07:57	07:34	08:00		
	21:06		20:29	13 20:05 (T-38)	19:37	19:12 (T-41)	18:49	17:15	17:14		
23	06:25		06:55	19:52 (T-38)	07:26	18:45 (T-41)	07:58	07:35	08:01		
	21:05		20:28	12 20:04 (T-38)	19:35	19:12 (T-41)	18:47	17:15	17:14		
24	06:26		06:56	19:53 (T-38)	07:27	18:45 (T-41)	07:59	07:36	08:01		
	21:04		20:26	10 20:03 (T-38)	19:34	19:11 (T-41)	18:46	17:14	17:15		
25	06:27		06:57	19:54 (T-38)	07:28	18:45 (T-41)	08:00	07:37	08:02		
	21:03		20:25	7 20:01 (T-38)	19:32	19:10 (T-41)	18:44	17:14	17:15		
26	06:28		06:58	19:56 (T-38)	07:29	18:45 (T-41)	08:02	07:38	08:02		
	21:02		20:23	4 20:00 (T-38)	19:30	19:08 (T-41)	18:43	17:13	17:16		
27	06:29		06:59		07:30	18:46 (T-41)	08:03	07:39	08:02		
	21:02		20:22		19:28	19:06 (T-41)	18:42	17:13	17:16		
28	06:30		07:00		07:31	18:47 (T-41)	08:04	07:40	08:03		
	21:01		20:20		19:27	19:05 (T-41)	18:40	17:12	17:17		
29	06:31		07:01		07:32	18:49 (T-41)	08:05	07:41	08:03		
	21:00		20:19		19:25	19:03 (T-41)	18:39	17:12	17:18		
30	06:32		07:02		07:33	18:51 (T-41)	08:06	07:42	08:03		
	20:59		20:17		19:23	9 19:00 (T-41)	18:38	17:11	17:19		
31	06:33		07:03				08:07		08:03		
	20:58		20:16				18:36		17:19		
Potential sun hours	459		428		375		345		298		288
Total, worst case	5		204		364						
Sun reduction	0.75		0.74		0.68						
Oper. time red.	0.97		0.97		0.97						
Wind dir. red.	0.69		0.61		0.65						
Total reduction	0.50		0.44		0.43						
Total, real	3		89		156						

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR241 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	07:50	07:14	07:23		06:38		19:50 (T-41)	06:09	20:29 (T-38)	
	17:21	17:55	18:29	20:02		20:34	21	20:11 (T-41)	21:03	20:39 (T-38)	
2	08:04	07:49	07:12	07:22		06:36		19:49 (T-41)	06:09	20:28 (T-38)	
	17:21	17:56	18:30	20:03		20:35	23	20:12 (T-41)	21:04	20:39 (T-38)	
3	08:04	07:48	07:11	07:20		06:35		19:49 (T-41)	06:08	20:29 (T-38)	
	17:22	17:57	18:31	20:04		20:36	25	20:14 (T-41)	21:05	20:41 (T-38)	
4	08:04	07:47	07:09	07:18		06:34		19:49 (T-41)	06:08	20:28 (T-38)	
	17:23	17:59	18:32	20:05		20:37	26	20:15 (T-41)	21:05	20:41 (T-38)	
5	08:04	07:46	07:08	07:17		06:32		19:48 (T-41)	06:07	20:28 (T-38)	
	17:24	18:00	18:33	20:06		20:38	26	20:14 (T-41)	21:06	20:41 (T-38)	
6	08:04	07:45	07:06	07:15		06:31		19:48 (T-41)	06:07	20:29 (T-38)	
	17:25	18:01	18:35	20:07		20:39	26	20:14 (T-41)	21:07	20:42 (T-38)	
7	08:04	07:44	07:05	07:13		06:30		19:48 (T-41)	06:07	20:29 (T-38)	
	17:26	18:02	18:36	20:08		20:40	26	20:14 (T-41)	21:08	20:43 (T-38)	
8	08:04	07:43	08:03	07:12		06:29		19:48 (T-41)	06:07	20:28 (T-38)	
	17:27	18:04	19:37	20:09		20:41	26	20:14 (T-41)	21:08	20:43 (T-38)	
9	08:03	07:41	08:01	07:10		06:28		19:48 (T-41)	06:06	20:29 (T-38)	
	17:28	18:05	19:38	20:10		20:42	26	20:14 (T-41)	21:09	20:44 (T-38)	
10	08:03	07:40	08:00	07:09		06:27		19:49 (T-41)	06:06	20:29 (T-38)	
	17:29	18:06	19:39	20:11		20:43	25	20:14 (T-41)	21:09	20:44 (T-38)	
11	08:03	07:39	07:58	07:07		06:26		19:49 (T-41)	06:06	20:29 (T-38)	
	17:30	18:07	19:40	20:12		20:44	24	20:13 (T-41)	21:10	20:45 (T-38)	
12	08:03	07:38	07:56	07:05		06:24		19:50 (T-41)	06:06	20:30 (T-38)	
	17:31	18:09	19:41	20:13		20:45	23	20:13 (T-41)	21:10	20:46 (T-38)	
13	08:02	07:37	07:55	07:04		06:23		19:50 (T-41)	06:06	20:30 (T-38)	
	17:32	18:10	19:42	20:15		20:46	22	20:12 (T-41)	21:11	20:46 (T-38)	
14	08:02	07:35	07:53	07:02		06:22		19:51 (T-41)	06:06	20:30 (T-38)	
	17:33	18:11	19:43	20:16		20:47	20	20:11 (T-41)	21:11	20:46 (T-38)	
15	08:02	07:34	07:52	07:01		06:21		19:52 (T-41)	06:06	20:30 (T-38)	
	17:34	18:12	19:45	20:17		20:48	18	20:10 (T-41)	21:12	20:47 (T-38)	
16	08:01	07:33	07:50	06:59		06:20		19:53 (T-41)	06:06	20:31 (T-38)	
	17:36	18:13	19:46	20:18		20:49	16	20:09 (T-41)	21:12	20:47 (T-38)	
17	08:01	07:31	07:48	06:58		06:20		19:54 (T-41)	06:06	20:31 (T-38)	
	17:37	18:15	19:47	20:19		20:50	14	20:08 (T-41)	21:13	20:47 (T-38)	
18	08:00	07:30	07:47	06:56		06:19		19:56 (T-41)	06:06	20:31 (T-38)	
	17:38	18:16	19:48	20:20		20:51	10	20:06 (T-41)	21:13	20:48 (T-38)	
19	08:00	07:29	07:45	06:54		06:18		19:59 (T-41)	06:06	20:31 (T-38)	
	17:39	18:17	19:49	20:21		20:52	3	20:02 (T-41)	21:13	20:48 (T-38)	
20	07:59	07:27	07:43	06:53		06:17			06:06	20:31 (T-38)	
	17:40	18:18	19:50	20:22		20:53			21:14	20:48 (T-38)	
21	07:59	07:26	07:42	06:52		06:16			06:06	20:32 (T-38)	
	17:41	18:19	19:51	20:23		20:54			21:14	20:49 (T-38)	
22	07:58	07:24	07:40	06:50		06:15			06:06	20:32 (T-38)	
	17:43	18:21	19:52	20:24		20:55			21:14	20:49 (T-38)	
23	07:57	07:23	07:38	06:49		06:14			06:07	20:32 (T-38)	
	17:44	18:22	19:53	20:25		20:56			21:14	20:49 (T-38)	
24	07:57	07:21	07:37	06:47		06:14			06:07	20:32 (T-38)	
	17:45	18:23	19:54	20:26		20:57			21:15	20:49 (T-38)	
25	07:56	07:20	07:35	06:46		06:13			06:07	20:33 (T-38)	
	17:46	18:24	19:55	20:27		20:57			21:15	20:50 (T-38)	
26	07:55	07:19	07:33	06:44		06:12		20:32 (T-38)	06:08	20:33 (T-38)	
	17:47	18:25	19:56	20:28	7	20:06 (T-41)	20:58	3	20:35 (T-38)	21:15	16
27	07:54	07:17	07:32	06:43		06:12		19:55 (T-41)	06:08	20:32 (T-38)	
	17:49	18:27	19:58	20:29	12	20:07 (T-41)	20:59	4	20:35 (T-38)	21:15	17
28	07:54	07:15	07:30	06:42		06:11		19:54 (T-41)	06:08	20:33 (T-38)	
	17:50	18:28	19:59	20:30	14	20:08 (T-41)	21:00	6	20:36 (T-38)	21:15	17
29	07:53		07:28	06:40		06:10		19:52 (T-41)	06:09	20:33 (T-38)	
	17:51		20:00	20:31	18	20:10 (T-41)	21:01	7	20:37 (T-38)	21:15	16
30	07:52		07:27	06:39		06:10		19:51 (T-41)	06:09	20:34 (T-38)	
	17:52		20:00	20:33	19	20:10 (T-41)	21:02	8	20:37 (T-38)	21:15	16
31	07:51		07:25			06:09			20:29 (T-38)		
	17:54		20:01			21:02	9	20:38 (T-38)			
Potential sun hours	298	297	370	398		448			452		
Total, worst case					70		437			462	
Sun reduction					0.60		0.68			0.74	
Oper. time red.					0.97		0.97			0.97	
Wind dir. red.					0.59		0.60			0.60	
Total reduction					0.34		0.39			0.43	
Total, real					24		171			198	

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR241 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:10	20:33 (T-38)	06:34	20:00 (T-41)	07:04	07:34	07:09	07:43			
	21:15	16	20:49 (T-38)	20:57	24	20:24 (T-41)	20:14	19:22	17:35	17:11	
2	06:10	20:34 (T-38)	06:35	19:58 (T-41)	07:05	07:35	07:10	07:44			
	21:15	16	20:50 (T-38)	20:56	25	20:23 (T-41)	20:12	19:20	17:34	17:11	
3	06:11	20:34 (T-38)	06:36	19:58 (T-41)	07:06	07:36	07:11	07:45			
	21:15	15	20:49 (T-38)	20:54	26	20:24 (T-41)	20:11	19:18	17:33	17:11	
4	06:11	20:35 (T-38)	06:37	19:58 (T-41)	07:07	07:38	07:12	07:46			
	21:14	14	20:49 (T-38)	20:53	26	20:24 (T-41)	20:09	19:17	17:32	17:10	
5	06:12	20:34 (T-38)	06:38	19:58 (T-41)	07:08	07:39	07:13	07:47			
	21:14	15	20:49 (T-38)	20:52	26	20:24 (T-41)	20:07	19:15	17:31	17:10	
6	06:12	20:35 (T-38)	06:39	19:57 (T-41)	07:09	07:40	07:15	07:48			
	21:14	14	20:49 (T-38)	20:51	27	20:24 (T-41)	20:06	19:13	17:29	17:10	
7	06:13	20:35 (T-38)	06:40	19:57 (T-41)	07:10	07:41	07:16	07:49			
	21:14	13	20:48 (T-38)	20:50	27	20:24 (T-41)	20:04	19:12	17:28	17:10	
8	06:14	20:35 (T-38)	06:41	19:57 (T-41)	07:11	07:42	07:17	07:50			
	21:13	13	20:48 (T-38)	20:49	27	20:24 (T-41)	20:02	19:10	17:27	17:10	
9	06:14	20:36 (T-38)	06:42	19:58 (T-41)	07:12	07:43	07:18	07:51			
	21:13	12	20:48 (T-38)	20:47	25	20:23 (T-41)	20:01	19:09	17:26	17:10	
10	06:15	20:36 (T-38)	06:43	19:58 (T-41)	07:13	07:44	07:19	07:52			
	21:13	11	20:47 (T-38)	20:46	24	20:22 (T-41)	19:57	19:07	17:25	17:10	
11	06:16	20:36 (T-38)	06:44	19:58 (T-41)	07:14	07:45	07:21	07:53			
	21:12	11	20:47 (T-38)	20:45	23	20:21 (T-41)	19:56	19:05	17:24	17:10	
12	06:16	20:37 (T-38)	06:45	19:59 (T-41)	07:15	07:46	07:22	07:54			
	21:12	10	20:47 (T-38)	20:44	21	20:20 (T-41)	19:54	19:04	17:23	17:10	
13	06:17	20:37 (T-38)	06:46	19:59 (T-41)	07:16	07:47	07:23	07:54			
	21:11	9	20:46 (T-38)	20:42	19	20:18 (T-41)	19:52	19:02	17:22	17:10	
14	06:18	20:38 (T-38)	06:47	20:00 (T-41)	07:17	07:48	07:24	07:55			
	21:11	7	20:45 (T-38)	20:41	17	20:17 (T-41)	19:51	19:01	17:21	17:11	
15	06:19	20:39 (T-38)	06:48	20:02 (T-41)	07:18	07:49	07:25	07:56			
	21:10	6	20:45 (T-38)	20:39	14	20:16 (T-41)	19:49	18:59	17:20	17:11	
16	06:19	20:40 (T-38)	06:49	20:04 (T-41)	07:19	07:50	07:26	07:57			
	21:10	5	20:45 (T-38)	20:38	11	20:15 (T-41)	19:47	18:58	17:20	17:11	
17	06:20	20:41 (T-38)	06:50	20:07 (T-41)	07:20	07:51	07:28	07:57			
	21:09	4	20:45 (T-38)	20:37	5	20:12 (T-41)	19:46	18:56	17:19	17:11	
18	06:21	20:42 (T-38)	06:51				07:21	07:53	07:29	07:58	
	21:09	1	20:43 (T-38)	20:35			19:44	18:55	17:18	17:12	
19	06:22		06:52				07:22	07:54	07:30	07:59	
	21:08		20:34				19:42	18:53	17:17	17:12	
20	06:23		06:53				07:23	07:55	07:31	07:59	
	21:07		20:32				19:40	18:52	17:17	17:13	
21	06:24		06:53				07:24	07:56	07:32	08:00	
	21:07		20:31				19:39	18:50	17:16	17:13	
22	06:24		06:54				07:25	07:57	07:34	08:00	
	21:06		20:29				19:37	18:49	17:15	17:14	
23	06:25		06:55				07:26	07:58	07:35	08:01	
	21:05		20:28				19:35	18:47	17:15	17:14	
24	06:26		06:56				07:27	07:59	07:36	08:01	
	21:04		20:26				19:34	18:46	17:14	17:15	
25	06:27	20:08 (T-41)	06:57				07:28	08:00	07:37	08:02	
	21:03	7	20:15 (T-41)	20:25			19:32	18:44	17:14	17:15	
26	06:28	20:05 (T-41)	06:58				07:29	08:02	07:38	08:02	
	21:02	12	20:17 (T-41)	20:23			19:30	18:43	17:13	17:16	
27	06:29	20:04 (T-41)	06:59				07:30	08:03	07:39	08:02	
	21:02	15	20:19 (T-41)	20:22			19:28	18:42	17:13	17:17	
28	06:30	20:03 (T-41)	07:00				07:31	08:04	07:40	08:03	
	21:01	17	20:20 (T-41)	20:20			19:27	18:40	17:12	17:17	
29	06:31	20:02 (T-41)	07:01				07:32	08:05	07:41	08:03	
	21:00	19	20:21 (T-41)	20:19			19:25	18:39	17:12	17:18	
30	06:32	20:01 (T-41)	07:02				07:33	08:06	07:42	08:03	
	20:59	21	20:22 (T-41)	20:17			19:23	18:38	17:11	17:19	
31	06:33	20:01 (T-41)	07:03					08:07		08:03	
	20:58	22	20:23 (T-41)	20:16				18:37		17:19	
Potential sun hours	459		428				375	345	298	288	
Total, worst case		305		367							
Sun reduction		0.75		0.74							
Oper. time red.		0.97		0.97							
Wind dir. red.		0.60		0.59							
Total reduction		0.43		0.43							
Total, real		132		156							

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

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

Northwest Ohio

Description:

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EAPC Wind Energy

3100 DeMers Avenue

US-GRAND FORKS, ND 58201

+1 701 775 3000

wind@eapc.net

Calculated:

5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520**Shadow receptor:** SR242 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S_0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	[January	[February	[March	[April	[May	[June	[July	[August	[September	[October	[November	[December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:34	07:09	07:43
	17:21	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:09	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:46
	17:23	17:59	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:31	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:48
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:07	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:09	06:27	06:06	06:15	06:43	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:45	07:15	07:46	07:22	07:54
	17:31	18:09	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:37	07:55	07:04	06:23	06:06	06:17	06:46	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:15	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:47	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:48	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:49	07:19	07:50	07:26	07:57
	17:36	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:20	06:06	06:20	06:50	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:46	18:56	17:19	17:11
18	08:00	07:30	07:47	06:56	06:19	06:06	06:21	06:51	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:55	06:18	06:06	06:22	06:52	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:53	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:52	06:16	06:06	06:24	06:54	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:07	06:24	06:55	07:25	07:57	07:34	08:00
	17:43	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:14
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:56	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:37	06:47	06:14	06:07	06:26	06:57	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:58	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:19	07:33	06:44	06:12	06:08	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:32	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:49	18:27	19:58	20:29	20:59	21:15	21:02	20:22	19:29	18:42	17:13	17:17
28	07:54	07:15	07:30	06:42	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:11	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:27	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:12	17:19
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:54		20:01		21:02		20:58	20:16		18:37		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR243 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04 17:20	07:50 17:55	07:14 18:29	07:23 20:02	06:37 20:34	06:09 21:03	06:10 21:15	06:34 20:57	07:04 20:14	07:34 19:22	07:09 17:35	16:43 (T-42) 17:10 (T-42)
2	08:04 17:21	07:47 17:56	07:12 18:30	07:22 20:03	06:36 20:35	06:08 21:04	06:10 21:15	06:35 20:56	07:05 20:12	07:35 19:20	07:10 17:34	16:43 (T-42) 17:10 (T-42)
3	08:04 17:22	07:48 17:57	17:22 (T-42) 17:31 (T-42)	07:11 18:31	06:35 20:36	06:08 21:05	06:11 21:15	06:36 20:54	07:06 20:11	07:36 19:18	07:11 17:33	16:44 (T-42) 17:09 (T-42)
4	08:04 17:23	07:47 17:59	17:19 (T-42) 17:34 (T-42)	07:09 18:32	06:34 20:37	06:08 21:06	06:11 21:15	06:37 20:53	07:07 20:09	07:38 19:17	07:12 17:32	16:45 (T-42) 17:08 (T-42)
5	08:04 17:24	07:46 18:00	17:18 (T-42) 17:36 (T-42)	07:08 18:33	06:32 20:38	06:07 21:06	06:12 21:14	06:38 20:52	07:08 20:07	07:39 19:15	07:13 17:30	16:46 (T-42) 17:07 (T-42)
6	08:04 17:25	07:45 18:01	17:16 (T-42) 17:37 (T-42)	07:06 18:35	06:31 20:39	06:07 21:07	06:12 21:14	06:39 20:51	07:09 20:06	07:40 19:13	07:15 17:29	16:48 (T-42) 17:05 (T-42)
7	08:04 17:26	07:44 18:02	17:15 (T-42) 17:39 (T-42)	07:05 18:36	06:30 20:40	06:07 21:08	06:13 21:14	06:39 20:50	07:10 20:04	07:41 19:12	07:16 17:28	16:50 (T-42) 17:04 (T-42)
8	08:04 17:27	07:43 18:04	17:13 (T-42) 17:40 (T-42)	08:03 19:37	06:29 20:41	06:06 21:08	06:14 21:14	06:40 20:49	07:11 20:02	07:42 19:10	07:17 17:27	16:53 (T-42) 17:01 (T-42)
9	08:04 17:28	07:41 18:05	17:13 (T-42) 17:40 (T-42)	08:01 19:38	06:28 20:42	06:06 21:09	06:14 21:13	06:41 20:47	07:12 20:01	07:43 19:09	07:18 17:26	17:01 (T-42) 17:10
10	08:03 17:29	07:40 18:06	17:13 (T-42) 17:41 (T-42)	08:00 19:39	06:27 20:43	06:06 21:09	06:15 21:13	06:42 20:46	07:13 19:57	07:44 19:07	07:19 17:25	17:10
11	08:03 17:30	07:39 18:07	17:13 (T-42) 17:42 (T-42)	07:58 19:40	06:25 20:44	06:06 21:10	06:16 21:12	06:43 20:45	07:14 19:56	07:45 19:05	07:21 17:24	17:10
12	08:03 17:31	07:38 18:08	17:13 (T-42) 17:42 (T-42)	07:56 19:41	06:24 20:45	06:06 21:11	06:16 21:12	06:44 20:44	07:15 19:54	07:46 19:04	07:22 17:23	17:10
13	08:03 17:32	07:37 18:10	17:12 (T-42) 17:42 (T-42)	07:55 19:42	06:23 20:46	06:06 21:11	06:17 21:12	06:45 20:42	07:16 19:52	07:47 19:02	07:23 17:22	17:10
14	08:02 17:33	07:35 18:11	17:12 (T-42) 17:42 (T-42)	07:53 19:43	06:22 20:47	06:06 21:11	06:18 21:11	06:46 20:41	07:17 19:51	07:48 19:01	07:24 17:21	17:10
15	08:02 17:34	07:34 18:12	17:13 (T-42) 17:42 (T-42)	07:52 19:45	06:21 20:48	06:06 21:12	06:19 21:10	06:47 20:40	07:18 19:49	07:49 18:59	07:25 17:20	17:11
16	08:01 17:35	07:33 18:13	17:12 (T-42) 17:41 (T-42)	07:50 19:46	06:20 20:49	06:06 21:12	06:19 21:10	06:48 20:38	07:19 19:47	07:50 18:58	07:27 17:20	17:11
17	08:01 17:37	07:31 18:15	17:13 (T-42) 17:41 (T-42)	07:48 19:47	06:19 20:50	06:06 21:13	06:20 21:09	06:49 20:37	07:20 19:46	07:51 18:56	07:28 17:19	17:11
18	08:00 17:38	07:30 18:16	17:14 (T-42) 17:41 (T-42)	07:47 19:48	06:19 20:51	06:06 21:13	06:21 21:09	06:50 20:35	07:21 19:44	07:53 18:55	07:29 17:18	17:12
19	08:00 17:39	07:29 18:17	17:14 (T-42) 17:40 (T-42)	07:45 19:49	06:18 20:52	06:06 21:13	06:22 21:08	06:51 20:34	07:22 19:42	07:54 18:53	07:30 17:17	17:12
20	07:59 17:40	07:27 18:18	17:16 (T-42) 17:39 (T-42)	07:43 19:50	06:17 20:22	06:06 21:14	06:23 21:07	06:52 20:32	07:23 19:40	07:55 18:52	07:31 17:17	17:13
21	07:59 17:41	07:26 18:19	17:16 (T-42) 17:37 (T-42)	07:42 19:51	06:16 20:23	06:06 21:14	06:24 21:07	06:53 20:31	07:24 19:39	07:56 18:50	07:32 17:16	17:13
22	07:58 17:42	07:24 18:21	17:18 (T-42) 17:36 (T-42)	07:40 19:52	06:15 20:24	06:06 21:14	06:24 21:06	06:54 20:29	07:25 19:37	07:57 18:49	07:34 17:15	17:13
23	07:57 17:44	07:23 18:22	17:21 (T-42) 17:34 (T-42)	07:38 19:53	06:14 20:25	06:07 21:14	06:25 21:05	06:55 20:28	07:26 19:35	07:58 18:47	07:35 17:15	17:14
24	07:57 17:45	07:21 18:23	17:37 (T-42) 19:54	06:47 20:26	06:14 20:57	06:07 21:15	06:26 21:04	06:56 20:26	07:27 19:34	07:59 18:46	07:36 17:14	17:15
25	07:56 17:46	07:20 18:24	17:35 (T-42) 19:55	06:46 20:27	06:13 20:58	06:07 21:15	06:27 21:03	06:57 20:25	07:28 19:32	08:01 18:44	07:37 17:14	17:15
26	07:55 17:47	07:19 18:25	17:42 (T-42) 19:56	06:44 20:28	06:12 20:58	06:08 21:15	06:28 21:02	06:58 20:23	07:29 19:30	08:02 18:43	07:38 17:13	17:16
27	07:54 17:49	07:17 18:26	17:42 (T-42) 19:58	06:43 20:29	06:12 20:59	06:08 21:15	06:29 21:02	06:59 20:22	07:30 19:28	08:03 18:42	07:39 17:13	17:16
28	07:54 17:50	07:16 18:28	17:42 (T-42) 19:59	06:41 20:30	06:11 21:00	06:08 21:15	06:30 21:01	07:00 20:20	07:31 19:27	08:04 18:40	07:40 17:12	17:17
29	07:53 17:51	07:15 18:28	17:42 (T-42) 19:59	06:40 20:32	06:10 21:01	06:09 21:15	06:31 21:00	07:01 20:19	07:32 19:25	08:05 18:39	07:41 17:12	17:18
30	07:52 17:52	07:14 18:28	17:42 (T-42) 19:59	06:39 20:33	06:10 21:02	06:09 21:15	06:32 20:59	07:02 20:17	07:33 19:23	08:06 18:38	07:42 17:11	17:19
31	07:51 17:54	07:13 18:28	17:42 (T-42) 19:59	06:38 20:33	06:09 21:03	06:09 21:15	06:33 20:58	07:03 20:16	08:08 18:36	08:09 18:11	17:43 (T-42) 17:10 (T-42)	17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case		499								342	162	
Sun reduction		0.51								0.62	0.42	
Oper. time red.		0.97								0.97	0.97	
Wind dir. red.		0.68								0.68	0.68	
Total reduction		0.34								0.41	0.28	
Total, real		168								140	45	

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR244 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	16:41 (T-40)	07:50	07:14	07:33 (T-49)	07:23	06:37		06:09	06:43 (T-48)	
	17:20	13	16:54 (T-40)	17:55	18:29	15	07:48 (T-49)	20:02	20:34	21:03	24
2	08:04	16:41 (T-40)	07:49	07:12	07:33 (T-49)	07:21	06:36		06:08	06:44 (T-48)	
	17:21	14	16:55 (T-40)	17:56	18:30	15	07:48 (T-49)	20:03	20:35	21:04	23
3	08:04	16:42 (T-40)	07:48	07:11	07:34 (T-49)	07:20	06:35		06:08	06:44 (T-48)	
	17:22	14	16:56 (T-40)	17:57	18:31	12	07:46 (T-49)	20:04	20:36	21:05	23
4	08:04	16:42 (T-40)	07:47	07:09	07:36 (T-49)	07:18	06:34		06:08	06:44 (T-48)	
	17:23	15	16:57 (T-40)	17:58	18:32	9	07:45 (T-49)	20:05	20:37	21:06	22
5	08:04	16:43 (T-40)	07:46	07:08	07:17		06:32		06:07	06:45 (T-48)	
	17:24	15	16:58 (T-40)	18:00	18:33		20:06	20:38	21:06	21	
6	08:04	16:43 (T-40)	07:45	07:06	07:15		06:31		06:07	06:46 (T-48)	
	17:25	16	16:59 (T-40)	18:01	18:35		20:07	20:39	21:07	20	
7	08:04	16:44 (T-40)	07:44	07:05	07:13		06:30		06:07	06:46 (T-48)	
	17:26	16	17:00 (T-40)	18:02	18:36		20:08	20:40	21:08	19	
8	08:04	16:45 (T-40)	07:43	08:03	07:12		06:29	06:51 (T-48)	06:06	06:47 (T-48)	
	17:27	16	17:01 (T-40)	18:03	19:37		20:09	20:41	21:08	18	
9	08:04	16:45 (T-40)	07:41	08:01	07:10		06:28	06:48 (T-48)	06:06	06:48 (T-48)	
	17:28	16	17:01 (T-40)	18:05	19:38		20:10	20:42	21:09	17	
10	08:03	16:45 (T-40)	07:40	08:00	07:08		06:27	06:47 (T-48)	06:06	06:48 (T-48)	
	17:29	17	17:02 (T-40)	18:06	19:39		20:11	20:43	21:09	17	
11	08:03	16:46 (T-40)	07:39	07:58	07:07		06:25	06:46 (T-48)	06:06	06:49 (T-48)	
	17:30	17	17:03 (T-40)	18:07	19:40		20:12	20:44	21:10	16	
12	08:03	16:48 (T-40)	07:38	07:56	07:05		06:24	06:45 (T-48)	06:06	06:50 (T-48)	
	17:31	15	17:03 (T-40)	18:08	19:41		20:13	20:45	21:11	14	
13	08:03	16:48 (T-40)	07:37	07:55	07:04		06:23	06:44 (T-48)	06:06	06:51 (T-48)	
	17:32	15	17:03 (T-40)	18:10	19:42		20:15	20:46	21:11	13	
14	08:02	16:49 (T-40)	07:35	07:53	07:02		06:22	06:43 (T-48)	06:06	06:51 (T-48)	
	17:33	14	17:03 (T-40)	18:11	19:43		20:16	20:47	21:12	13	
15	08:02	16:50 (T-40)	07:34	07:52	07:01		06:21	06:42 (T-48)	06:06	06:52 (T-48)	
	17:34	12	17:02 (T-40)	18:12	19:45		20:17	20:48	21:12	12	
16	08:01	16:52 (T-40)	07:33	07:50	06:59		06:20	06:41 (T-48)	06:06	06:52 (T-48)	
	17:35	10	17:02 (T-40)	18:13	19:46		20:18	20:49	21:12	12	
17	08:01	16:53 (T-40)	07:31	07:48	06:57		06:19	06:40 (T-48)	06:06	06:53 (T-48)	
	17:37	7	17:00 (T-40)	18:15	19:47		20:19	20:50	21:13	10	
18	08:00		07:30	07:47	06:56		06:18	06:40 (T-48)	06:06	06:53 (T-48)	
	17:38		18:16	19:48	20:20		20:51	20:57	21:13	10	
19	08:00		07:29	07:45	06:54		06:18	06:40 (T-48)	06:06	06:53 (T-48)	
	17:39		18:17	19:49	20:21		20:52	20:57	21:13	10	
20	07:59		07:27	07:43	06:53		06:17	06:40 (T-48)	06:06	06:54 (T-48)	
	17:40		18:18	19:50	20:22		20:53	20:58	21:14	9	
21	07:59		07:26	07:42	06:51		06:16	06:40 (T-48)	06:06	06:54 (T-48)	
	17:41		18:19	19:51	20:23		20:54	20:58	21:14	9	
22	07:58		07:24	07:44 (T-49)	07:40		06:15	06:40 (T-48)	06:06	06:55 (T-48)	
	17:42		18:21	1	07:45 (T-49)	19:52	20:24	20:55	21:14	9	
23	07:58		07:23	07:43 (T-49)	07:38		06:14	06:40 (T-48)	06:07	06:55 (T-48)	
	17:44		18:22	4	07:47 (T-49)	19:53	20:25	20:56	21:14	9	
24	07:57		07:21	07:41 (T-49)	07:37		06:14	06:40 (T-48)	06:07	06:54 (T-48)	
	17:45		18:23	7	07:48 (T-49)	19:54	20:26	20:57	21:15	10	
25	07:56		07:20	07:40 (T-49)	07:35		06:13	06:40 (T-48)	06:07	06:55 (T-48)	
	17:46		18:24	9	07:49 (T-49)	19:55	20:27	20:58	21:15	10	
26	07:55		07:19	07:38 (T-49)	07:33		06:12	06:40 (T-48)	06:07	06:55 (T-48)	
	17:47		18:25	11	07:49 (T-49)	19:56	20:28	20:58	21:15	11	
27	07:55		07:17	07:36 (T-49)	07:31		06:12	06:41 (T-48)	06:08	06:54 (T-48)	
	17:48		18:26	13	07:49 (T-49)	19:57	20:29	20:59	21:15	12	
28	07:54		07:16	07:35 (T-49)	07:30		06:11	06:41 (T-48)	06:08	06:54 (T-48)	
	17:50		18:28	14	07:49 (T-49)	19:59	20:30	21:00	21:15	13	
29	07:53				07:28		06:10	06:42 (T-48)	06:09	06:54 (T-48)	
	17:51				20:00		20:32	21:01	21:15	13	
30	07:52				07:26		06:39	06:10	06:09	06:54 (T-48)	
	17:52				20:00		20:33	21:02	21:15	14	
31	07:51				07:25			06:09	06:43 (T-48)		
	17:53				20:01			21:03	24	07:07 (T-48)	
Potential sun hours	298		297		370		398	448		452	
Total, worst case	242		59		51			571		433	
Sun reduction	0.46		0.51		0.55			0.68		0.74	
Oper. time red.	0.97		0.97		0.97			0.97		0.97	
Wind dir. red.	0.69		0.60		0.60			0.68		0.68	
Total reduction	0.31		0.30		0.32			0.45		0.49	
Total, real	75		18		16			255		210	

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR244 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July			August			September			October			November			December		
1	06:10	06:53 (T-48)	06:34	19	06:55 (T-48)	07:04	07:34					07:09			07:44	16:29 (T-40)	
	21:15	07:09 (T-48)	20:57		07:14 (T-48)	20:14	19:22					17:35			17:11	16:45 (T-40)	
2	06:10	06:54 (T-48)	06:35		06:56 (T-48)	07:05	07:35					07:10			07:45	16:29 (T-40)	
	21:15	07:10 (T-48)	20:56	17	07:13 (T-48)	20:12	19:20					17:34			17:11	16:45 (T-40)	
3	06:11	06:53 (T-48)	06:36		06:57 (T-48)	07:06	07:36					07:11			07:46	16:29 (T-40)	
	21:15	07:10 (T-48)	20:54	14	07:11 (T-48)	20:11	19:18					17:33			17:11	16:45 (T-40)	
4	06:11	06:53 (T-48)	06:36		06:59 (T-48)	07:07	07:38					07:12			07:47	16:29 (T-40)	
	21:15	07:11 (T-48)	20:53	10	07:09 (T-48)	20:09	19:17					17:32			17:10	16:45 (T-40)	
5	06:12	06:52 (T-48)	06:37			07:08	07:39					07:13			07:48	16:29 (T-40)	
	21:14	07:11 (T-48)	20:52			20:07	19:15					17:30			17:10	16:45 (T-40)	
6	06:12	06:52 (T-48)	06:38			07:09	07:40					07:15			07:49	16:29 (T-40)	
	21:14	07:12 (T-48)	20:51			20:06	19:13					17:29			17:10	16:45 (T-40)	
7	06:13	06:52 (T-48)	06:39			07:10	07:41					07:16			07:49	16:30 (T-40)	
	21:14	07:12 (T-48)	20:50			20:04	19:12					17:28			17:10	16:45 (T-40)	
8	06:14	06:52 (T-48)	06:40			07:11	07:42					07:17			07:50	16:30 (T-40)	
	21:14	07:13 (T-48)	20:49			20:02	19:10					17:27			17:10	16:45 (T-40)	
9	06:14	06:52 (T-48)	06:41			07:12	07:43				08:12 (T-49)	07:18			07:51	16:31 (T-40)	
	21:13	07:14 (T-48)	20:47			20:01	19:09			6	08:18 (T-49)	17:26			17:10	16:45 (T-40)	
10	06:15	06:51 (T-48)	06:42			07:13	07:44				08:09 (T-49)	07:19			07:52	16:31 (T-40)	
	21:13	07:14 (T-48)	20:46			19:57	19:07			11	08:20 (T-49)	17:25			17:10	16:45 (T-40)	
11	06:16	06:51 (T-48)	06:43			07:14	07:45				08:07 (T-49)	07:21			07:53	16:31 (T-40)	
	21:12	07:15 (T-48)	20:45			19:56	19:05			14	08:21 (T-49)	17:24			17:10	16:44 (T-40)	
12	06:16	06:51 (T-48)	06:44			07:15	07:46				08:06 (T-49)	07:22			07:54	16:32 (T-40)	
	21:12	07:16 (T-48)	20:44			19:54	19:04			16	08:22 (T-49)	17:23			17:10	16:44 (T-40)	
13	06:17	06:50 (T-48)	06:45			07:16	07:47				08:07 (T-49)	07:23			07:55	16:33 (T-40)	
	21:12	07:15 (T-48)	20:42			19:52	19:02			15	08:22 (T-49)	17:22			17:10	16:45 (T-40)	
14	06:18	06:50 (T-48)	06:46			07:17	07:48				08:08 (T-49)	07:24			07:55	16:33 (T-40)	
	21:11	07:16 (T-48)	20:41			19:51	19:01			14	08:22 (T-49)	17:21			17:11	16:45 (T-40)	
15	06:19	06:50 (T-48)	06:47			07:18	07:49				08:09 (T-49)	07:25			07:56	16:34 (T-40)	
	21:11	07:17 (T-48)	20:40			19:49	18:59			12	08:21 (T-49)	17:20			17:11	16:45 (T-40)	
16	06:19	06:51 (T-48)	06:48			07:19	07:50				08:11 (T-49)	07:27			07:57	16:34 (T-40)	
	21:10	07:17 (T-48)	20:38			19:47	18:58			11	08:22 (T-49)	17:20			17:11	16:45 (T-40)	
17	06:20	06:50 (T-48)	06:49			07:20	07:51				08:12 (T-49)	07:28			07:57	16:35 (T-40)	
	21:09	07:17 (T-48)	20:37			19:46	18:56			9	08:21 (T-49)	17:19			17:11	16:46 (T-40)	
18	06:21	06:50 (T-48)	06:50			07:21	07:53				08:13 (T-49)	07:29			07:58	16:35 (T-40)	
	21:09	07:17 (T-48)	20:35			19:44	18:54			6	08:19 (T-49)	17:18			17:12	16:45 (T-40)	
19	06:22	06:50 (T-48)	06:51			07:22	07:54				08:14 (T-49)	07:30			07:59	16:36 (T-40)	
	21:08	07:18 (T-48)	20:34			19:42	18:53			3	08:17 (T-49)	17:17			17:12	16:46 (T-40)	
20	06:23	06:50 (T-48)	06:52			07:23	07:55					07:31			07:59	16:37 (T-40)	
	21:07	07:18 (T-48)	20:32			19:40	18:51					17:16			17:12	16:47 (T-40)	
21	06:23	06:50 (T-48)	06:53			07:24	07:56					07:32			08:00	16:37 (T-40)	
	21:07	07:18 (T-48)	20:31			19:39	18:50					17:16			17:13	16:47 (T-40)	
22	06:24	06:49 (T-48)	06:54			07:25	07:57					07:34			08:00	16:37 (T-40)	
	21:06	07:18 (T-48)	20:29			19:37	18:49					17:15			17:13	16:48 (T-40)	
23	06:25	06:50 (T-48)	06:55			07:26	07:58					07:35			08:01	16:38 (T-40)	
	21:05	07:18 (T-48)	20:28			19:35	18:47					17:15			17:14	16:48 (T-40)	
24	06:26	06:50 (T-48)	06:56			07:27	07:59					07:36			08:01	16:38 (T-40)	
	21:04	07:18 (T-48)	20:26			19:34	18:46					17:14			17:14	16:48 (T-40)	
25	06:27	06:50 (T-48)	06:57			07:28	08:01					07:37			16:31 (T-40)	08:02	
	21:03	07:18 (T-48)	20:25			19:32	18:44					17:13		7	16:38 (T-40)	17:15	
26	06:28	06:51 (T-48)	06:58			07:29	08:02					07:38			16:30 (T-40)	08:02	
	21:03	07:18 (T-48)	20:23			19:30	18:43					17:13		10	16:40 (T-40)	17:16	
27	06:29	06:51 (T-48)	06:59			07:30	08:03					07:39			16:29 (T-40)	08:02	
	21:02	07:18 (T-48)	20:22			19:28	18:42					17:13		12	16:41 (T-40)	17:16	
28	06:30	06:52 (T-48)	07:00			07:31	08:04					07:40			16:29 (T-40)	08:03	
	21:01	07:17 (T-48)	20:20			19:27	18:40					17:12		14	16:43 (T-40)	17:17	
29	06:31	06:53 (T-48)	07:01			07:32	08:05					07:41			16:29 (T-40)	08:03	
	21:00	07:17 (T-48)	20:19			19:25	18:39					17:12		15	16:44 (T-40)	17:18	
30	06:32	06:54 (T-48)	07:02			07:33	08:06					07:42			16:29 (T-40)	08:03	
	20:59	07:16 (T-48)	20:17			19:23	18:38					17:11		15	16:44 (T-40)	17:19	
31	06:33	06:55 (T-48)	07:03				08:08								08:03	16:41 (T-40)	
	20:58	07:16 (T-48)	20:16				18:36								17:19	16:53 (T-40)	
Potential sun hours	459		428			375	345					298				288	
Total, worst case		742		60			117					73				385	
Sun reduction		0.75		0.74			0.62					0.42				0.38	
Oper. time red.		0.97		0.97			0.97					0.97				0.97	
Wind dir. red.		0.68		0.68			0.60					0.69				0.69	
Total reduction		0.49		0.49			0.36					0.28				0.25	
Total, real		366		29			42					21				98	

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
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Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR245 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:38	06:09	06:10	06:34	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:22	06:36	06:08	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:38	07:12	07:46
	17:23	17:59	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:48
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:42	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:08	06:27	06:06	06:15	06:43	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:44	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:37	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:52	07:01	06:21	06:06	06:19	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:58	06:19	06:06	06:20	06:49	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	17:11
18	08:00	07:30	07:47	06:56	06:19	06:06	06:21	06:50	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:55	17:18	17:12
19	08:00	07:29	07:45	06:54	06:18	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:51	06:16	06:06	06:24	06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33	08:00
	17:43	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:14
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:37	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:14	21:04	20:26	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:18	07:33	06:44	06:12	06:08	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:31	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:49	18:26	19:57	20:29	20:59	21:15	21:01	20:22	19:28	18:42	17:13	17:16
28	07:54	07:15	07:30	06:42	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:32	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:19
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:54		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR246 - Non-Participating

Assumptions for shadow calculations

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0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March	April	May	June	
1	08:04	16:25 (T-45)	07:50	07:14	07:23	06:37		06:09
	17:20	24	16:49 (T-45)	17:55	18:29	20:02		21:03
2	08:04	16:26 (T-45)	07:49	07:12	07:21	06:36		06:08
	17:21	24	16:50 (T-45)	17:56	18:30	20:03		21:04
3	08:04	16:26 (T-45)	07:48	07:11	07:20	06:35		06:08
	17:22	24	16:50 (T-45)	17:57	18:31	20:04		21:05
4	08:04	16:27 (T-45)	07:47	07:09	07:18	06:34		06:08
	17:23	23	16:50 (T-45)	17:58	18:32	20:05		21:06
5	08:04	16:28 (T-45)	07:46	07:08	07:17	06:32		06:07
	17:24	23	16:51 (T-45)	18:00	18:33	20:06		21:06
6	08:04	16:29 (T-45)	07:45	07:06	07:15	06:31		06:07
	17:25	22	16:51 (T-45)	18:01	18:35	20:07		21:07
7	08:04	16:29 (T-45)	07:44	07:05	07:13	06:30		06:07
	17:26	22	16:51 (T-45)	18:02	18:36	20:08		21:08
8	08:04	16:30 (T-45)	07:43	08:03	07:12	06:29		06:06
	17:27	22	16:52 (T-45)	18:03	19:37	20:09		21:08
9	08:04	16:30 (T-45)	07:41	08:01	07:10	06:28	20:16 (Alt-06)	06:06
	17:28	21	16:51 (T-45)	18:05	19:38	20:10	3 20:19 (Alt-06)	21:09
10	08:03	16:31 (T-45)	07:40	08:00	07:08	06:27	20:15 (Alt-06)	06:06
	17:29	20	16:51 (T-45)	18:06	19:39	20:11	5 20:20 (Alt-06)	21:09
11	08:03	16:33 (T-45)	07:39	07:58	07:07	06:25	20:14 (Alt-06)	06:06
	17:30	18	16:51 (T-45)	18:07	19:40	20:12	7 20:21 (Alt-06)	21:10
12	08:03	16:33 (T-45)	07:38	07:56	07:05	06:24	20:13 (Alt-06)	06:06
	17:31	17	16:50 (T-45)	18:08	19:41	20:13	9 20:22 (Alt-06)	21:10
13	08:03	16:35 (T-45)	07:37	07:55	07:04	06:23	20:13 (Alt-06)	06:06
	17:32	16	16:51 (T-45)	18:10	19:42	20:14	10 20:23 (Alt-06)	21:11
14	08:02	16:36 (T-45)	07:35	07:53	07:02	06:22	20:12 (Alt-06)	06:06
	17:33	14	16:50 (T-45)	18:11	19:43	20:16	12 20:24 (Alt-06)	21:11
15	08:02	16:37 (T-45)	07:34	07:52	07:01	06:21	20:12 (Alt-06)	06:06
	17:34	12	16:49 (T-45)	18:12	19:45	20:17	13 20:25 (Alt-06)	21:12
16	08:01	16:40 (T-45)	07:33	07:50	06:59	06:20	20:12 (Alt-06)	06:06
	17:35	8	16:48 (T-45)	18:13	19:46	20:18	14 20:26 (Alt-06)	21:12
17	08:01		07:31	07:48	06:57	06:19	20:12 (Alt-06)	06:06
	17:37		18:15	19:47	20:19	20:50	15 20:27 (Alt-06)	21:13
18	08:00		07:30	07:47	06:56	06:18	20:12 (Alt-06)	06:06
	17:38		18:16	19:48	20:20	20:51	15 20:27 (Alt-06)	21:13
19	08:00		07:29	07:45	06:54	06:18	20:12 (Alt-06)	06:06
	17:39		18:17	19:49	20:21	20:52	16 20:28 (Alt-06)	21:13
20	07:59		07:27	07:43	06:53	06:17	20:13 (Alt-06)	06:06
	17:40		18:18	19:50	20:22	20:53	17 20:30 (Alt-06)	21:14
21	07:59		07:26	07:42	06:51	06:16	20:13 (Alt-06)	06:06
	17:41		18:19	19:51	20:23	20:54	16 20:29 (Alt-06)	21:14
22	07:58		07:24	07:40	06:50	06:15	20:13 (Alt-06)	06:06
	17:42		18:21	19:52	20:24	20:55	16 20:29 (Alt-06)	21:14
23	07:57		07:23	07:38	06:48	06:14	20:14 (Alt-06)	06:07
	17:44		18:22	19:53	20:25	20:56	14 20:28 (Alt-06)	21:14
24	07:57		07:21	07:36	06:47	06:14	20:15 (Alt-06)	06:07
	17:45		18:23	19:54	20:26	20:57	13 20:28 (Alt-06)	21:15
25	07:56		07:20	07:35	06:46	06:13	20:16 (Alt-06)	06:07
	17:46		18:24	19:55	20:27	20:57	10 20:26 (Alt-06)	21:15
26	07:55		07:18	07:33	06:44	06:12	20:17 (Alt-06)	06:07
	17:47		18:25	19:56	20:28	20:58	8 20:25 (Alt-06)	21:15
27	07:54		07:17	07:31	06:43	06:12	20:20 (Alt-06)	06:08
	17:49		18:26	19:57	20:29	20:59	4 20:24 (Alt-06)	21:15
28	07:54		07:15	07:30	06:41	06:11		06:08
	17:50		18:28	19:59	20:30	21:00		21:15
29	07:53			07:28	06:40	06:10		06:09
	17:51			20:00	20:31	21:01		21:15
30	07:52			07:26	06:39	06:10		06:09
	17:52			20:00	20:33	21:02		21:15
31	07:51			07:25		06:09		
	17:53			20:01		21:03		
Potential sun hours	298		297		398	448		452
Total, worst case	310					217		
Sun reduction	0.46					0.68		
Oper. time red.	0.97					0.97		
Wind dir. red.	0.69					0.60		
Total reduction	0.31					0.40		
Total, real	97					87		

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

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

Project:

Northwest Ohio

Description:

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5/21/2013 8:55 AM / 338

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR246 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	July		August		September		October		November		December	
1	06:10		06:34	20:23 (Alt-06)	07:04	07:34	07:09				07:43	16:15 (T-45)
	21:15		20:57	9 20:32 (Alt-06)	20:14	19:22	17:35				17:11	18 16:33 (T-45)
2	06:10		06:35	20:24 (Alt-06)	07:05	07:35	07:10				07:45	16:15 (T-45)
	21:15		20:56	7 20:31 (Alt-06)	20:12	19:20	17:34				17:11	19 16:34 (T-45)
3	06:11		06:36	20:25 (Alt-06)	07:06	07:36	07:11				07:46	16:14 (T-45)
	21:15		20:54	5 20:30 (Alt-06)	20:11	19:18	17:33				17:11	21 16:35 (T-45)
4	06:11		06:37	20:27 (Alt-06)	07:07	07:38	07:12				07:47	16:14 (T-45)
	21:14		20:53	2 20:29 (Alt-06)	20:09	19:17	17:32				17:10	22 16:36 (T-45)
5	06:12		06:37		07:08	07:39	07:13				07:47	16:14 (T-45)
	21:14		20:52		20:07	19:15	17:30				17:10	22 16:36 (T-45)
6	06:12		06:38		07:09	07:40	07:15				07:48	16:15 (T-45)
	21:14		20:51		20:06	19:13	17:29				17:10	22 16:37 (T-45)
7	06:13		06:39		07:10	07:41	07:16				07:49	16:15 (T-45)
	21:14		20:50		20:04	19:12	17:28				17:10	23 16:38 (T-45)
8	06:14		06:40		07:11	07:42	07:17				07:50	16:15 (T-45)
	21:13		20:49		20:02	19:10	17:27				17:10	23 16:38 (T-45)
9	06:14		06:41		07:12	07:43	07:18				07:51	16:16 (T-45)
	21:13		20:47		20:01	19:09	17:26				17:10	23 16:39 (T-45)
10	06:15		06:42		07:13	07:44	07:19				07:52	16:16 (T-45)
	21:13		20:46		19:57	19:07	17:25				17:10	24 16:40 (T-45)
11	06:16		06:43		07:14	07:45	07:21				07:53	16:15 (T-45)
	21:12		20:45		19:56	19:05	17:24				17:10	24 16:39 (T-45)
12	06:16		06:44		07:15	07:46	07:22				07:54	16:16 (T-45)
	21:12		20:44		19:54	19:04	17:23				17:10	24 16:40 (T-45)
13	06:17		06:45		07:16	07:47	07:23				07:55	16:17 (T-45)
	21:11		20:42		19:52	19:02	17:22				17:10	24 16:41 (T-45)
14	06:18		06:46		07:17	07:48	07:24				07:55	16:17 (T-45)
	21:11		20:41		19:51	19:01	17:21				17:11	25 16:42 (T-45)
15	06:19		06:47		07:18	07:49	07:25				07:56	16:17 (T-45)
	21:10		20:39		19:49	18:59	17:20				17:11	24 16:41 (T-45)
16	06:19		06:48		07:19	07:50	07:27				07:57	16:18 (T-45)
	21:10		20:38		19:47	18:58	17:20				17:11	24 16:42 (T-45)
17	06:20		20:27 (Alt-06)	06:49	07:20	07:51	07:28				07:57	16:19 (T-45)
	21:09	6	20:33 (Alt-06)	20:37	19:45	18:56	17:19				17:11	24 16:43 (T-45)
18	06:21		20:26 (Alt-06)	06:50	07:21	07:53	07:29				07:58	16:18 (T-45)
	21:09	9	20:35 (Alt-06)	20:35	19:44	18:54	17:18				17:12	25 16:43 (T-45)
19	06:22		20:25 (Alt-06)	06:51	07:22	07:54	07:30				07:59	16:19 (T-45)
	21:08	12	20:37 (Alt-06)	20:34	19:42	18:53	17:17				17:12	25 16:44 (T-45)
20	06:23		20:25 (Alt-06)	06:52	07:23	07:55	07:31				07:59	16:20 (T-45)
	21:07	13	20:38 (Alt-06)	20:32	19:40	18:51	17:17				17:12	25 16:45 (T-45)
21	06:23		20:24 (Alt-06)	06:53	07:24	07:56	07:32				08:00	16:20 (T-45)
	21:07	15	20:39 (Alt-06)	20:31	19:39	18:50	17:16				17:13	25 16:45 (T-45)
22	06:24		20:24 (Alt-06)	06:54	07:25	07:57	07:34				08:00	16:20 (T-45)
	21:06	15	20:39 (Alt-06)	20:29	19:37	18:49	17:15				17:13	25 16:45 (T-45)
23	06:25		20:22 (Alt-06)	06:55	07:26	07:58	07:35				08:01	16:21 (T-45)
	21:05	17	20:39 (Alt-06)	20:28	19:35	18:47	17:15				17:14	25 16:46 (T-45)
24	06:26		20:22 (Alt-06)	06:56	07:27	07:59	07:36				08:01	16:21 (T-45)
	21:04	17	20:39 (Alt-06)	20:26	19:34	18:46	17:14				17:15	25 16:46 (T-45)
25	06:27		20:22 (Alt-06)	06:57	07:28	08:00	07:37				08:02	16:22 (T-45)
	21:03	16	20:38 (Alt-06)	20:25	19:32	18:44	17:13				17:15	25 16:47 (T-45)
26	06:28		20:22 (Alt-06)	06:58	07:29	08:02	07:38			16:18 (T-45)	08:02	16:22 (T-45)
	21:02	16	20:38 (Alt-06)	20:23	19:30	18:43	17:13		8	16:26 (T-45)	17:16	25 16:47 (T-45)
27	06:29		20:22 (Alt-06)	06:59	07:30	08:03	07:39			16:16 (T-45)	08:02	16:23 (T-45)
	21:02	15	20:37 (Alt-06)	20:22	19:28	18:42	17:13		12	16:28 (T-45)	17:16	24 16:47 (T-45)
28	06:30		20:22 (Alt-06)	07:00	07:31	08:04	07:40			16:15 (T-45)	08:03	16:24 (T-45)
	21:01	14	20:36 (Alt-06)	20:20	19:27	18:40	17:12		14	16:29 (T-45)	17:17	24 16:48 (T-45)
29	06:31		20:23 (Alt-06)	07:01	07:32	08:05	07:41			16:16 (T-45)	08:03	16:24 (T-45)
	21:00	12	20:35 (Alt-06)	20:19	19:25	18:39	17:12		16	16:32 (T-45)	17:18	24 16:48 (T-45)
30	06:32		20:23 (Alt-06)	07:02	07:33	08:06	07:42			16:15 (T-45)	08:03	16:25 (T-45)
	20:59	11	20:34 (Alt-06)	20:17	19:23	18:38	17:11		17	16:32 (T-45)	17:19	24 16:49 (T-45)
31	06:33		20:23 (Alt-06)	07:03		08:07					08:03	16:25 (T-45)
	20:58	11	20:34 (Alt-06)	20:16		18:36					17:19	24 16:49 (T-45)
Potential sun hours	459		428		375	345	298				288	
Total, worst case	199		23				67				731	
Sun reduction	0.75		0.74				0.42				0.38	
Oper. time red.	0.97		0.97				0.97				0.97	
Wind dir. red.	0.60		0.60				0.69				0.69	
Total reduction	0.44		0.44				0.29				0.26	
Total, real	88		10				19				188	

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

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

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR247 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December		
1	08:04	07:50	17:04 (T-44)	07:14	07:23	06:37	06:09	06:09	06:34	07:04	07:34	07:09	07:44	
	17:20	17:55	15 17:19 (T-44)	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11	
2	08:04	07:49	17:06 (T-44)	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:45	
	17:21	17:56	12 17:18 (T-44)	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11	
3	08:04	07:48	17:08 (T-44)	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:46	
	17:22	17:57	8 17:16 (T-44)	18:31	20:04	20:36	21:05	21:15	20:55	20:11	19:18	17:33	17:10	
4	08:04	07:47		07:09	07:18	06:34	06:07	06:11	06:36	07:07	07:38	07:12	07:47	
	17:23	17:58		18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:31	17:10	
5	08:04	07:46		07:08	07:17	06:32	06:07	06:12	06:37	07:08	07:39	07:13	07:48	
	17:24	18:00		18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10	
6	08:04	07:45		07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:40	07:15	07:49	
	17:25	18:01		18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10	
7	08:04	07:44		07:05	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:49	
	17:26	18:02		18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10	
8	08:04	07:43		08:03	07:12	06:29	06:06	06:13	06:40	07:11	07:42	16:39 (T-44)	07:50	
	17:27	18:03		19:37	20:09	20:41	21:08	21:14	20:49	20:02	19:10	17:27	8 16:47 (T-44)	17:10
9	08:04	07:41		08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	16:36 (T-44)	07:51	17:10
	17:28	18:05		19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	13 16:49 (T-44)	17:10
10	08:03	07:40		08:00	07:08	06:26	06:06	06:15	06:42	07:13	07:44	16:35 (T-44)	07:52	17:10
	17:29	18:06		19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	15 16:50 (T-44)	17:10
11	08:03	07:39		07:58	07:07	06:25	06:06	06:15	06:43	07:14	07:45	16:35 (T-44)	07:53	17:10
	17:30	18:07		19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17 16:52 (T-44)	17:10
12	08:03	07:38		07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	16:34 (T-44)	07:54	17:10
	17:31	18:08		19:41	20:13	20:45	21:11	21:12	20:44	19:54	19:04	17:23	19 16:53 (T-44)	17:10
13	08:03	17:04 (T-44)	07:37	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	16:33 (T-44)	07:55	17:10
	17:32	2 17:06 (T-44)	18:10	19:42	20:15	20:46	21:11	21:12	20:42	19:52	19:02	17:22	20 16:53 (T-44)	17:10
14	08:02	17:03 (T-44)	07:35	07:53	07:02	06:22	06:05	06:18	06:46	07:17	07:48	16:33 (T-44)	07:55	17:10
	17:33	5 17:08 (T-44)	18:11	19:43	20:16	20:47	21:12	21:11	20:41	19:51	19:01	17:21	21 16:54 (T-44)	17:10
15	08:02	17:01 (T-44)	07:34	07:52	07:00	06:21	06:05	06:18	06:47	07:18	07:49	16:33 (T-44)	07:56	17:10
	17:34	7 17:08 (T-44)	18:12	19:45	20:17	20:48	21:12	21:11	20:40	19:49	18:59	17:20	22 16:55 (T-44)	17:11
16	08:01	17:01 (T-44)	07:33	07:50	06:59	06:20	06:05	06:19	06:48	07:19	07:50	16:33 (T-44)	07:57	17:11
	17:35	9 17:10 (T-44)	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:57	17:19	22 16:55 (T-44)	17:11
17	08:01	17:00 (T-44)	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:51	16:34 (T-44)	07:57	17:11
	17:36	11 17:11 (T-44)	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	21 16:54 (T-44)	17:11
18	08:01	17:00 (T-44)	07:30	07:47	06:56	06:18	06:06	06:21	06:50	07:21	07:53	16:34 (T-44)	07:58	17:11
	17:38	12 17:12 (T-44)	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	20 16:54 (T-44)	17:12
19	08:00	16:59 (T-44)	07:29	07:45	06:54	06:18	06:06	06:22	06:51	07:22	07:54	16:34 (T-44)	07:59	17:12
	17:39	14 17:13 (T-44)	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	19 16:53 (T-44)	17:12
20	07:59	16:59 (T-44)	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	16:34 (T-44)	07:59	17:12
	17:40	15 17:14 (T-44)	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:51	17:16	18 16:52 (T-44)	17:12
21	07:59	16:59 (T-44)	07:26	07:42	06:51	06:16	06:06	06:23	06:53	07:24	07:56	16:34 (T-44)	08:00	17:12
	17:41	17 17:16 (T-44)	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17 16:51 (T-44)	17:13
22	07:58	16:59 (T-44)	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	16:36 (T-44)	08:00	17:13
	17:42	18 17:17 (T-44)	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	15 16:51 (T-44)	17:13
23	07:58	16:59 (T-44)	07:23	07:38	06:48	06:14	06:06	06:25	06:55	07:26	07:58	16:36 (T-44)	08:01	17:14
	17:44	19 17:18 (T-44)	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	14 16:50 (T-44)	17:14
24	07:57	17:00 (T-44)	07:21	07:36	06:47	06:14	06:07	06:26	06:56	07:27	07:59	16:37 (T-44)	08:01	17:14
	17:45	20 17:20 (T-44)	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14	13 16:50 (T-44)	17:14
25	07:56	17:00 (T-44)	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:01	16:38 (T-44)	08:02	17:15
	17:46	21 17:21 (T-44)	18:24	19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:44	17:13	11 16:49 (T-44)	17:15
26	07:55	17:00 (T-44)	07:19	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:02	16:39 (T-44)	08:02	17:16
	17:47	22 17:22 (T-44)	18:25	19:56	20:28	20:58	21:15	21:03	20:23	19:30	18:43	17:13	9 16:48 (T-44)	17:16
27	07:55	17:00 (T-44)	07:17	07:31	06:43	06:11	06:08	06:29	06:59	07:30	08:03	16:40 (T-44)	08:03	17:16
	17:48	22 17:22 (T-44)	18:26	19:57	20:29	20:59	21:15	21:02	20:22	19:28	18:42	17:12	7 16:47 (T-44)	17:16
28	07:54	17:00 (T-44)	07:15	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	16:43 (T-44)	08:03	17:17
	17:50	21 17:21 (T-44)	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	5 16:48 (T-44)	17:17
29	07:53	17:01 (T-44)		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	16:45 (T-44)	08:03	17:18
	17:51	20 17:21 (T-44)		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	2 16:47 (T-44)	17:18
30	07:52	17:02 (T-44)		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	16:46 (T-44)	08:03	17:18
	17:52	19 17:21 (T-44)		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:11		17:18
31	07:51	17:03 (T-44)		07:25		06:09		06:33	07:03		08:08			17:18
	17:53	17 17:20 (T-44)		20:01		21:03		20:58	20:16		18:36			17:19
Potential sun hours	298	297	370	399	448	452	459	428	375	345	298	288		
Total, worst case	291	35									328			
Sun reduction	0.46	0.51									0.42			
Oper. time red.	0.97	0.97									0.97			
Wind dir. red.	0.69	0.69									0.69			
Total reduction	0.31	0.34									0.28			
Total, real	89	12									92			

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR248 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:10	06:34	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:37	07:12	07:46
	17:23	17:59	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:15	07:48
	17:25	18:01	18:35	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:14	06:41	07:11	07:42	07:17	07:50
	17:27	18:04	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:08	06:27	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:26	06:06	06:16	06:43	07:14	07:45	07:20	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:37	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:51	07:01	06:21	06:06	06:19	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	17:11
18	08:00	07:30	07:47	06:56	06:19	06:06	06:21	06:50	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:29	07:45	06:54	06:18	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:42	06:51	06:16	06:06	06:24	06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33	08:00
	17:42	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:14
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:36	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:56	21:14	21:04	20:26	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:18	07:33	06:44	06:12	06:08	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:31	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:49	18:26	19:57	20:29	20:59	21:15	21:01	20:22	19:28	18:42	17:13	17:16
28	07:54	07:15	07:30	06:42	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:32	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:19
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:54		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR249 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR250 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:33	07:04	07:34	07:09	07:44
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:45
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:56	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:46
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:10
4	08:04	07:47	07:09	07:18	06:34	06:07	06:11	06:36	07:07	07:37	07:12	07:47
	17:23	17:58	18:32	20:05	20:37	21:06	21:15	20:53	20:09	19:17	17:31	17:10
5	08:04	07:46	07:08	07:16	06:32	06:07	06:12	06:37	07:08	07:39	07:13	07:48
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:40	07:15	07:49
	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:05	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:13	06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21:14	20:49	20:02	19:10	17:27	17:10
9	08:04	07:41	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:08	17:26	17:10
10	08:03	07:40	08:00	07:08	06:26	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:25	06:06	06:15	06:43	07:14	07:45	07:21	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:13	20:45	21:11	21:12	20:44	19:54	19:04	17:23	17:10
13	08:03	07:37	07:55	07:04	06:23	06:05	06:17	06:45	07:16	07:47	07:23	07:55
	17:32	18:10	19:42	20:14	20:46	21:11	21:12	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:05	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:16	20:47	21:12	21:11	20:41	19:51	19:01	17:21	17:10
15	08:02	07:34	07:51	07:00	06:21	06:05	06:18	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:44	20:17	20:48	21:12	21:11	20:40	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:05	06:19	06:48	07:19	07:50	07:27	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:57	17:19	17:11
17	08:01	07:31	07:48	06:57	06:19	06:05	06:20	06:49	07:20	07:51	07:28	07:57
	17:36	18:14	19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	17:11
18	08:00	07:30	07:47	06:56	06:18	06:06	06:21	06:50	07:21	07:53	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:29	07:45	06:54	06:17	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:51	17:16	17:12
21	07:59	07:26	07:41	06:51	06:16	06:06	06:23	06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:34	08:00
	17:42	18:20	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:13
23	07:58	07:23	07:38	06:48	06:14	06:06	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:14	17:14
24	07:57	07:21	07:36	06:47	06:13	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14	17:14
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:58	21:15	21:03	20:25	19:32	18:44	17:13	17:15
26	07:55	07:18	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:03	20:23	19:30	18:43	17:13	17:16
27	07:55	07:17	07:31	06:43	06:11	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:48	18:26	19:57	20:29	20:59	21:15	21:02	20:22	19:28	18:42	17:12	17:16
28	07:54	07:15	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:32	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:33	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:18
31	07:51		07:25		06:09		06:33	07:03		08:07		08:04
	17:53		20:01		21:03		20:58	20:16		18:36		17:19
Potential sun hours	298	297	370	399	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR251 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04	14:39 (Alt-05)	07:50	07:14	17:28 (Alt-07)	07:23		06:37	06:09		
	17:20	25 15:04 (Alt-05)	17:55	18:29	33 18:01 (Alt-07)	20:02		20:34	21:03		
2	08:04	14:40 (Alt-05)	07:49	07:12	17:28 (Alt-07)	07:21		06:36	06:08		
	17:21	24 15:04 (Alt-05)	17:56	18:30	34 18:02 (Alt-07)	20:03		20:35	21:04		
3	08:04	14:42 (Alt-05)	07:48	07:11	17:27 (Alt-07)	07:20		06:35	06:08		
	17:22	21 15:03 (Alt-05)	17:57	18:31	35 18:02 (Alt-07)	20:04		20:36	21:05		
4	08:04	14:44 (Alt-05)	07:47	07:09	17:27 (Alt-07)	07:18		06:34	06:08		
	17:23	18 15:02 (Alt-05)	17:58	18:32	35 18:02 (Alt-07)	20:05		20:37	21:05		
5	08:04	14:46 (Alt-05)	07:46	07:08	17:26 (Alt-07)	07:17		06:32	06:07		
	17:24	15 15:01 (Alt-05)	18:00	18:33	36 18:02 (Alt-07)	20:06		20:38	21:06		
6	08:04	14:50 (Alt-05)	07:45	07:06	17:26 (Alt-07)	07:15		06:31	06:07		
	17:25	9 14:59 (Alt-05)	18:01	18:34	35 18:01 (Alt-07)	20:07		20:39	21:07		
7	08:04		07:44	07:05	17:26 (Alt-07)	07:13		19:45 (T-45)	06:30	06:07	
	17:26		18:02	18:36	36 18:02 (Alt-07)	20:08	2	19:47 (T-45)	20:40	21:08	
8	08:04		07:43	08:03	18:26 (Alt-07)	07:12		19:43 (T-45)	06:29	06:06	
	17:27		18:03	19:37	35 19:01 (Alt-07)	20:09	6	19:49 (T-45)	20:41	21:08	
9	08:03		07:41	08:01	18:27 (Alt-07)	07:10		19:42 (T-45)	06:28	06:06	
	17:28		18:05	19:38	34 19:01 (Alt-07)	20:10	7	19:49 (T-45)	20:42	21:09	
10	08:03		07:40	08:00	18:27 (Alt-07)	07:08		19:40 (T-45)	06:27	06:06	
	17:29		18:06	19:39	32 18:59 (Alt-07)	20:11	10	19:50 (T-45)	20:43	21:09	
11	08:03		07:39	07:58	18:27 (Alt-07)	07:07		19:40 (T-45)	06:25	06:06	
	17:30		18:07	19:40	31 18:58 (Alt-07)	20:12	12	19:52 (T-45)	20:44	21:10	
12	08:03		07:38	07:56	18:29 (Alt-07)	07:05		19:40 (T-45)	06:24	06:06	
	17:31		18:08	19:41	28 18:57 (Alt-07)	20:13	12	19:52 (T-45)	20:45	21:10	
13	08:02		07:37	07:55	18:30 (Alt-07)	07:04		19:40 (T-45)	06:23	06:06	
	17:32		18:10	19:42	25 18:55 (Alt-07)	20:14	14	19:54 (T-45)	20:46	21:11	
14	08:02		07:35	07:53	18:31 (Alt-07)	07:02		19:40 (T-45)	06:22	06:06	
	17:33		18:11	19:43	22 18:53 (Alt-07)	20:16	14	19:54 (T-45)	20:47	21:11	
15	08:02		07:34	07:51	18:33 (Alt-07)	07:01		19:41 (T-45)	06:21	06:06	
	17:34		18:12	19:45	18 18:51 (Alt-07)	20:17	13	19:54 (T-45)	20:48	21:12	
16	08:01		07:33	07:50	18:36 (Alt-07)	06:59		19:41 (T-45)	06:20	06:06	
	17:35		18:13	19:46	12 18:48 (Alt-07)	20:18	11	19:52 (T-45)	20:49	21:12	
17	08:01		07:31	07:48	19:21 (T-36)	06:57		19:44 (T-45)	06:19	06:06	
	17:37		18:15	19:47	4 19:25 (T-36)	20:19	6	19:50 (T-45)	20:50	21:13	
18	08:00		07:30	07:46	19:19 (T-36)	06:56			06:18	06:06	
	17:38		18:16	19:48	8 19:27 (T-36)	20:20			20:51	21:13	
19	08:00		07:29	07:45	19:17 (T-36)	06:54			06:18	06:06	
	17:39		18:17	19:49	11 19:28 (T-36)	20:21			20:52	21:13	
20	07:59		07:27	07:43	19:15 (T-36)	06:53			06:17	06:06	
	17:40		18:18	19:50	13 19:28 (T-36)	20:22			20:53	21:14	
21	07:59		07:26	07:41	19:15 (T-36)	06:51			06:16	06:06	
	17:41		18:19	19:51	15 19:30 (T-36)	20:23			20:54	21:14	
22	07:58		07:24	07:40	19:14 (T-36)	06:50			06:15	06:06	
	17:42		18:21	10 17:51 (Alt-07)	19:52	17 19:31 (T-36)	20:24		20:55	21:14	
23	07:57		07:23	07:37	17:37 (Alt-07)	07:38			06:14	06:07	
	17:44		18:22	17 17:54 (Alt-07)	19:53	19 19:32 (T-36)	20:25		20:56	21:14	
24	07:57		07:21	07:35	17:35 (Alt-07)	07:36			06:14	06:07	
	17:45		18:23	21 17:56 (Alt-07)	19:54	19 19:32 (T-36)	20:26		20:57	21:15	
25	07:56		07:20	07:32	17:32 (Alt-07)	07:35			06:13	06:07	
	17:46		18:24	25 17:57 (Alt-07)	19:55	18 19:32 (T-36)	20:27		20:57	21:15	
26	07:55		07:18	07:31	17:31 (Alt-07)	07:33			06:12	06:07	
	17:47		18:25	28 17:59 (Alt-07)	19:56	17 19:31 (T-36)	20:28		20:58	21:15	
27	07:54		07:17	07:30	17:30 (Alt-07)	07:31			06:12	06:08	
	17:48		18:26	30 18:00 (Alt-07)	19:57	15 19:29 (T-36)	20:29		20:59	21:15	
28	07:54		07:15	07:29	17:29 (Alt-07)	07:30			06:11	06:08	
	17:50		18:28	32 18:01 (Alt-07)	19:59	12 19:28 (T-36)	20:30		21:00	21:15	
29	07:53				07:28				06:10	06:09	
	17:51				20:00	5 19:24 (T-36)	20:31		21:01	21:15	
30	07:52				07:26				06:10	06:09	
	17:52				20:00				21:02	21:15	
31	07:51				07:25				06:09		
	17:53				20:01				21:02		
Potential sun hours	298		297		370		398		448		452
Total, worst case		112		163		654		107			
Sun reduction		0.46		0.51		0.55		0.60			
Oper. time red.		0.97		0.97		0.97		0.97			
Wind dir. red.		0.69		0.66		0.66		0.63			
Total reduction		0.31		0.33		0.35		0.37			
Total, real		34		53		230		39			

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR251 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	[July]		[August]		[September]		[October]		[November]		[December]	
1	06:10	06:34			07:04	19:39 (T-45)	07:34		18:08 (Alt-07)	07:09	07:43	
	21:15	20:57			20:14	19:51 (T-45)	19:22	27	18:35 (Alt-07)	17:35	17:11	
2	06:10	06:35			07:05	19:39 (T-45)	07:35		18:06 (Alt-07)	07:10	07:44	
	21:15	20:55			20:12	19:49 (T-45)	19:20	30	18:36 (Alt-07)	17:34	17:11	
3	06:11	06:36			07:06	19:40 (T-45)	07:36		18:05 (Alt-07)	07:11	07:45	
	21:15	20:54			20:11	19:47 (T-45)	19:18	32	18:37 (Alt-07)	17:33	17:11	
4	06:11	06:37			07:07	19:40 (T-45)	07:37		18:04 (Alt-07)	07:12	07:46	
	21:14	20:53			20:09	19:46 (T-45)	19:17	33	18:37 (Alt-07)	17:32	17:10	
5	06:12	06:37			07:08	19:42 (T-45)	07:39		18:03 (Alt-07)	07:13	07:47	
	21:14	20:52			20:07	19:44 (T-45)	19:15	34	18:37 (Alt-07)	17:30	17:10	
6	06:12	06:38			07:09		07:40		18:02 (Alt-07)	07:15	07:48	14:36 (Alt-05)
	21:14	20:51			20:06		19:13	35	18:37 (Alt-07)	17:29	17:10	8 14:44 (Alt-05)
7	06:13	06:39			07:10		07:41		18:02 (Alt-07)	07:16	07:49	14:34 (Alt-05)
	21:14	20:50			20:04		19:12	35	18:37 (Alt-07)	17:28	17:10	14 14:48 (Alt-05)
8	06:14	06:40			07:11		07:42		18:02 (Alt-07)	07:17	07:50	14:32 (Alt-05)
	21:13	20:49			20:02		19:10	36	18:38 (Alt-07)	17:27	17:10	18 14:50 (Alt-05)
9	06:14	06:41			07:12		07:43		18:02 (Alt-07)	07:18	07:51	14:31 (Alt-05)
	21:13	20:47			20:01		19:09	35	18:37 (Alt-07)	17:26	17:10	21 14:52 (Alt-05)
10	06:15	06:42			07:13		07:44		18:01 (Alt-07)	07:19	07:52	14:30 (Alt-05)
	21:13	20:46			19:57		19:07	36	18:37 (Alt-07)	17:25	17:10	23 14:53 (Alt-05)
11	06:16	06:43			07:14		07:45		18:01 (Alt-07)	07:21	07:53	14:29 (Alt-05)
	21:12	20:45			19:56		19:05	35	18:36 (Alt-07)	17:24	17:10	25 14:54 (Alt-05)
12	06:16	06:44			07:15		07:46		18:01 (Alt-07)	07:22	07:54	14:29 (Alt-05)
	21:12	20:43			19:54		19:04	34	18:35 (Alt-07)	17:23	17:10	27 14:56 (Alt-05)
13	06:17	06:45			07:16		07:47		18:02 (Alt-07)	07:23	07:54	14:29 (Alt-05)
	21:11	20:42			19:52		19:02	32	18:34 (Alt-07)	17:22	17:10	28 14:57 (Alt-05)
14	06:18	06:46			07:17		07:48		18:02 (Alt-07)	07:24	07:55	14:29 (Alt-05)
	21:11	20:41			19:51	1 19:12 (T-36)	19:01	31	18:33 (Alt-07)	17:21	17:11	29 14:58 (Alt-05)
15	06:19	06:47			07:18	19:06 (T-36)	07:49		18:03 (Alt-07)	07:25	07:56	14:28 (Alt-05)
	21:10	20:39			19:49	11 19:17 (T-36)	18:59	29	18:32 (Alt-07)	17:20	17:11	30 14:58 (Alt-05)
16	06:19	06:48			07:19	19:04 (T-36)	07:50		18:03 (Alt-07)	07:26	07:57	14:29 (Alt-05)
	21:10	20:38			19:47	14 19:18 (T-36)	18:57	27	18:30 (Alt-07)	17:20	17:11	32 15:00 (Alt-05)
17	06:20	06:49			07:20	19:02 (T-36)	07:51		18:06 (Alt-07)	07:28	07:57	14:29 (Alt-05)
	21:09	20:37			19:45	17 19:19 (T-36)	18:56	23	18:29 (Alt-07)	17:19	17:11	32 15:01 (Alt-05)
18	06:21	06:50			07:21	19:01 (T-36)	07:53		18:07 (Alt-07)	07:29	07:58	14:28 (Alt-05)
	21:09	20:35			19:44	18 19:19 (T-36)	18:54	20	18:27 (Alt-07)	17:18	17:12	33 15:01 (Alt-05)
19	06:22	06:51			07:22	19:00 (T-36)	07:54		18:09 (Alt-07)	07:30	07:59	14:29 (Alt-05)
	21:08	20:34			19:42	20 19:20 (T-36)	18:53	15	18:24 (Alt-07)	17:17	17:12	33 15:02 (Alt-05)
20	06:23	06:52			07:23	19:00 (T-36)	07:55		18:14 (Alt-07)	07:31	07:59	14:29 (Alt-05)
	21:07	20:32			19:40	18 19:18 (T-36)	18:51	5	18:19 (Alt-07)	17:16	17:12	33 15:02 (Alt-05)
21	06:23	06:53			07:24	18:59 (T-36)	07:56			07:32	08:00	14:30 (Alt-05)
	21:07	20:31			19:39	18 19:17 (T-36)	18:50			17:16	17:13	33 15:03 (Alt-05)
22	06:24	06:54			07:25	18:59 (T-36)	07:57			07:33	08:00	14:30 (Alt-05)
	21:06	20:29			19:37	16 19:15 (T-36)	18:49			17:15	17:13	33 15:03 (Alt-05)
23	06:25	06:55			07:26	18:59 (T-36)	07:58			07:35	08:01	14:31 (Alt-05)
	21:05	20:28			19:35	14 19:13 (T-36)	18:47			17:15	17:14	33 15:04 (Alt-05)
24	06:26	06:56			07:27	19:00 (T-36)	07:59			07:36	08:01	14:31 (Alt-05)
	21:04	20:26			19:34	12 19:12 (T-36)	18:46			17:14	17:14	33 15:04 (Alt-05)
25	06:27	06:57			07:28	19:01 (T-36)	08:00			07:37	08:02	14:32 (Alt-05)
	21:03	20:25			19:32	9 19:10 (T-36)	18:44			17:13	17:15	33 15:05 (Alt-05)
26	06:28	06:58		19:46 (T-45)	07:29	19:02 (T-36)	08:02			07:38	08:02	14:33 (Alt-05)
	21:02	20:23	7	19:53 (T-45)	19:30	6 19:08 (T-36)	18:43			17:13	17:16	32 15:05 (Alt-05)
27	06:29	06:59		19:43 (T-45)	07:30		18:19 (Alt-07)	08:03		07:39	08:02	14:33 (Alt-05)
	21:02	20:22	11	19:54 (T-45)	19:28	8 18:27 (Alt-07)	18:42			17:13	17:16	32 15:05 (Alt-05)
28	06:30	07:00		19:42 (T-45)	07:31		18:12 (Alt-07)	08:04		07:40	08:03	14:34 (Alt-05)
	21:01	20:20	13	19:55 (T-45)	19:27	16 18:31 (Alt-07)	18:40			17:12	17:17	30 15:04 (Alt-05)
29	06:31	07:01		19:41 (T-45)	07:32		18:15 (Alt-07)	08:05		07:41	08:03	14:36 (Alt-05)
	21:00	20:19	14	19:55 (T-45)	19:25	21 18:33 (Alt-07)	18:39			17:12	17:18	29 15:05 (Alt-05)
30	06:32	07:02		19:40 (T-45)	07:33		18:10 (Alt-07)	08:06		07:42	08:03	14:36 (Alt-05)
	20:59	20:17	14	19:54 (T-45)	19:23	24 18:34 (Alt-07)	18:38			17:11	17:19	29 15:05 (Alt-05)
31	06:33	07:03		19:39 (T-45)			08:07				08:03	14:37 (Alt-05)
	20:58	20:15	13	19:52 (T-45)			18:36				17:19	28 15:05 (Alt-05)
Potential sun hours	459	428			375		345			298	288	
Total, worst case			72		280		584					731
Sun reduction			0.74		0.68		0.62					0.38
Oper. time red.			0.97		0.97		0.97					0.97
Wind dir. red.			0.63		0.65		0.66					0.69
Total reduction			0.45		0.43		0.40					0.25
Total, real			33		120		232					185

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net

Calculated:

5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR252 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December		
1	08:04	07:50	17:14 (T-36)	07:14	07:23	06:37	06:09	06:10	06:34	07:04	07:34	07:09	07:43	
	17:20	17:55	15 17:29 (T-36)	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11	
2	08:04	07:49	17:15 (T-36)	07:12	07:21	06:36	06:08	06:10	06:35	07:05	07:35	07:10	07:44	
	17:21	17:56	14 17:29 (T-36)	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11	
3	08:04	07:48	17:16 (T-36)	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:36	07:11	07:45	
	17:22	17:57	12 17:28 (T-36)	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11	
4	08:04	07:47	17:18 (T-36)	07:09	07:18	06:34	06:08	06:11	06:36	07:07	07:37	07:12	07:46	
	17:23	17:58	8 17:26 (T-36)	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:10	
5	08:04	07:46		07:08	07:17	06:32	06:07	06:12	06:37	07:08	07:39	07:13	07:47	
	17:24	18:00		18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10	
6	08:04	07:45		07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:40	07:15	07:48	
	17:25	18:01		18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10	
7	08:04	07:44		07:05	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	16:48 (T-36)	07:49
	17:26	18:02		18:36	20:08	20:40	21:08	21:14	20:50	20:04	19:12	17:28	8 16:56 (T-36)	17:10
8	08:04	07:43		08:03	07:12	06:29	06:06	06:14	06:40	07:11	07:42	07:17	16:47 (T-36)	07:50
	17:27	18:03		19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	12 16:59 (T-36)	17:10
9	08:03	07:41		08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	16:45 (T-36)	07:51
	17:28	18:05		19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	15 17:00 (T-36)	17:10
10	08:03	07:40		08:00	07:08	06:27	06:06	06:15	06:42	07:13	07:44	07:19	16:44 (T-36)	07:52
	17:29	18:06		19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	16 17:00 (T-36)	17:10
11	08:03	07:39		07:58	07:07	06:25	06:06	06:16	06:43	07:14	07:45	07:21	16:45 (T-36)	07:53
	17:30	18:07		19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	16 17:01 (T-36)	17:10
12	08:03	07:38		07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	16:44 (T-36)	07:54
	17:31	18:08		19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	15 16:59 (T-36)	17:10
13	08:02	07:37		07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	16:44 (T-36)	07:54
	17:32	18:10		19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	14 16:58 (T-36)	17:10
14	08:02	07:35		07:53	07:02	06:22	06:06	06:18	06:46	07:17	07:48	07:24	16:44 (T-36)	07:55
	17:33	18:11		19:43	20:16	20:47	21:11	21:11	20:41	19:51	19:01	17:21	13 16:57 (T-36)	17:11
15	08:02	07:34		07:51	07:01	06:21	06:06	06:19	06:47	07:18	07:49	07:25	16:45 (T-36)	07:56
	17:34	18:12		19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	12 16:57 (T-36)	17:11
16	08:01	07:33		07:50	06:59	06:20	06:06	06:19	06:48	07:19	07:50	07:26	16:45 (T-36)	07:57
	17:35	18:13		19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:57	17:20	11 16:56 (T-36)	17:11
17	08:01	07:31		07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:51	07:28	16:46 (T-36)	07:57
	17:37	18:15		19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	8 16:54 (T-36)	17:11
18	08:00	07:30		07:46	06:56	06:18	06:06	06:21	06:50	07:21	07:53	07:29	16:46 (T-36)	07:58
	17:38	18:16		19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	7 16:53 (T-36)	17:12
19	08:00	07:29		07:45	06:54	06:18	06:06	06:22	06:51	07:22	07:54	07:30	16:48 (T-36)	07:59
	17:39	18:17		19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	5 16:53 (T-36)	17:12
20	07:59	07:27		07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	16:49 (T-36)	07:59
	17:40	18:18		19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:51	17:16	3 16:52 (T-36)	17:12
21	07:59	17:15 (T-36)	07:26	07:41	06:51	06:16	06:06	06:23	06:53	07:24	07:56	07:32	16:50 (T-36)	08:00
	17:41	1 17:16 (T-36)	18:19	19:51	20:23	20:54	21:14	21:07	20:31	19:39	18:50	17:16	1 16:51 (T-36)	17:13
22	07:58	17:14 (T-36)	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33		08:00
	17:42	3 17:17 (T-36)	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15		17:13
23	07:57	17:13 (T-36)	07:23	07:38	06:48	06:14	06:07	06:25	06:55	07:26	07:58	07:35		08:01
	17:44	5 17:18 (T-36)	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15		17:14
24	07:57	17:12 (T-36)	07:21	07:36	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36		08:01
	17:45	7 17:19 (T-36)	18:23	19:54	20:26	20:57	21:15	21:04	20:26	19:34	18:46	17:14		17:14
25	07:56	17:13 (T-36)	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37		08:02
	17:46	8 17:21 (T-36)	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:13		17:15
26	07:55	17:12 (T-36)	07:18	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:02	07:38		08:02
	17:47	11 17:23 (T-36)	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13		17:16
27	07:54	17:12 (T-36)	07:17	07:31	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39		08:02
	17:48	12 17:24 (T-36)	18:26	19:57	20:29	20:59	21:15	21:02	20:22	19:28	18:42	17:13		17:16
28	07:54	17:12 (T-36)	07:15	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40		08:03
	17:50	13 17:25 (T-36)	18:28	19:59	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12		17:17
29	07:53	17:12 (T-36)		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41		08:03
	17:51	14 17:26 (T-36)		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12		17:18
30	07:52	17:12 (T-36)		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42		08:03
	17:52	16 17:28 (T-36)		20:00	20:32	21:02	21:15	20:59	20:17	19:23	18:38	17:11		17:19
31	07:51	17:13 (T-36)		07:25		06:09		06:33	07:03		08:07			08:03
	17:53	16 17:29 (T-36)		20:01		21:02		20:58	20:15		18:36			17:19
Potential sun hours	298		297		370	398	448	452	459	428	375	345	298	288
Total, worst case	106		49									156		
Sun reduction	0.46		0.51									0.42		
Oper. time red.	0.97		0.97									0.97		
Wind dir. red.	0.69		0.69									0.69		
Total reduction	0.31		0.34									0.28		
Total, real	33		17									44		

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

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

Project:

Northwest Ohio

Description:

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5/21/2013 8:55 AM / 346

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR253 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December					
1	08:04	07:50	07:14	07:23	06:37	20:05 (T-43)	06:09	06:10	06:34	20:07 (T-47)	07:04	07:34	07:09	07:43			
	17:20	17:55	18:29	20:02	20:34	6	20:11 (T-43)	21:03	21:15	20:57	24	20:31 (T-47)	20:14	19:22	17:35	17:11	
2	08:04	07:49	07:12	07:21	06:36	20:04 (T-43)	06:08	06:10	06:35	20:07 (T-47)	07:05	07:35	07:10	07:44			
	17:21	17:56	18:30	20:03	20:35	8	20:12 (T-43)	21:04	21:15	20:55	24	20:31 (T-47)	20:12	19:20	17:34	17:11	
3	08:04	07:48	07:11	07:20	06:35	20:02 (T-47)	06:08	06:11	06:36	20:07 (T-47)	07:06	07:36	07:11	07:45			
	17:22	17:57	18:31	20:04	20:36	12	20:14 (T-43)	21:05	21:15	20:54	23	20:30 (T-47)	20:11	19:18	17:33	17:11	
4	08:04	07:47	07:09	07:18	06:34	20:00 (T-47)	06:08	06:11	06:37	20:07 (T-47)	07:07	07:37	07:12	07:46			
	17:23	17:58	18:32	20:05	20:37	14	20:14 (T-43)	21:05	21:14	20:53	22	20:29 (T-47)	20:09	19:17	17:32	17:10	
5	08:04	07:46	07:08	07:17	06:32	19:59 (T-47)	06:07	06:12	06:38	20:07 (T-47)	07:08	07:39	07:13	07:47			
	17:24	18:00	18:33	20:06	20:38	16	20:15 (T-43)	21:06	21:14	20:52	21	20:28 (T-43)	20:07	19:15	17:30	17:10	
6	08:04	07:45	07:06	07:15	06:31	19:58 (T-47)	06:07	06:12	06:38	20:08 (T-47)	07:09	07:40	07:15	07:48			
	17:25	18:01	18:34	20:07	20:39	18	20:16 (T-43)	21:07	21:14	20:51	19	20:27 (T-43)	20:06	19:13	17:29	17:10	
7	08:04	07:44	07:04	07:13	06:30	19:58 (T-47)	06:07	06:13	06:39	20:08 (T-47)	07:10	07:41	07:16	07:49			
	17:26	18:02	18:36	20:08	20:40	19	20:17 (T-43)	21:07	21:14	20:50	17	20:25 (T-43)	20:04	19:12	17:28	17:10	
8	08:04	07:43	08:03	07:12	06:29	19:57 (T-47)	06:06	06:14	06:40	20:09 (T-47)	07:11	07:42	07:17	07:50			
	17:27	18:03	19:37	20:09	20:41	21	20:18 (T-43)	21:08	21:13	20:49	15	20:24 (T-43)	20:02	19:10	17:27	17:10	
9	08:03	07:41	08:01	07:10	06:28	19:57 (T-47)	06:06	06:14	06:41	20:10 (T-47)	07:12	07:43	07:18	07:51			
	17:28	18:05	19:38	20:10	20:42	22	20:19 (T-47)	21:09	21:13	20:47	13	20:23 (T-43)	20:01	19:09	17:26	17:10	
10	08:03	07:40	08:00	07:08	06:27	19:57 (T-47)	06:06	06:15	06:42	20:11 (T-47)	07:13	07:44	07:19	07:52			
	17:29	18:06	19:39	20:11	20:43	23	20:20 (T-47)	21:09	21:13	20:46	11	20:22 (T-43)	19:57	19:07	17:25	17:10	
11	08:03	07:39	07:58	07:07	06:25	19:57 (T-47)	06:06	06:16	06:43	20:13 (T-43)	07:14	07:45	07:20	07:53			
	17:30	18:07	19:40	20:12	20:44	24	20:21 (T-47)	21:10	21:12	20:45	8	20:21 (T-43)	19:56	19:05	17:24	17:10	
12	08:03	07:38	07:56	07:05	06:24	19:57 (T-47)	06:06	06:16	06:44	20:14 (T-43)	07:15	07:46	07:22	07:54			
	17:31	18:08	19:41	20:13	20:45	24	20:21 (T-47)	21:10	21:12	20:43	6	20:20 (T-43)	19:54	19:04	17:23	17:10	
13	08:02	07:36	07:55	07:04	06:23	19:57 (T-47)	06:06	06:17	06:45	20:15 (T-43)	07:16	07:47	07:23	07:54			
	17:32	18:10	19:42	20:14	20:46	24	20:21 (T-47)	21:11	21:11	20:42	3	20:18 (T-43)	19:52	19:02	17:22	17:10	
14	08:02	07:35	07:53	07:02	06:22	19:57 (T-47)	06:06	06:18	06:46	20:16 (T-43)	07:17	07:48	07:24	07:55			
	17:33	18:11	19:43	20:15	20:47	24	20:21 (T-47)	21:11	21:11	20:41	1	20:17 (T-43)	19:51	19:01	17:21	17:11	
15	08:02	07:34	07:51	07:01	06:21	19:57 (T-47)	06:06	06:19	06:47	20:17 (T-43)	07:18	07:49	07:25	07:56			
	17:34	18:12	19:45	20:17	20:48	23	20:20 (T-47)	21:12	21:10	20:39		19:49	18:59	17:20	17:11		
16	08:01	07:33	07:50	06:59	06:20	19:58 (T-47)	06:06	06:19	06:48	20:18 (T-47)	07:19	07:50	07:26	07:57			
	17:35	18:13	19:46	20:18	20:49	22	20:20 (T-47)	21:12	21:10	20:38		19:47	18:58	17:20	17:11		
17	08:01	07:31	07:48	06:57	06:19	19:58 (T-47)	06:06	06:20	06:49	20:19 (T-47)	07:20	07:51	07:28	07:57			
	17:37	18:15	19:47	20:19	20:50	21	20:19 (T-47)	21:13	21:09	20:37		19:45	18:56	17:19	17:11		
18	08:00	07:30	07:46	06:56	06:19	19:59 (T-47)	06:06	06:21	06:50	20:20 (T-47)	07:21	07:52	07:29	07:58			
	17:38	18:16	19:48	20:20	20:51	19	20:18 (T-47)	21:13	21:09	20:35		19:44	18:54	17:18	17:12		
19	08:00	07:29	07:45	06:54	06:18	19:59 (T-47)	06:06	06:22	06:51	20:21 (T-47)	07:22	07:54	07:30	07:59			
	17:39	18:17	19:49	20:21	20:52	19	20:18 (T-47)	21:13	21:08	20:34		19:42	18:53	17:17	17:12		
20	07:59	07:27	07:43	06:53	06:17	20:01 (T-47)	06:06	06:23	06:49	20:16 (T-47)	06:52	07:23	07:55	07:31	07:59		
	17:40	18:18	19:50	20:22	20:53	17	20:18 (T-47)	21:14	21:07	20:22	6	20:22 (T-47)	20:32	19:40	18:51	17:17	17:13
21	07:59	07:26	07:41	06:51	06:16	20:02 (T-47)	06:06	06:24	06:49	20:14 (T-47)	06:53	07:24	07:56	07:32	08:00		
	17:41	18:19	19:51	20:23	20:54	14	20:16 (T-47)	21:14	21:06	20:25	11	20:25 (T-47)	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	20:03 (T-47)	06:06	06:24	06:49	20:13 (T-47)	06:54	07:25	07:57	07:33	08:00		
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23	07:57	07:23	07:38	06:49	06:14	20:04 (T-47)	06:07	06:25	06:49	20:11 (T-47)	06:55	07:26	07:58	07:35	08:01		
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26	07:55	07:18	07:33	06:44	06:12	20:08 (T-47)	06:08	06:28	06:49	20:09 (T-47)	06:58	07:29	08:02	07:38	08:02		
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27	07:54	07:17	07:31	06:43	06:12	20:08 (T-47)	06:08	06:29	06:49	20:08 (T-47)	06:59	07:30	08:03	07:39	08:02		
	17:49	18:26	19:57	20:29	20:59		21:15	21:01	21:01	20:30	22	20:30 (T-47)	20:22	19:28	18:42	17:13	17:16
28	07:54	07:15	07:30	06:41	06:11	20:08 (T-47)	06:08	06:30	06:49	20:08 (T-47)	07:00	07:31	08:04	07:40	08:03		
	17:50	18:28	19:59	20:30	21:00		21:15	21:01	21:01	20:31	23	20:31 (T-47)	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	20:08 (T-43)	06:09	06:31	06:49	20:08 (T-47)	07:01	07:32	08:05	07:41	08:03		
	17:51		20:00	20:31	21:01	2	20:10 (T-43)	21:01	21:15	20:31	23	20:31 (T-47)	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	20:06 (T-43)	06:09	06:32	06:49	20:08 (T-47)	07:02	07:33	08:06	07:42	08:03		
	17:52		20:00	20:32	21:02	4	20:10 (T-43)	21:02	21:15	20:59	23	20:31 (T-47)	20:17	19:23	18:38	17:11	17:19
31	07:51		07:25		06:09			06:33	06:49	20:08 (T-47)	07:03		08:07		08:03		
	17:53		20:01		21:02			20:58	24	20:32 (T-47)	20:15		18:36		17:19		
Potential sun hours	298	297	370	398	448		452	459	428		375	345	298	288			
Total, worst case				6	414			219	207								
Sun reduction				0.60	0.68			0.75	0.74								
Oper. time red.				0.97	0.97			0.97	0.97								
Wind dir. red.				0.60	0.60			0.60	0.60								
Total reduction				0.35	0.39			0.43	0.43								
Total, real				2	162			95	88								

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR254 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:10	06:34	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:34	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:37	07:12	07:46
	17:23	17:59	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:14	07:48
	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:14	06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:08	06:27	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:25	06:06	06:16	06:43	07:14	07:45	07:20	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:36	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:46	07:17	07:48	07:24	07:55
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15	08:02	07:34	07:51	07:01	06:21	06:06	06:19	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:51	07:28	07:57
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	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:41	06:51	06:16	06:06	06:24	06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33	08:00
	17:42	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:13
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:36	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36	08:01
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25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
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	17:54		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

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EAPC Wind Energy

3100 DeMers Avenue
 NC GRAND FORKS, ND 58001

US-GRAND FOR

+1 701 775 3000

wind@eapc.net

Calculated:

5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520**Shadow receptor:** SR255 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S_0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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Operational time

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

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

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

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

Project:

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US-GRAND FORKS, ND 58201
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SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR256 - Non-Participating

Assumptions for shadow calculations

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

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2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:11	06:36	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	06:11	06:37	07:07	07:37	07:12	07:46
	17:23	17:59	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:17	06:32	06:07	06:12	06:38	07:08	07:39	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:39	07:09	07:40	07:14	07:48
	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:07	06:13	06:40	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:14	06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21:13	20:49	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:09	17:26	17:10
10	08:03	07:40	08:00	07:08	06:27	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:25	06:06	06:16	06:43	07:14	07:45	07:20	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:36	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:15	20:47	21:11	21:11	20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:51	07:01	06:21	06:06	06:19	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:45	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:58	17:20	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	17:11
18	08:00	07:30	07:46	06:56	06:19	06:06	06:21	06:50	07:21	07:52	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:29	07:45	06:54	06:18	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:52	17:17	17:13
21	07:59	07:26	07:41	06:51	06:16	06:06	06:24	06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33	08:00
	17:42	18:21	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:49	17:15	17:13
23	07:57	07:23	07:38	06:49	06:14	06:07	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:36	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:56	21:14	21:04	20:26	19:34	18:46	17:14	17:15
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:14	17:15
26	07:55	07:18	07:33	06:44	06:12	06:08	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:31	06:43	06:12	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:49	18:26	19:57	20:29	20:59	21:15	21:01	20:22	19:28	18:42	17:13	17:16
28	07:54	07:15	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:58	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:32	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:19
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:54		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	298	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR257 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March	April	May	June
1	08:04	08:29 (T-34)	07:50	07:14	07:23	06:37	19:45 (T-48) 06:09
2	08:04	08:31 (T-34)	07:47	07:09	07:18	06:34	20:11 (T-48) 21:03
3	08:04	08:32 (T-34)	07:46	07:08	07:16	06:35	19:45 (T-48) 06:08
4	08:04	08:33 (T-34)	07:44	07:04	07:13	06:36	20:12 (T-48) 21:04
5	08:04	08:34 (T-34)	07:43	07:03	07:12	06:37	19:46 (T-48) 06:07
6	08:04	08:35 (T-34)	07:42	07:02	07:11	06:38	20:13 (T-48) 21:05
7	08:04	08:36 (T-34)	07:41	07:01	07:10	06:39	19:47 (T-48) 06:06
8	08:04	08:37 (T-34)	07:40	07:00	07:09	06:40	20:14 (T-48) 21:06
9	08:04	08:38 (T-34)	07:39	06:59	07:08	06:41	19:48 (T-48) 06:05
10	08:04	08:39 (T-34)	07:38	06:58	07:07	06:42	20:15 (T-48) 21:07
11	08:04	08:40 (T-34)	07:37	06:57	07:06	06:43	19:49 (T-48) 06:04
12	08:04	08:41 (T-34)	07:36	06:56	07:05	06:44	20:16 (T-48) 21:08
13	08:04	08:42 (T-34)	07:35	06:55	07:04	06:45	19:50 (T-48) 06:03
14	08:04	08:43 (T-34)	07:34	06:54	07:03	06:46	20:17 (T-48) 21:09
15	08:04	08:44 (T-34)	07:33	06:53	07:02	06:47	19:51 (T-48) 06:02
16	08:04	08:45 (T-34)	07:32	06:52	07:01	06:48	20:18 (T-48) 21:10
17	08:04	08:46 (T-34)	07:31	06:51	07:00	06:49	19:52 (T-48) 06:01
18	08:04	08:47 (T-34)	07:30	06:50	06:59	06:50	20:19 (T-48) 21:11
19	08:04	08:48 (T-34)	07:29	06:49	06:58	06:51	19:53 (T-48) 06:00
20	08:04	08:49 (T-34)	07:28	06:48	06:57	06:52	20:20 (T-48) 21:12
21	08:04	08:50 (T-34)	07:27	06:47	06:56	06:53	19:54 (T-48) 05:59
22	08:04	08:51 (T-34)	07:26	06:46	06:55	06:54	20:21 (T-48) 21:13
23	08:04	08:52 (T-34)	07:25	06:45	06:54	06:55	19:55 (T-48) 05:58
24	08:04	08:53 (T-34)	07:24	06:44	06:53	06:56	20:22 (T-48) 21:14
25	08:04	08:54 (T-34)	07:23	06:43	06:52	06:57	19:56 (T-48) 05:57
26	08:04	08:55 (T-34)	07:22	06:42	06:51	06:58	20:23 (T-48) 21:15
27	08:04	08:56 (T-34)	07:21	06:41	06:50	06:59	19:57 (T-48) 05:56
28	08:04	08:57 (T-34)	07:20	06:40	06:49	07:00	20:24 (T-48) 21:16
29	08:04	08:58 (T-34)	07:19	06:39	06:48	07:01	19:58 (T-48) 05:55
30	08:04	08:59 (T-34)	07:18	06:38	06:47	07:02	20:25 (T-48) 21:17
31	08:04	09:00 (T-34)	07:17	06:37	06:46	07:03	19:59 (T-48) 05:54
Potential sun hours	298	297	370	398	448	452	
Total, worst case	299			88	737	527	
Sun reduction	0.46			0.60	0.68	0.74	
Oper. time red.	0.97			0.97	0.97	0.97	
Wind dir. red.	0.59			0.59	0.60	0.60	
Total reduction	0.26			0.34	0.39	0.43	
Total, real	78			30	288	226	

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR257 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July			August			September			October			November			December		
1	06:09		20:28 (T-29)	06:34		19:53 (T-48)	07:04	07:34	07:09			07:43			08:18 (T-34)		
2	12:15	18	20:46 (T-29)	20:57	29	20:22 (T-48)	20:14	19:22	17:35			17:11	18		08:36 (T-34)		
3	06:10		20:27 (T-29)	06:34		19:53 (T-48)	07:05	07:35	07:10			07:44			08:18 (T-34)		
4	12:15	19	20:46 (T-29)	20:56	30	20:23 (T-48)	20:12	19:20	17:34			17:11	19		08:37 (T-34)		
5	06:10		20:28 (T-29)	06:35		19:52 (T-48)	07:06	07:36	07:11			07:46			08:18 (T-34)		
6	12:15	19	20:47 (T-29)	20:54	31	20:23 (T-48)	20:11	19:18	17:33			17:10	20		08:38 (T-34)		
7	06:11		20:27 (T-29)	06:36		19:52 (T-48)	07:07	07:37	07:12			07:47			08:18 (T-34)		
8	12:14	19	20:46 (T-29)	20:53	31	20:23 (T-48)	20:09	19:17	17:31			17:10	21		08:39 (T-34)		
9	06:12		20:28 (T-29)	06:37		19:52 (T-48)	07:08	07:38	07:13			07:47			08:18 (T-34)		
10	12:14	19	20:47 (T-29)	20:52	31	20:23 (T-48)	20:07	19:15	17:30			17:10	21		08:39 (T-34)		
11	06:12		20:28 (T-29)	06:38		19:52 (T-48)	07:09	07:40	07:15			07:48			08:18 (T-34)		
12	12:14	20	20:48 (T-29)	20:51	31	20:23 (T-48)	20:06	19:13	17:29			17:10	22		08:40 (T-34)		
13	06:13		20:28 (T-29)	06:39		19:52 (T-48)	07:10	07:41	07:16			07:49			08:19 (T-34)		
14	12:14	20	20:48 (T-29)	20:50	31	20:23 (T-48)	20:04	19:12	17:28			17:10	22		08:41 (T-34)		
15	06:13		20:28 (T-29)	06:40		19:53 (T-48)	07:11	07:42	07:17			07:50			08:19 (T-34)		
16	12:13	20	20:48 (T-29)	20:49	29	20:22 (T-48)	20:02	19:10	17:27			17:10	22		08:41 (T-34)		
17	06:14		20:29 (T-29)	06:41		19:53 (T-48)	07:12	07:43	07:18			07:51			08:19 (T-34)		
18	12:13	19	20:48 (T-29)	20:47	29	20:22 (T-48)	20:01	19:08	17:26			17:10	23		08:42 (T-34)		
19	06:15		20:28 (T-29)	06:42		19:53 (T-48)	07:13	07:44	07:19			07:52			08:20 (T-34)		
20	12:13	19	20:47 (T-29)	20:46	28	20:21 (T-48)	19:57	19:07	17:25			17:10	23		08:43 (T-34)		
21	06:15		20:28 (T-29)	06:43		19:54 (T-48)	07:14	07:45	07:21			07:53			08:19 (T-34)		
22	12:12	19	20:47 (T-29)	20:45	27	20:21 (T-48)	19:56	19:05	17:24			17:10	23		08:42 (T-34)		
23	06:16		20:29 (T-29)	06:44		19:54 (T-48)	07:15	07:46	07:22			07:54			08:20 (T-34)		
24	12:12	18	20:47 (T-29)	20:43	26	20:20 (T-48)	19:54	19:04	17:23			17:10	23		08:43 (T-34)		
25	06:17		20:28 (T-29)	06:45		19:55 (T-48)	07:16	07:47	07:23			07:55			08:20 (T-34)		
26	12:11	18	20:46 (T-29)	20:42	24	20:19 (T-48)	19:52	19:02	17:22			17:10	24		08:44 (T-34)		
27	06:18		20:29 (T-29)	06:46		19:56 (T-48)	07:17	07:48	07:24			07:55			08:21 (T-34)		
28	12:11	17	20:46 (T-29)	20:41	21	20:17 (T-48)	19:51	19:01	17:21			17:10	23		08:44 (T-34)		
29	06:18		20:29 (T-29)	06:47		19:58 (T-48)	07:18	07:49	07:25			07:56			08:21 (T-34)		
30	12:10	16	20:45 (T-29)	20:39	18	20:16 (T-48)	19:49	18:59	17:20			17:11	23		08:44 (T-34)		
31	06:19		20:30 (T-29)	06:48		20:00 (T-48)	07:19	07:50	07:26			07:57			08:22 (T-34)		
32	12:10	15	20:45 (T-29)	20:38	13	20:13 (T-48)	19:47	18:57	17:19			17:11	23		08:45 (T-34)		
33	06:20		20:29 (T-29)	06:49		20:03 (T-48)	07:20	07:51	07:28			07:57			08:22 (T-34)		
34	12:09	15	20:44 (T-29)	20:37	6	20:09 (T-48)	19:45	18:56	17:19			17:11	24		08:46 (T-34)		
35	06:21		20:30 (T-29)	06:50			07:21	07:53	07:29			07:58			08:22 (T-34)		
36	12:09	13	20:43 (T-29)	20:35			19:44	18:54	17:18			17:12	24		08:46 (T-34)		
37	06:22		20:30 (T-29)	06:51			07:22	07:54	07:30			07:59			08:23 (T-34)		
38	12:08	13	20:43 (T-29)	20:34			19:42	18:53	17:17			17:12	24		08:47 (T-34)		
39	06:23		20:07 (T-48)	06:52			07:23	07:55	07:31			07:59			08:24 (T-34)		
40	12:07	13	20:42 (T-29)	20:32			19:40	18:51	17:16			17:12	23		08:47 (T-34)		
41	06:23		20:03 (T-48)	06:53			07:24	07:56	07:32			08:00			08:24 (T-34)		
42	12:07	20	20:42 (T-29)	20:31			19:39	18:50	17:16			17:13	23		08:47 (T-34)		
43	06:24		20:01 (T-48)	06:54			07:25	07:57	07:34			08:00			08:24 (T-34)		
44	12:06	21	20:40 (T-29)	20:29			19:37	18:49	17:15			17:13	23		08:47 (T-34)		
45	06:25		19:59 (T-48)	06:55			07:26	07:58	07:35			08:01			08:25 (T-34)		
46	12:05	24	20:40 (T-29)	20:28			19:35	18:47	17:14			17:14	23		08:48 (T-34)		
47	06:26		19:58 (T-48)	06:56			07:27	07:59	07:36			08:01			08:25 (T-34)		
48	12:04	24	20:39 (T-29)	20:26			19:33	18:46	17:14			17:14	24		08:49 (T-34)		
49	06:27		19:58 (T-48)	06:57			07:28	08:00	07:37			08:02			08:26 (T-34)		
50	12:03	22	20:38 (T-29)	20:25			19:32	18:44	17:13			17:15	24		08:50 (T-34)		
51	06:28		19:57 (T-48)	06:58			07:29	08:02	07:38			08:02			08:26 (T-34)		
52	12:02	23	20:20 (T-48)	20:23			19:30	18:43	17:13			17:16	24		08:50 (T-34)		
53	06:29		19:56 (T-48)	06:59			07:30	08:03	07:39			08:02			08:27 (T-34)		
54	12:02	25	20:21 (T-48)	20:22			19:28	18:42	17:12			17:16	23		08:50 (T-34)		
55	06:30		19:56 (T-48)	07:00			07:31	08:04	07:40			08:03			08:28 (T-34)		
56	12:01	25	20:21 (T-48)	20:20			19:27	18:40	17:12			17:17	23		08:51 (T-34)		
57	06:31		19:55 (T-48)	07:01			07:32	08:05	07:41			08:03			08:28 (T-34)		
58	12:00	27	20:22 (T-48)	20:19			19:25	18:39	17:12			17:18	23		08:51 (T-34)		
59	06:32		19:55 (T-48)	07:02			07:33	08:06	07:42			08:03			08:28 (T-34)		
60	12:59	27	20:22 (T-48)	20:17			19:23	18:38	17:11			17:18	24		08:52 (T-34)		
61	06:33		19:53 (T-48)	07:03				08:07				08:03			08:29 (T-34)		
62	12:58	29	20:22 (T-48)	20:15				18:36				17:19	23		08:52 (T-34)		
Potential sun hours			459	428		375	345	298				288					
Total, worst case			616		435			65				702					
Sun reduction			0.75		0.74			0.42				0.38					
Oper. time red.			0.97		0.97			0.97				0.97					
Wind dir. red.			0.60		0.59			0.59				0.59					
Total reduction			0.43		0.42			0.24				0.22					
Total, real			266		184			15				151					

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR258 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	20:23 (Alt-05) 06:10	20:27 (Alt-05) 06:34	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:33	21:03	15 20:33 (Alt-05) 21:15	22 20:49 (Alt-05) 20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	20:23 (Alt-05) 06:10	20:27 (Alt-05) 06:35	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	17 20:40 (Alt-05) 21:15	23 20:50 (Alt-05) 20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	20:23 (Alt-05) 06:11	20:27 (Alt-05) 06:36	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	18 20:41 (Alt-05) 21:15	22 20:49 (Alt-05) 20:54	20:11	19:18	17:33	17:11
4	08:04	07:47	07:09	07:18	06:34	06:08	20:22 (Alt-05) 06:11	20:28 (Alt-05) 06:36	07:07	07:37	07:12	07:46
	17:23	17:58	18:32	20:05	20:37	21:05	19 20:41 (Alt-05) 21:14	21 20:49 (Alt-05) 20:53	20:09	19:17	17:32	17:10
5	08:04	07:46	07:08	07:16	06:32	06:07	20:22 (Alt-05) 06:12	20:28 (Alt-05) 06:37	07:08	07:38	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	20 20:42 (Alt-05) 21:14	21 20:49 (Alt-05) 20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	20:22 (Alt-05) 06:12	20:29 (Alt-05) 06:38	07:09	07:40	07:14	07:48
	17:25	18:01	18:34	20:07	20:39	21:07	20 20:42 (Alt-05) 21:14	20 20:49 (Alt-05) 20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:07	20:22 (Alt-05) 06:13	20:28 (Alt-05) 06:39	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	20 20:42 (Alt-05) 21:14	20 20:48 (Alt-05) 20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	20:22 (Alt-05) 06:14	20:29 (Alt-05) 06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21 20:43 (Alt-05) 21:13	19 20:48 (Alt-05) 20:49	20:02	19:10	17:27	17:10
9	08:04	07:41	08:01	07:10	06:28	06:06	20:22 (Alt-05) 06:14	20:30 (Alt-05) 06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	22 20:44 (Alt-05) 21:13	18 20:48 (Alt-05) 20:47	20:01	19:08	17:26	17:10
10	08:04	07:40	08:00	07:08	06:27	06:06	20:22 (Alt-05) 06:15	20:30 (Alt-05) 06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	22 20:44 (Alt-05) 21:13	17 20:47 (Alt-05) 20:46	19:57	19:07	17:25	17:10
11	08:04	07:39	07:58	07:07	06:25	06:06	20:22 (Alt-05) 06:16	20:31 (Alt-05) 06:43	07:14	07:45	07:20	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	23 20:45 (Alt-05) 21:12	16 20:47 (Alt-05) 20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	20:23 (Alt-05) 06:16	20:32 (Alt-05) 06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:13	20:45	21:10	23 20:46 (Alt-05) 21:12	15 20:47 (Alt-05) 20:43	19:54	19:04	17:23	17:10
13	08:02	07:36	07:55	07:04	06:23	06:06	20:23 (Alt-05) 06:17	20:32 (Alt-05) 06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	23 20:46 (Alt-05) 21:11	14 20:46 (Alt-05) 20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:06	20:23 (Alt-05) 06:18	20:32 (Alt-07) 06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:15	20:47	21:11	24 20:47 (Alt-05) 21:11	14 20:46 (Alt-05) 20:41	19:51	19:01	17:21	17:11
15	08:02	07:34	07:51	07:00	06:21	06:06	20:23 (Alt-05) 06:19	20:33 (Alt-07) 06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:44	20:17	20:48	21:12	24 20:47 (Alt-05) 21:10	12 20:45 (Alt-05) 20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:06	20:23 (Alt-05) 06:19	20:33 (Alt-07) 06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	24 20:47 (Alt-05) 21:10	12 20:45 (Alt-05) 20:38	19:47	18:57	17:20	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	20:23 (Alt-05) 06:20	20:32 (Alt-07) 06:49	07:20	07:51	07:28	07:57
	17:37	18:15	19:47	20:19	20:50	21:13	24 20:47 (Alt-05) 21:09	12 20:44 (Alt-05) 20:37	19:45	18:56	17:19	17:11
18	08:00	07:30	07:46	06:56	06:18	06:06	20:23 (Alt-05) 06:21	20:33 (Alt-07) 06:50	07:21	07:52	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	25 20:48 (Alt-05) 21:09	10 20:43 (Alt-07) 20:35	19:44	18:54	17:18	17:12
19	08:00	07:29	07:45	06:54	06:18	20:27 (Alt-07) 06:06	20:23 (Alt-05) 06:22	20:33 (Alt-07) 06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	1 20:28 (Alt-07) 21:13	25 20:48 (Alt-05) 21:08	10 20:43 (Alt-07) 20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	20:26 (Alt-07) 06:06	20:24 (Alt-05) 06:23	20:34 (Alt-07) 06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	4 20:30 (Alt-07) 21:14	24 20:48 (Alt-05) 21:07	8 20:42 (Alt-07) 20:32	19:40	18:51	17:16	17:12
21	07:59	07:26	07:41	06:51	06:16	20:25 (Alt-07) 06:06	20:25 (Alt-05) 06:23	20:35 (Alt-07) 06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	5 20:30 (Alt-07) 21:14	24 20:49 (Alt-05) 21:06	7 20:42 (Alt-07) 20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	20:24 (Alt-07) 06:06	20:25 (Alt-05) 06:24	20:34 (Alt-07) 06:54	07:25	07:57	07:33	08:00
	17:42	18:21	19:52	20:24	20:55	7 20:31 (Alt-07) 21:14	24 20:49 (Alt-05) 21:06	6 20:40 (Alt-07) 20:29	19:37	18:49	17:15	17:13
23	07:57	07:23	07:38	06:48	06:14	20:24 (Alt-07) 06:07	20:24 (Alt-05) 06:25	20:35 (Alt-07) 06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	8 20:32 (Alt-07) 21:14	25 20:49 (Alt-05) 21:05	5 20:40 (Alt-07) 20:28	19:35	18:47	17:15	17:14
24	07:57	07:21	07:36	06:47	06:14	20:24 (Alt-07) 06:07	20:24 (Alt-05) 06:26	20:36 (Alt-07) 06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:56	9 20:33 (Alt-07) 21:14	25 20:49 (Alt-05) 21:04	3 20:39 (Alt-07) 20:26	19:33	18:46	17:14	17:14
25	07:56	07:20	07:35	06:46	06:13	20:24 (Alt-07) 06:07	20:25 (Alt-05) 06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	9 20:33 (Alt-07) 21:15	25 20:50 (Alt-05) 21:03	20:25	19:32	18:44	17:13	17:15
26	07:55	07:18	07:33	06:44	06:12	20:23 (Alt-07) 06:07	20:25 (Alt-05) 06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	11 20:34 (Alt-05) 21:15	24 20:49 (Alt-05) 21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:31	06:43	06:12	20:24 (Alt-07) 06:08	20:25 (Alt-05) 06:29	06:59	07:30	08:03	07:39	08:02
	17:48	18:26	19:57	20:29	20:59	11 20:35 (Alt-05) 21:15	24 20:49 (Alt-05) 21:01	20:22	19:28	18:42	17:13	17:16
28	07:54	07:15	07:30	06:41	06:11	20:23 (Alt-07) 06:08	20:26 (Alt-05) 06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:58	20:30	21:00	13 20:36 (Alt-05) 21:15	24 20:50 (Alt-05) 21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	20:24 (Alt-07) 06:09	20:26 (Alt-05) 06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	13 20:37 (Alt-05) 21:15	23 20:49 (Alt-05) 21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	20:24 (Alt-05) 06:09	20:27 (Alt-05) 06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:32	21:02	13 20:37 (Alt-05) 21:15	23 20:50 (Alt-05) 20:59	20:17	19:23	18:38	17:11	17:19
31	07:51		07:25		06:09	20:24 (Alt-05)	06:33	07:03		08:07		08:03
	17:53		20:01		21:02	14 20:38 (Alt-05)	20:58	20:15		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case					118	674	347					
Sun reduction					0.68	0.74	0.75					
Oper. time red.					0.97	0.97	0.97					
Wind dir. red.					0.60	0.60	0.60					
Total reduction					0.39	0.43	0.44					
Total, real					47	289	151					

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR259 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04 17:20	07:50 17:55	07:14 18:29	07:23 20:02	06:37 20:33	06:09 21:03	06:10 21:15	06:34 20:57	20:12 (Alt-05) 20:32 (Alt-05)	07:04 20:14	07:34 19:22	07:09 17:35
2	08:04 17:21	07:49 17:56	07:12 18:30	07:21 20:03	06:36 20:35	06:08 21:04	06:10 21:15	06:35 20:55	20:12 (Alt-05) 20:31 (Alt-05)	07:05 20:12	07:35 19:20	07:10 17:34
3	08:04 17:22	07:48 17:57	07:11 18:31	07:20 20:04	06:35 20:36	06:08 21:05	06:11 21:15	06:36 20:54	20:13 (Alt-05) 20:30 (Alt-05)	07:06 20:11	07:36 19:18	07:11 17:33
4	08:04 17:23	07:47 17:58	07:09 18:32	07:18 20:05	06:34 20:37	20:10 (Alt-05) 21:05	06:08 21:14	06:11 20:53	20:13 (Alt-05) 20:29 (Alt-05)	07:07 20:09	07:37 19:17	07:12 17:32
5	08:04 17:24	07:46 18:00	07:08 18:33	07:16 20:06	06:32 20:38	20:08 (Alt-05) 21:06	06:07 21:14	06:12 20:52	20:14 (Alt-05) 20:28 (Alt-05)	07:08 20:07	07:38 19:15	07:13 17:30
6	08:04 17:25	07:45 18:01	07:06 18:34	07:15 20:07	06:31 20:39	20:06 (Alt-05) 21:07	06:07 21:14	06:12 20:51	20:15 (Alt-05) 20:27 (Alt-05)	07:09 20:06	07:40 19:13	07:14 17:29
7	08:04 17:26	07:44 18:02	07:04 18:36	07:13 20:08	06:30 20:40	20:05 (Alt-05) 21:07	06:07 21:14	06:13 20:50	20:16 (Alt-05) 20:26 (Alt-05)	07:10 20:04	07:41 19:12	07:16 17:28
8	08:04 17:27	07:43 18:03	08:03 19:37	07:12 20:09	06:29 20:41	20:04 (Alt-05) 21:08	06:06 21:13	06:14 20:48	20:18 (Alt-05) 20:24 (Alt-05)	07:11 20:02	07:42 19:10	07:17 17:27
9	08:03 17:28	07:41 18:05	08:01 19:38	07:10 20:10	06:28 20:42	20:18 (Alt-05) 21:09	06:06 21:13	06:14 20:47	20:22 (Alt-05) 20:23 (Alt-05)	07:12 20:01	07:43 19:08	07:18 17:26
10	08:03 17:29	07:40 18:06	08:00 19:39	07:08 20:11	06:27 20:43	20:03 (Alt-05) 21:09	06:06 21:13	06:15 20:46	1 20:23 (Alt-05)	07:13 19:57	07:44 19:07	07:19 17:25
11	08:03 17:30	07:39 18:07	07:58 19:40	07:07 20:12	06:25 20:44	20:20 (Alt-05) 21:10	06:06 21:12	06:16 20:45		07:14 19:56	07:45 19:05	07:20 17:24
12	08:03 17:31	07:38 18:08	07:56 19:41	07:05 20:13	06:24 20:45	20:02 (Alt-05) 21:10	06:06 21:12	06:16 20:43		07:15 19:54	07:46 19:04	07:22 17:23
13	08:02 17:32	07:36 18:10	07:55 19:42	07:04 20:14	06:23 20:46	20:22 (Alt-05) 21:11	06:06 21:11	06:17 20:42		07:16 19:52	07:47 19:02	07:23 17:22
14	08:02 17:33	07:35 18:11	07:53 19:43	07:02 20:15	06:22 20:47	20:02 (Alt-05) 21:11	06:06 21:11	06:18 20:41		07:17 19:51	07:48 19:01	07:24 17:21
15	08:02 17:34	07:34 18:12	07:51 19:44	07:00 20:17	06:21 20:48	20:02 (Alt-05) 21:12	06:06 21:10	06:19 20:39		07:18 19:49	07:49 18:59	07:25 17:20
16	08:01 17:35	07:33 18:13	07:50 19:46	06:59 20:18	06:20 20:49	20:02 (Alt-05) 21:12	06:06 21:10	06:19 20:38		07:19 19:47	07:50 18:57	07:26 17:20
17	08:01 17:37	07:31 18:15	07:48 19:47	06:57 20:19	06:19 20:50	20:02 (Alt-05) 21:13	06:06 21:09	06:20 20:37		07:20 19:45	07:51 18:56	07:28 17:19
18	08:00 17:38	07:30 18:16	07:46 19:48	06:56 20:20	06:18 20:51	20:03 (Alt-05) 21:13	06:06 21:09	06:21 20:35	20:19 (Alt-05)	07:21 19:44	07:52 18:54	07:29 17:18
19	08:00 17:39	07:29 18:17	07:45 19:49	06:54 20:21	06:18 20:52	20:03 (Alt-05) 21:13	06:06 21:08	06:22 20:34	20:18 (Alt-05)	07:22 19:42	07:54 18:53	07:30 17:17
20	07:59 17:40	07:27 18:18	07:43 19:50	06:53 20:22	06:17 20:53	20:04 (Alt-05) 21:14	06:06 21:07	06:23 20:30	20:17 (Alt-05)	07:23 19:40	07:55 18:51	07:31 17:16
21	07:59 17:41	07:26 18:19	07:41 19:51	06:51 20:23	06:16 20:54	20:05 (Alt-05) 21:14	06:06 21:06	06:23 20:31	20:16 (Alt-05)	07:24 19:39	07:56 18:50	07:32 17:13
22	07:58 17:42	07:24 18:21	07:40 19:52	06:50 20:24	06:15 20:55	20:05 (Alt-05) 21:14	06:06 21:06	06:24 20:31	20:15 (Alt-05)	07:25 19:37	07:57 18:49	07:33 17:15
23	07:57 17:44	07:23 18:22	07:38 19:53	06:48 20:25	06:14 20:56	20:06 (Alt-05) 21:14	06:07 21:05	06:25 20:32	20:14 (Alt-05)	07:26 19:35	07:58 18:47	07:35 17:15
24	07:57 17:45	07:21 18:23	07:36 19:54	06:47 20:26	06:14 20:56	20:08 (Alt-05) 21:14	06:07 21:04	06:26 20:33	20:14 (Alt-05)	07:27 19:33	07:59 18:46	07:36 17:14
25	07:56 17:46	07:20 18:24	07:35 19:55	06:46 20:27	06:13 20:57	20:09 (Alt-05) 21:15	06:07 21:03	06:27 20:34	20:13 (Alt-05)	07:28 19:32	08:00 18:44	07:37 17:15
26	07:55 17:47	07:18 18:25	07:33 19:56	06:44 20:28	06:12 20:58	20:11 (Alt-05) 21:15	06:07 21:02	06:28 20:34	20:13 (Alt-05)	07:29 19:30	08:02 18:43	07:38 17:13
27	07:54 17:48	07:17 18:26	07:31 19:57	06:43 20:29	06:12 20:59	20:16 (Alt-05) 21:15	06:08 21:01	06:29 20:35	20:13 (Alt-05)	07:30 19:28	08:03 18:42	07:39 17:16
28	07:54 17:50	07:15 18:28	07:30 19:58	06:41 20:30	06:11 21:00	20:13 (Alt-05) 21:15	06:08 21:01	06:30 20:35	20:13 (Alt-05)	07:31 19:27	08:04 18:40	07:40 17:17
29	07:53 17:51		07:28 20:00	06:40 20:31	06:10 21:01	20:13 (Alt-05) 21:15	06:09 21:00	06:31 20:35	20:13 (Alt-05)	07:32 19:25	08:05 18:39	07:41 17:18
30	07:52 17:52		07:26 20:00	06:39 20:32	06:10 21:02	20:13 (Alt-05) 21:15	06:09 20:59	06:32 20:34	20:13 (Alt-05)	07:33 19:23	08:06 18:38	07:42 17:19
31	07:51 17:53		07:25 20:01	06:38 21:02	06:09 21:02		06:33 20:58	20:12 (Alt-05) 20:33 (Alt-05)	07:03 20:15		08:07 18:36	08:03 17:19
Potential sun hours	298	297	370	398	448	452	459	428		375	345	298
Total, worst case					360		250	115				288
Sun reduction					0.68		0.75	0.74				
Oper. time red.					0.97		0.97	0.97				
Wind dir. red.					0.60		0.60	0.60				
Total reduction					0.39		0.43	0.43				
Total, real					142		108	49				

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

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

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR260 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

January		February		March		April		May		June	
1	08:04 17:20	07:50 17:55	28	17:28 (T-49) 18:29	07:14 20:02	07:23 20:02	06:37 20:34	19:52 (T-48) 20:08 (T-48)	06:09 21:03		
2	08:04 17:21	07:49 17:56	30	16:59 (T-49) 18:30	07:12 20:03	07:21 20:03	06:36 20:35	19:53 (T-48) 20:07 (T-48)	06:08 21:04		
3	08:04 17:22	07:48 17:57	30	16:59 (T-49) 18:31	07:11 20:04	07:20 20:04	06:35 20:36	19:54 (T-48) 20:06 (T-48)	06:08 21:05		
4	08:04 17:23	07:47 17:58	31	16:59 (T-49) 18:32	07:09 20:05	07:18 20:05	06:34 20:37	19:55 (T-48) 20:03 (T-48)	06:07 21:05		
5	08:04 17:24	07:46 18:00	31	16:59 (T-49) 18:33	07:08 20:06	07:16 20:06	06:32 20:38		06:07 21:06		
6	08:04 17:25	07:45 18:01	31	16:59 (T-49) 18:34	07:06 20:07	07:15 20:07	06:31 20:39		06:07 21:07		
7	08:04 17:26	07:44 18:02	32	16:59 (T-49) 18:36	07:04 20:08	07:13 20:08	06:30 20:40		06:07 21:08		
8	08:04 17:27	07:43 18:03	32	17:31 (T-49) 19:37	08:03 20:09	07:12 20:09	06:29 20:41		06:06 21:08		
9	08:03 17:28	07:41 18:05	31	17:31 (T-49) 19:38	08:01 20:10	07:10 20:10	06:28 20:42		06:06 21:09		
10	08:03 17:29	07:40 18:06	30	17:31 (T-49) 19:39	08:00 20:11	07:08 20:11	06:26 20:43		06:06 21:09		
11	08:03 17:30	07:39 18:07	30	17:01 (T-49) 19:40	07:58 20:12	07:07 20:12	06:25 20:44		06:06 21:10		
12	08:03 17:31	07:38 18:08	29	17:02 (T-49) 19:41	07:56 20:13	07:05 20:13	06:24 20:45		06:06 21:10		
13	08:02 17:32	07:37 18:10	27	17:29 (T-49) 19:42	07:55 20:14	07:04 20:14	06:23 20:46		06:06 21:11		
14	08:02 17:33	07:35 18:11	26	17:04 (T-49) 19:43	07:53 20:15	07:02 20:15	06:22 20:47		06:05 21:11		
15	08:02 17:34	07:34 18:12	23	17:05 (T-49) 19:44	07:51 20:17	07:00 20:17	06:21 20:48		06:05 21:12		
16	08:01 17:35	07:33 18:13	21	17:07 (T-49) 19:46	07:50 20:18	06:59 20:18	06:20 20:49		06:05 21:12		
17	08:01 17:36	07:31 18:14	16	17:23 (T-49) 19:47	07:48 20:19	06:57 20:19	06:19 20:50		06:06 21:13		
18	08:00 17:38	07:30 18:16	11	17:21 (T-49) 19:47	07:46 20:20	06:56 20:20	06:18 20:51		06:06 21:13		
19	08:00 17:39	07:29 18:17		07:45 19:49	06:54 20:21	06:54 20:21	06:17 20:52		06:06 21:13		
20	07:59 17:40	07:27 18:18		07:43 19:50	06:53 20:22	06:53 20:22	06:17 20:53		06:06 21:14		
21	07:59 17:41	07:26 18:19		07:41 19:51	06:51 20:23	19:57 (T-48) 20:02 (T-48)	06:16 20:54		06:06 21:14		
22	07:58 17:42	07:24 18:20		07:40 19:52	06:50 20:24	19:55 (T-48) 20:02 (T-48)	06:15 20:55		06:06 21:14		
23	07:57 17:44	07:23 18:22		07:38 19:53	06:48 20:25	19:54 (T-48) 20:04 (T-48)	06:14 20:56		06:06 21:14		
24	07:57 17:45	17:10 (T-49) 18:23		07:36 19:54	06:47 20:26	19:52 (T-48) 20:04 (T-48)	06:13 20:57		06:07 21:15		
25	07:56 17:46	17:07 (T-49) 18:24		07:35 19:55	06:46 20:27	19:52 (T-48) 20:06 (T-48)	06:13 20:57		06:07 21:15		
26	07:55 17:47	17:05 (T-49) 18:25		07:33 19:56	06:44 20:28	19:52 (T-48) 20:07 (T-48)	06:12 20:58		06:07 21:15		
27	07:54 17:48	17:21 (T-49) 18:26		07:31 19:57	06:43 20:29	19:51 (T-48) 20:07 (T-48)	06:11 20:59		06:08 21:15		
28	07:54 17:50	17:22 (T-49) 18:28		07:30 19:58	06:41 20:30	19:51 (T-48) 20:09 (T-48)	06:11 21:00		06:08 21:15		
29	07:53 17:51	17:01 (T-49) 18:28		07:28 20:00	06:40 20:31	19:51 (T-48) 20:10 (T-48)	06:10 21:01		06:09 21:15		
30	07:52 17:52	17:01 (T-49) 18:28		07:26 20:00	06:39 20:32	19:51 (T-48) 20:09 (T-48)	06:10 21:02		06:09 21:15		
31	07:51 17:53	17:00 (T-49) 18:28		07:25 20:01	06:38 20:33	19:51 (T-48) 20:09 (T-48)	06:10 21:03		06:09 21:15		
Potential sun hours	298	297		370	398	448	452				
Total, worst case	149	458		134	50						
Sun reduction	0.46	0.51		0.60	0.68						
Oper. time red.	0.97	0.97		0.97	0.97						
Wind dir. red.	0.69	0.69		0.60	0.60						
Total reduction	0.31	0.34		0.35	0.40						
Total, real	46	157		47	20						

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

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

Project:

Northwest Ohio

Description:

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Licensed user:

EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR260 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

July		August		September		October		November		December	
1	06:09	06:33		07:04	07:34			07:09	16:30 (T-49)	07:43	
	21:15	20:57		20:14	19:22			17:35	30	17:00 (T-49)	17:11
2	06:10	06:34		07:05	07:35			07:10		16:29 (T-49)	07:44
	21:15	20:55		20:12	19:20			17:34	31	17:00 (T-49)	17:11
3	06:10	06:35		07:06	07:36			07:11		16:29 (T-49)	07:45
	21:15	20:54		20:11	19:18			17:33	31	17:00 (T-49)	17:10
4	06:11	06:36		07:07	07:37			07:12		16:29 (T-49)	07:46
	21:14	20:53		20:09	19:17			17:31	31	17:00 (T-49)	17:10
5	06:12	06:37		07:08	07:38			07:13		16:29 (T-49)	07:47
	21:14	20:52		20:07	19:15			17:30	31	17:00 (T-49)	17:10
6	06:12	06:38		07:09	07:40			07:15		16:29 (T-49)	07:48
	21:14	20:51		20:06	19:13			17:29	31	17:00 (T-49)	17:10
7	06:13	06:39		07:10	07:41			07:16		16:29 (T-49)	07:49
	21:14	20:50		20:04	19:12			17:28	30	16:59 (T-49)	17:10
8	06:13	06:40	20:08 (T-48)	07:11	07:42			07:17		16:30 (T-49)	07:50
	21:13	20:49	2	20:10 (T-48)	20:02	19:10		17:27	30	17:00 (T-49)	17:10
9	06:14	06:41	20:04 (T-48)	07:12	07:43			07:18		16:30 (T-49)	07:51
	21:13	20:47	10	20:14 (T-48)	20:01	19:08		17:26	29	16:59 (T-49)	17:10
10	06:15	06:42	20:03 (T-48)	07:13	07:44			07:19		16:31 (T-49)	07:52
	21:13	20:46	12	20:15 (T-48)	19:57	19:07		17:25	28	16:59 (T-49)	17:10
11	06:15	06:43	20:01 (T-48)	07:14	07:45			07:21		16:32 (T-49)	07:53
	21:12	20:45	15	20:16 (T-48)	19:56	19:05		17:24	27	16:59 (T-49)	17:10
12	06:16	06:44	20:00 (T-48)	07:15	07:46			07:22		16:33 (T-49)	07:54
	21:12	20:43	17	20:17 (T-48)	19:54	19:04		17:23	25	16:58 (T-49)	17:10
13	06:17	06:45	20:00 (T-48)	07:16	07:47			07:23		16:33 (T-49)	07:54
	21:11	20:42	18	20:18 (T-48)	19:52	19:02		17:22	24	16:57 (T-49)	17:10
14	06:18	06:46	19:59 (T-48)	07:17	07:48			07:24		16:34 (T-49)	07:55
	21:11	20:41	18	20:17 (T-48)	19:51	19:01		17:21	22	16:56 (T-49)	17:10
15	06:18	06:47	19:59 (T-48)	07:18	07:49			07:25		16:36 (T-49)	07:56
	21:10	20:39	17	20:16 (T-48)	19:49	18:59		17:20	19	16:55 (T-49)	17:11
16	06:19	06:48	19:59 (T-48)	07:19	07:50			07:26		16:38 (T-49)	07:57
	21:10	20:38	16	20:15 (T-48)	19:47	18:57		17:19	16	16:54 (T-49)	17:11
17	06:20	06:49	19:58 (T-48)	07:20	07:51			07:28		16:40 (T-49)	07:57
	21:09	20:37	15	20:13 (T-48)	19:45	18:56		17:19	12	16:52 (T-49)	17:11
18	06:21	06:50	19:58 (T-48)	07:21	07:52			07:29		16:44 (T-49)	07:58
	21:09	20:35	13	20:11 (T-48)	19:44	18:54		17:18	3	16:47 (T-49)	17:12
19	06:22	06:51	19:58 (T-48)	07:22	07:54			07:30			07:59
	21:08	20:34	12	20:10 (T-48)	19:42	18:53		17:17			17:12
20	06:23	06:52	19:59 (T-48)	07:23	07:55			07:31			07:59
	21:07	20:32	9	20:08 (T-48)	19:40	18:51		17:16			17:12
21	06:23	06:53	20:00 (T-48)	07:24	07:56			07:32			08:00
	21:07	20:31	7	20:07 (T-48)	19:39	18:50		17:16			17:13
22	06:24	06:54	20:01 (T-48)	07:25	07:57			07:33			08:00
	21:06	20:29	5	20:06 (T-48)	19:37	18:48		17:15			17:13
23	06:25	06:55		07:26	07:58			07:35			08:01
	21:05	20:28		19:35	18:47			17:14			17:14
24	06:26	06:56		07:27	07:59	17:44 (T-49)		07:36			08:01
	21:04	20:26		19:33	18:46	3	17:47 (T-49)	17:14			17:14
25	06:27	06:57		07:28	08:00			17:38 (T-49)			08:02
	21:03	20:25		19:32	18:44	14	17:52 (T-49)	17:13			17:15
26	06:28	06:58		07:29	08:02			17:36 (T-49)			08:02
	21:02	20:23		19:30	18:43	18	17:54 (T-49)	17:13			17:16
27	06:29	06:59		07:30	08:03			17:35 (T-49)			08:02
	21:02	20:22		19:28	18:42	21	17:56 (T-49)	17:12			17:16
28	06:30	07:00		07:31	08:04			17:33 (T-49)			08:03
	21:01	20:20		19:27	18:40	24	17:57 (T-49)	17:12			17:17
29	06:31	07:01		07:32	08:05			17:32 (T-49)			08:03
	21:00	20:19		19:25	18:39	26	17:58 (T-49)	17:12			17:18
30	06:32	07:02		07:33	08:06			17:31 (T-49)			08:03
	20:59	20:17		19:23	18:38	27	17:58 (T-49)	17:11			17:18
31	06:33	07:03			08:07			17:31 (T-49)			08:03
	20:58	20:15			18:36	28	17:59 (T-49)				17:19
Potential sun hours	459	428		375	345			298			288
Total, worst case			186			161		450			
Sun reduction			0.74			0.62		0.42			
Oper. time red.			0.97			0.97		0.97			
Wind dir. red.			0.60			0.69		0.69			
Total reduction			0.44			0.42		0.28			
Total, real			81			67		127			

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

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

Northwest Ohio

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
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SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR261 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:34	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:33	21:03	21:15	20:56	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:10
4	08:04	07:47	07:09	07:18	06:34	06:07	06:11	06:36	07:07	07:37	07:12	07:46
	17:23	17:58	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:31	17:10
5	08:04	07:46	07:08	07:16	06:32	06:07	06:12	06:37	07:08	07:38	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:39	07:14	07:48
	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:13	06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21:13	20:48	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:08	17:26	17:10
10	08:03	07:40	08:00	07:08	06:26	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:25	06:06	06:15	06:43	07:14	07:45	07:20	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
12	08:03	07:38	07:56	07:05	06:24	06:06	06:16	06:44	07:15	07:46	07:22	07:54
	17:31	18:08	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:36	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:05	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:15	20:47	21:11	21:11	20:41	19:51	19:00	17:21	17:10
15	08:02	07:34	07:51	07:00	06:21	06:05	06:18	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:44	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:05	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:57	17:19	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:51	07:28	07:57
	17:36	18:14	19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	17:11
18	08:00	07:30	07:46	06:56	06:18	06:06	06:21	06:50	07:21	07:52	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:28	07:45	06:54	06:17	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:51	17:16	17:12
21	07:59	07:26	07:41	06:51	06:16	06:06	06:23	06:53	07:24	07:56	07:32	08:00
	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33	08:00
	17:42	18:20	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:48	17:15	17:13
23	07:57	07:23	07:38	06:48	06:14	06:06	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:14	17:14
24	07:57	07:21	07:36	06:47	06:14	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:56	21:14	21:04	20:26	19:33	18:46	17:14	17:14
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:13	17:15
26	07:55	07:18	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:31	06:43	06:11	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:48	18:26	19:57	20:29	20:59	21:15	21:01	20:22	19:28	18:42	17:12	17:16
28	07:54	07:15	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:58	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:32	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:18
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:53		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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5/21/2013 8:55 AM / 357

Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR262 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:33	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:33	21:03	21:15	20:57	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:10
4	08:04	07:47	07:09	07:18	06:34	06:07	06:11	06:36	07:07	07:37	07:12	07:46
	17:23	17:58	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:31	17:10
5	08:04	07:46	07:08	07:16	06:32	06:07	06:12	06:37	07:08	07:38	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:39	07:14	07:48
	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:43	08:03	07:12	06:29	06:06	06:13	06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21:13	20:48	20:02	19:10	17:27	17:10
9	08:03	07:41	08:01	07:10	06:28	06:06	06:14	06:41	07:12	07:43	07:18	07:51
	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:08	17:26	17:10
10	08:03	07:40	08:00	07:08	06:26	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
11	08:03	07:39	07:58	07:07	06:25	06:06	06:15	06:43	07:14	07:45	07:20	07:53
	17:30	18:07	19:40	20:12	20:44	21:10	21:12	20:45	19:56	19:05	17:24	17:10
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	17:31	18:08	19:41	20:13	20:45	21:10	21:12	20:43	19:54	19:04	17:23	17:10
13	08:02	07:36	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:05	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:15	20:47	21:11	21:11	20:41	19:50	19:00	17:21	17:10
15	08:02	07:34	07:51	07:00	06:21	06:05	06:18	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:44	20:17	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:05	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:57	17:19	17:11
17	08:01	07:31	07:48	06:57	06:19	06:06	06:20	06:49	07:20	07:51	07:28	07:57
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18	08:00	07:30	07:46	06:56	06:18	06:06	06:21	06:50	07:21	07:52	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:28	07:45	06:54	06:17	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
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	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33	08:00
	17:42	18:20	19:52	20:24	20:55	21:14	21:06	20:29	19:37	18:48	17:15	17:13
23	07:57	07:23	07:38	06:48	06:14	06:06	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:14	17:14
24	07:57	07:21	07:36	06:47	06:13	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:56	21:14	21:04	20:26	19:33	18:46	17:14	17:14
25	07:56	07:20	07:35	06:46	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:13	17:15
26	07:55	07:18	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:31	06:43	06:11	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:48	18:26	19:57	20:29	20:59	21:15	21:01	20:22	19:28	18:42	17:12	17:16
28	07:54	07:15	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:28	19:58	20:30	21:00	21:15	21:01	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		20:00	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:00	20:32	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:18
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:53		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR263 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:33	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:33	21:03	21:15	20:56	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:10
4	08:04	07:47	07:09	07:18	06:34	06:07	06:11	06:36	07:07	07:37	07:12	07:46
	17:23	17:58	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:31	17:10
5	08:04	07:46	07:08	07:16	06:32	06:07	06:12	06:37	07:08	07:38	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:39	07:14	07:48
	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:42	08:03	07:12	06:29	06:06	06:13	06:40	07:11	07:42	07:17	07:50
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	17:28	18:05	19:38	20:10	20:42	21:09	21:13	20:47	20:01	19:08	17:26	17:10
10	08:03	07:40	08:00	07:08	06:26	06:06	06:15	06:42	07:13	07:44	07:19	07:52
	17:29	18:06	19:39	20:11	20:43	21:09	21:13	20:46	19:57	19:07	17:25	17:10
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	17:33	18:11	19:43	20:15	20:47	21:11	21:11	20:41	19:50	19:00	17:21	17:10
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	17:34	18:12	19:44	20:16	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:05	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:46	20:18	20:49	21:12	21:10	20:38	19:47	18:57	17:19	17:11
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	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:28	07:45	06:54	06:17	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:23	06:52	07:23	07:55	07:31	07:59
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	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
22	07:58	07:24	07:40	06:50	06:15	06:06	06:24	06:54	07:25	07:57	07:33	08:00
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23	07:57	07:23	07:38	06:48	06:14	06:06	06:25	06:55	07:26	07:58	07:35	08:01
	17:44	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:14	17:14
24	07:57	07:21	07:36	06:47	06:13	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:56	21:14	21:04	20:26	19:33	18:46	17:14	17:14
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	17:46	18:24	19:55	20:27	20:57	21:15	21:03	20:25	19:32	18:44	17:13	17:15
26	07:55	07:18	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:02	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
27	07:54	07:17	07:31	06:43	06:11	06:08	06:29	06:59	07:30	08:03	07:39	08:02
	17:48	18:26	19:57	20:29	20:59	21:15	21:01	20:22	19:28	18:42	17:12	17:16
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	17:51		19:59	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
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31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:53		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR264 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:33	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:33	21:03	21:15	20:56	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:10
4	08:04	07:47	07:09	07:18	06:33	06:07	06:11	06:36	07:07	07:37	07:12	07:46
	17:23	17:58	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:31	17:10
5	08:04	07:46	07:08	07:16	06:32	06:07	06:12	06:37	07:08	07:38	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
6	08:04	07:45	07:06	07:15	06:31	06:07	06:12	06:38	07:09	07:39	07:14	07:48
	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:07	06:13	06:39	07:10	07:41	07:16	07:49
	17:26	18:02	18:36	20:08	20:40	21:07	21:14	20:50	20:04	19:12	17:28	17:10
8	08:04	07:42	08:03	07:12	06:29	06:06	06:13	06:40	07:11	07:42	07:17	07:50
	17:27	18:03	19:37	20:09	20:41	21:08	21:13	20:48	20:02	19:10	17:27	17:10
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11	08:03	07:39	07:58	07:07	06:25	06:06	06:15	06:43	07:14	07:45	07:20	07:53
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	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
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16	08:01	07:33	07:50	06:59	06:20	06:05	06:19	06:48	07:19	07:50	07:26	07:57
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18	08:00	07:30	07:46	06:56	06:18	06:06	06:21	06:50	07:21	07:52	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:28	07:45	06:54	06:17	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
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	17:41	18:19	19:51	20:23	20:54	21:14	21:06	20:31	19:39	18:50	17:16	17:13
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	17:43	18:22	19:53	20:25	20:56	21:14	21:05	20:28	19:35	18:47	17:14	17:14
24	07:57	07:21	07:36	06:47	06:13	06:07	06:26	06:56	07:27	07:59	07:36	08:01
	17:45	18:23	19:54	20:26	20:56	21:14	21:04	20:26	19:33	18:46	17:14	17:14
25	07:56	07:20	07:35	06:45	06:13	06:07	06:27	06:57	07:28	08:00	07:37	08:02
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26	07:55	07:18	07:33	06:44	06:12	06:07	06:28	06:58	07:29	08:01	07:38	08:02
	17:47	18:25	19:56	20:28	20:58	21:15	21:02	20:23	19:30	18:43	17:13	17:16
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28	07:53	07:15	07:30	06:41	06:11	06:08	06:30	07:00	07:31	08:04	07:40	08:03
	17:50	18:27	19:58	20:30	21:00	21:15	21:00	20:20	19:27	18:40	17:12	17:17
29	07:53		07:28	06:40	06:10	06:09	06:31	07:01	07:32	08:05	07:41	08:03
	17:51		19:59	20:31	21:01	21:15	21:00	20:19	19:25	18:39	17:12	17:18
30	07:52		07:26	06:39	06:10	06:09	06:32	07:02	07:33	08:06	07:42	08:03
	17:52		20:01	20:32	21:02	21:15	20:59	20:17	19:23	18:38	17:11	17:18
31	07:51		07:25		06:09		06:33	07:03		08:07		08:03
	17:53		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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EAPC Wind Energy
3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR265 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:33	07:04	07:34	07:09	07:43
	17:20	17:55	18:29	20:02	20:33	21:03	21:15	20:56	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:35	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:15	20:54	20:11	19:18	17:33	17:10
4	08:04	07:47	07:09	07:18	06:33	06:07	06:11	06:36	07:07	07:37	07:12	07:46
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13	08:02	07:36	07:55	07:04	06:23	06:06	06:17	06:45	07:16	07:47	07:23	07:54
	17:32	18:10	19:42	20:14	20:46	21:11	21:11	20:42	19:52	19:02	17:22	17:10
14	08:02	07:35	07:53	07:02	06:22	06:05	06:18	06:46	07:17	07:48	07:24	07:55
	17:33	18:11	19:43	20:15	20:47	21:11	21:11	20:41	19:50	19:00	17:21	17:10
15	08:02	07:34	07:51	07:00	06:21	06:05	06:18	06:47	07:18	07:49	07:25	07:56
	17:34	18:12	19:44	20:16	20:48	21:12	21:10	20:39	19:49	18:59	17:20	17:11
16	08:01	07:33	07:50	06:59	06:20	06:05	06:19	06:48	07:19	07:50	07:26	07:57
	17:35	18:13	19:45	20:18	20:49	21:12	21:10	20:38	19:47	18:57	17:19	17:11
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	17:36	18:14	19:47	20:19	20:50	21:13	21:09	20:37	19:45	18:56	17:19	17:11
18	08:00	07:30	07:46	06:56	06:18	06:06	06:21	06:50	07:21	07:52	07:29	07:58
	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
19	08:00	07:28	07:45	06:54	06:17	06:06	06:22	06:51	07:22	07:54	07:30	07:59
	17:39	18:17	19:49	20:21	20:52	21:13	21:08	20:34	19:42	18:53	17:17	17:12
20	07:59	07:27	07:43	06:53	06:17	06:06	06:22	06:52	07:23	07:55	07:31	07:59
	17:40	18:18	19:50	20:22	20:53	21:14	21:07	20:32	19:40	18:51	17:16	17:12
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23	07:57	07:23	07:38	06:48	06:14	06:06	06:25	06:55	07:26	07:58	07:35	08:01
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	17:53		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

SHADOW - Calendar

Calculation: NwOH - Vestas Final Layout - valid 130520Shadow receptor: SR266 - Non-Participating

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.46	0.51	0.55	0.60	0.68	0.74	0.75	0.74	0.68	0.62	0.42	0.38

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
434	482	706	559	385	472	793	1,057	1,141	1,029	807	596	8,460

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:04	07:50	07:14	07:23	06:37	06:09	06:09	06:33	07:04	07:34	07:08	07:43
	17:20	17:55	18:29	20:02	20:33	21:03	21:15	20:56	20:14	19:22	17:35	17:11
2	08:04	07:49	07:12	07:21	06:36	06:08	06:10	06:34	07:05	07:35	07:10	07:44
	17:21	17:56	18:30	20:03	20:34	21:04	21:15	20:55	20:12	19:20	17:34	17:11
3	08:04	07:48	07:11	07:20	06:35	06:08	06:10	06:35	07:06	07:36	07:11	07:45
	17:22	17:57	18:31	20:04	20:36	21:05	21:14	20:54	20:11	19:18	17:33	17:10
4	08:04	07:47	07:09	07:18	06:33	06:07	06:11	06:36	07:07	07:37	07:12	07:46
	17:23	17:58	18:32	20:05	20:37	21:05	21:14	20:53	20:09	19:17	17:31	17:10
5	08:04	07:46	07:08	07:16	06:32	06:07	06:12	06:37	07:08	07:38	07:13	07:47
	17:24	18:00	18:33	20:06	20:38	21:06	21:14	20:52	20:07	19:15	17:30	17:10
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	17:25	18:01	18:34	20:07	20:39	21:07	21:14	20:51	20:06	19:13	17:29	17:10
7	08:04	07:44	07:04	07:13	06:30	06:06	06:13	06:39	07:10	07:41	07:16	07:49
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	17:38	18:16	19:48	20:20	20:51	21:13	21:09	20:35	19:44	18:54	17:18	17:12
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	17:53		20:01		21:02		20:58	20:15		18:36		17:19
Potential sun hours	298	297	370	398	448	452	459	428	375	345	298	288
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project:

Northwest Ohio

Description:

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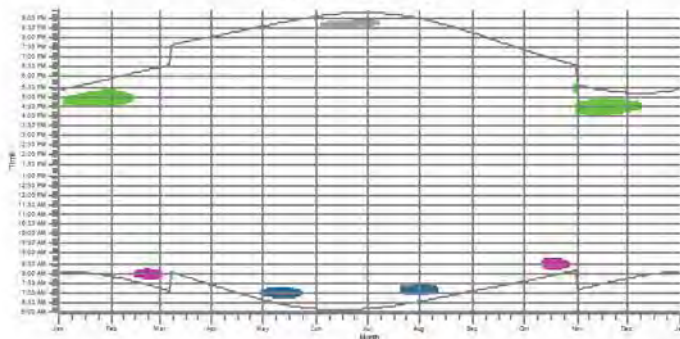
Licensed user:

EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

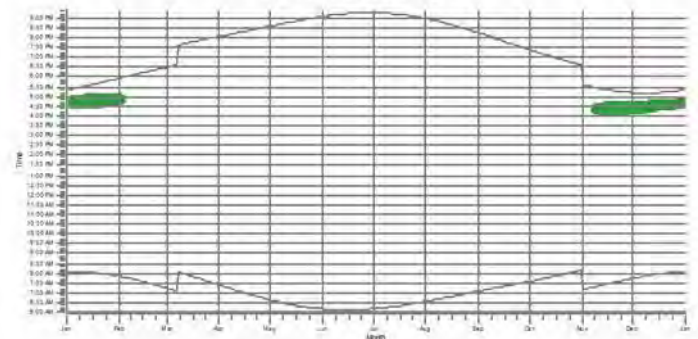
SHADOW - Calendar, graphical

Calculation: NwOH - Vestas Final Layout - valid 130520

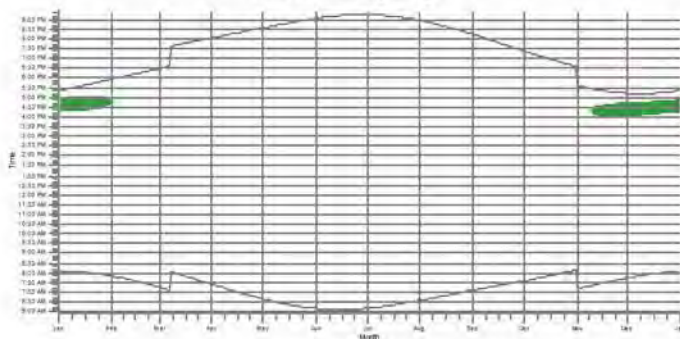
SR001: Participating



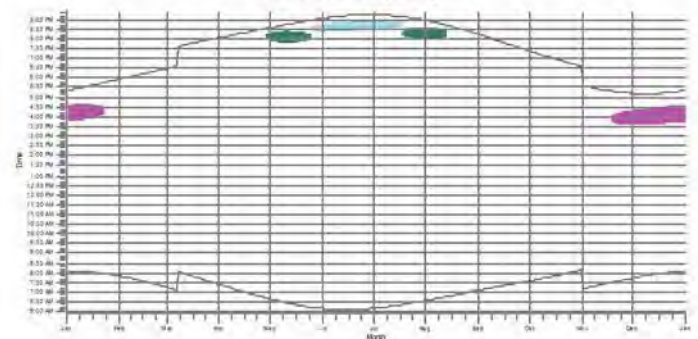
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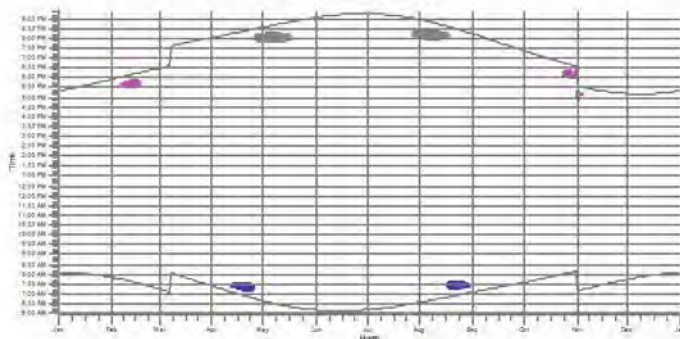
SR003: Participating



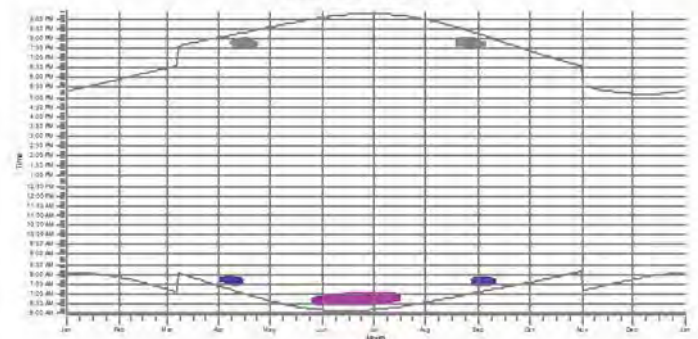
SR004: Participating



SR005: Participating



SR006: Participating



WTG6

T-06 T-06 T-06 T-08 T-10 T-10 T-12 T-12 T-14 T-14 T-16 T-16 T-20 T-20 T-25 T-25 T-28 T-28 T-31 T-31 T-32 T-32

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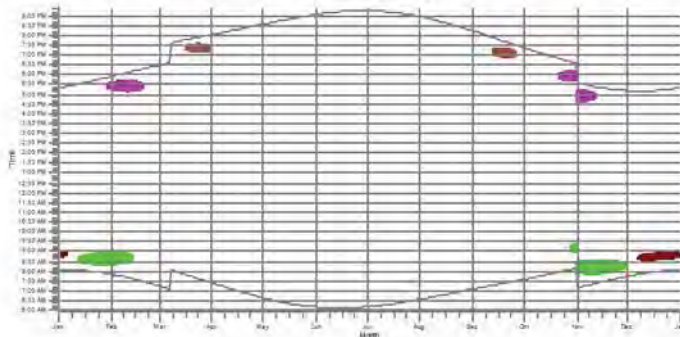
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3100 DeMers Avenue
US-GRAND FORKS, ND 58201
+1 701 775 3000
wind@eapc.net
Calculated:
5/21/2013 1:08 AM/2.9.207

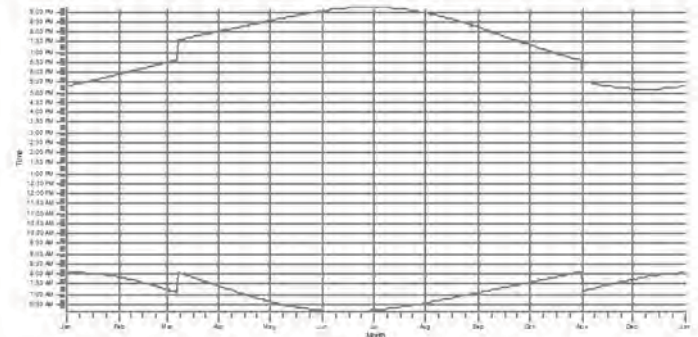
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Calculation: NwOH - Vestas Final Layout - valid 130520

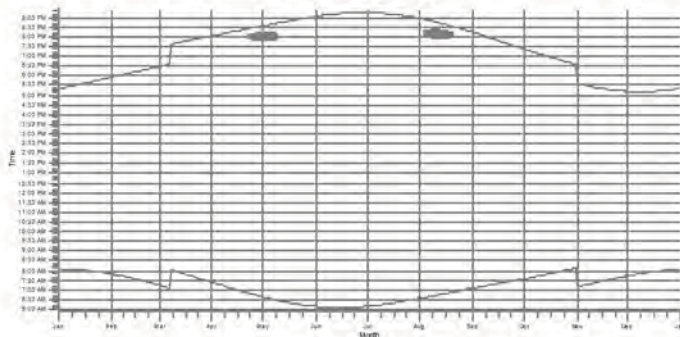
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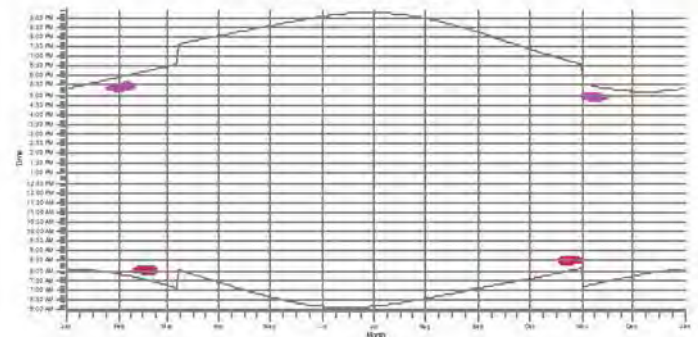
SR008: Participating



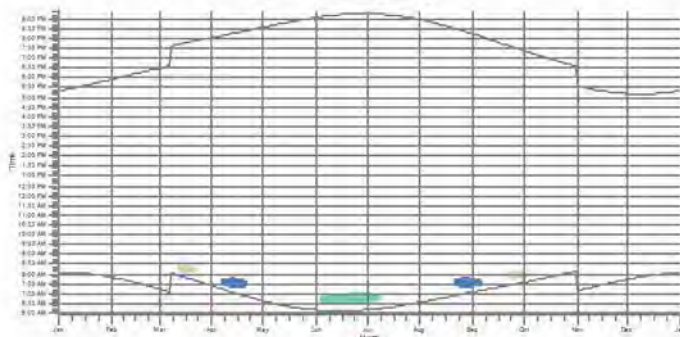
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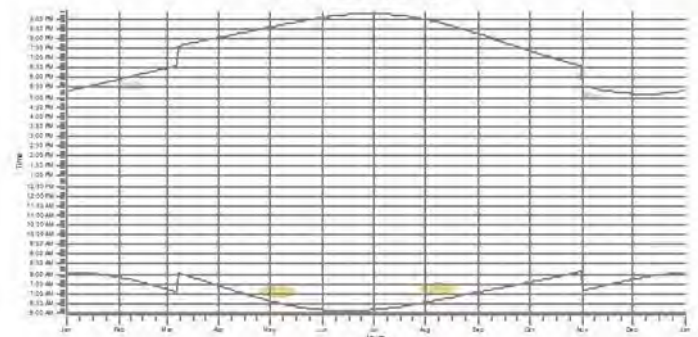
SR010: Participating



SR011: Participating



SR012: Participating



WTG:

AB-04 AB-04 AB-06 AB-06 AB-09 AB-09 T-20 T-20 T-30 T-30 T-31 T-31 T-37 T-37 T-39 T-39 T-43 T-43 T-46 T-46 T-48 T-48

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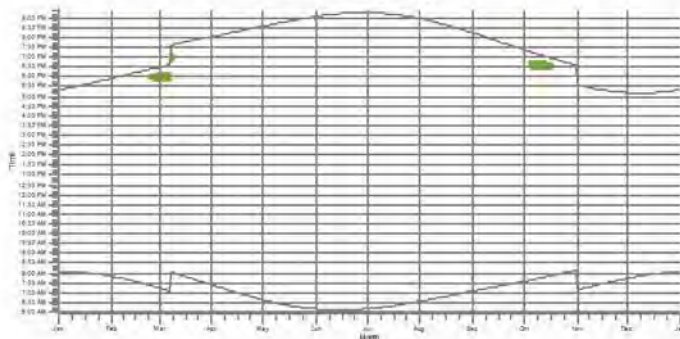
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EAPC Wind Energy
 3100 DeMers Avenue
 US-GRAND FORKS, ND 58201
 +1 701 775 3000
 wind@eapc.net
 Calculated:
 5/21/2013 1:08 AM/2.9.207

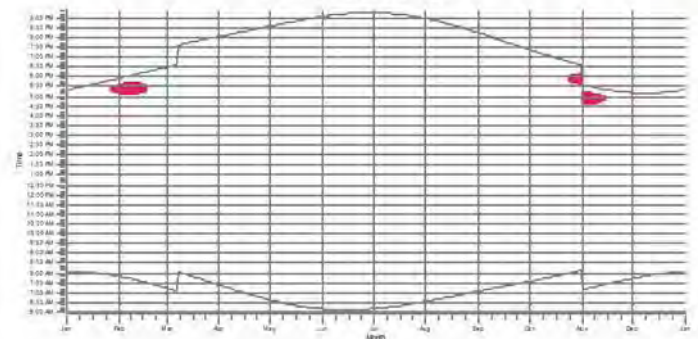
SHADOW - Calendar, graphical

Calculation: NwOH - Vestas Final Layout - valid 130520

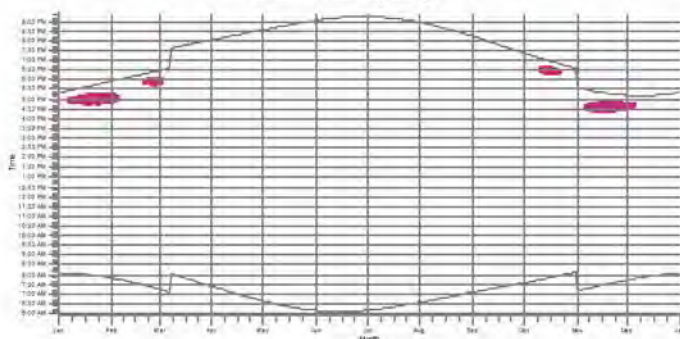
SR013: Participating



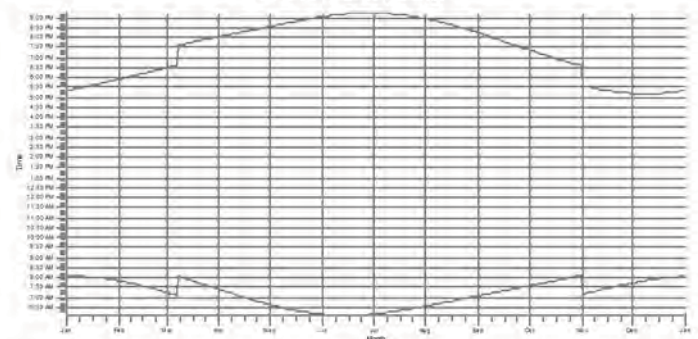
SR014: Participating



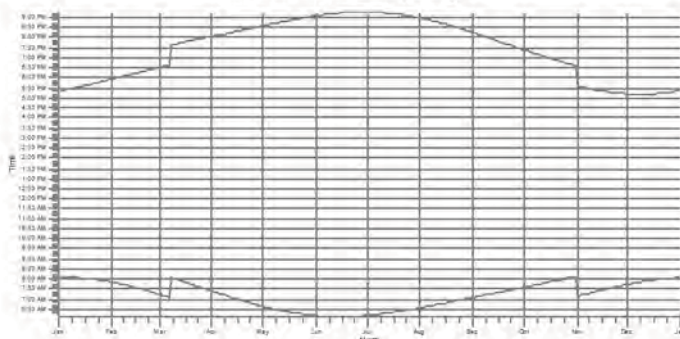
SR015: Participating



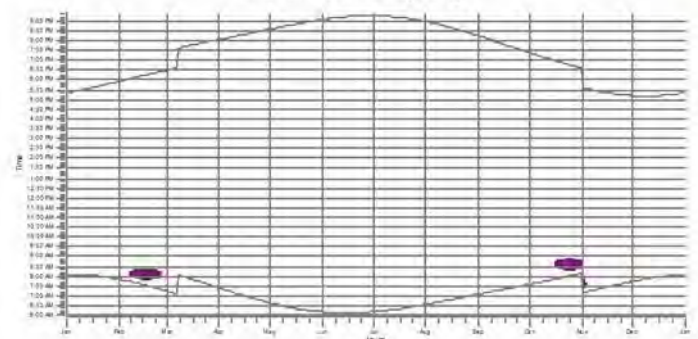
SR016: Participating



SR017: Non-Participating



SR018: Non-Participating



WTG:

T-01 T-01 T-42 T-42 T-43 T-43 T-47 T-47

Project:

Northwest Ohio

Description:

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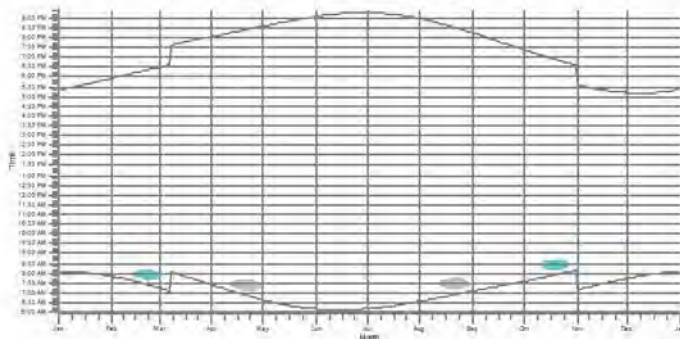
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wind@eapc.net
Calculated:
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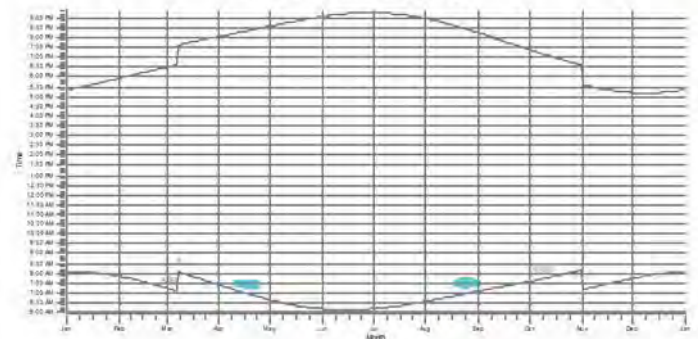
SHADOW - Calendar, graphical

Calculation: NwOH - Vestas Final Layout - valid 130520

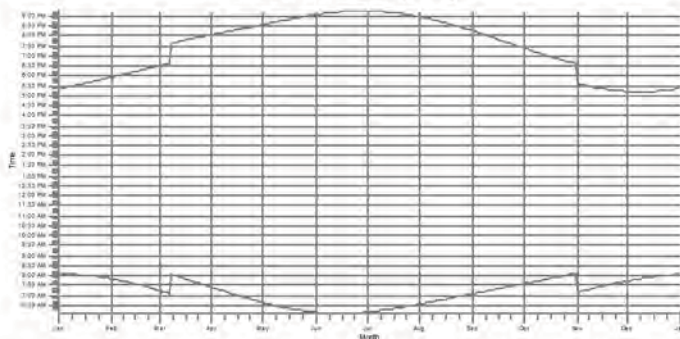
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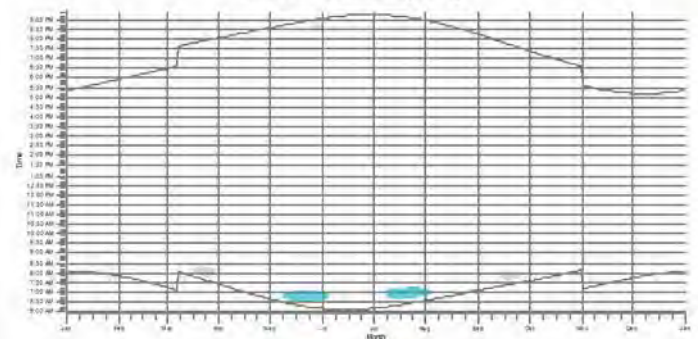
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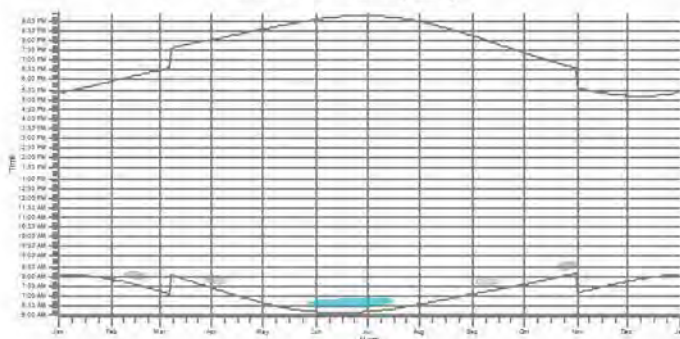
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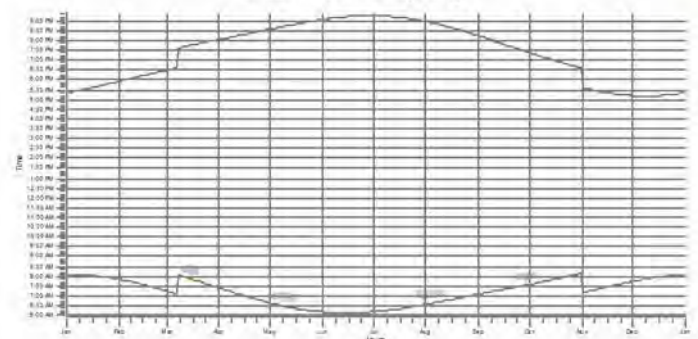
SR022: Non-Participating



SR023: Non-Participating



SR024: Non-Participating



WTG:

T-02 T-03 T-04 T-05

Project:

Northwest Ohio

Description:

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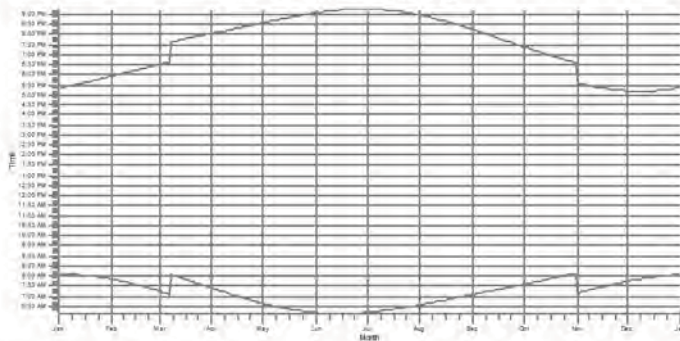
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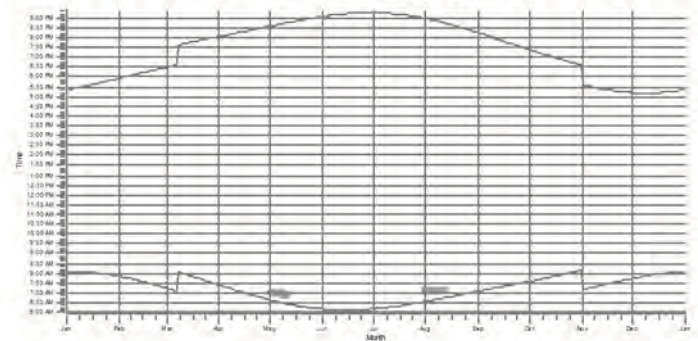
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Calculation: NwOH - Vestas Final Layout - valid 130520

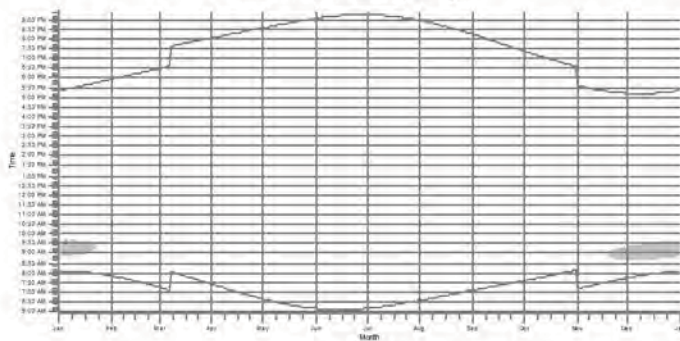
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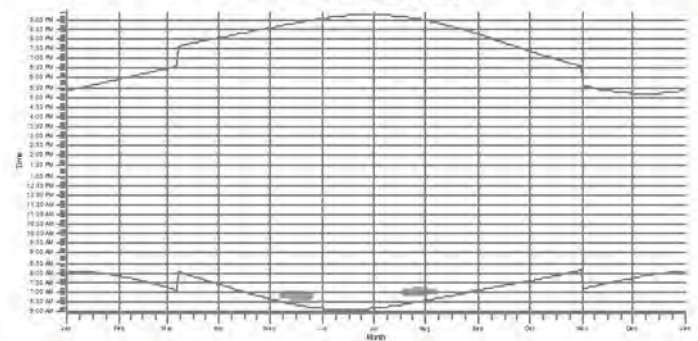
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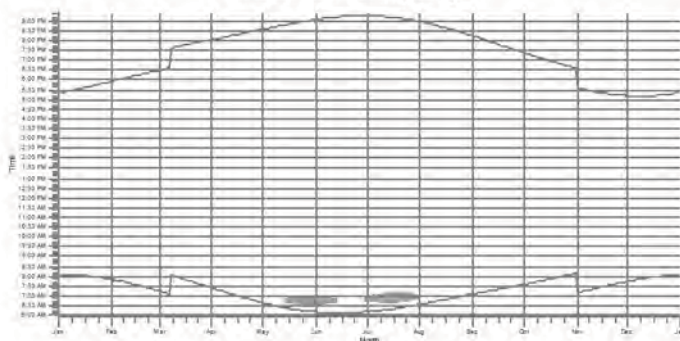
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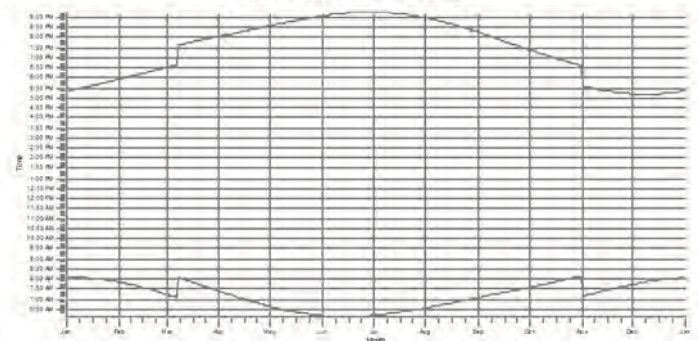
SR028: Non-Participating



SR029: Non-Participating



SR030: Non-Participating



WTG

T.02 T.06

T.06 T.06

Project:

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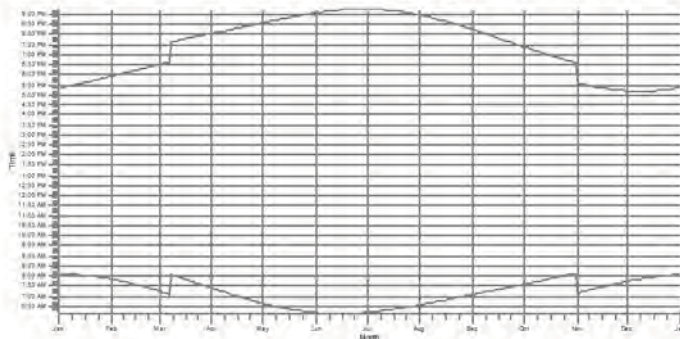
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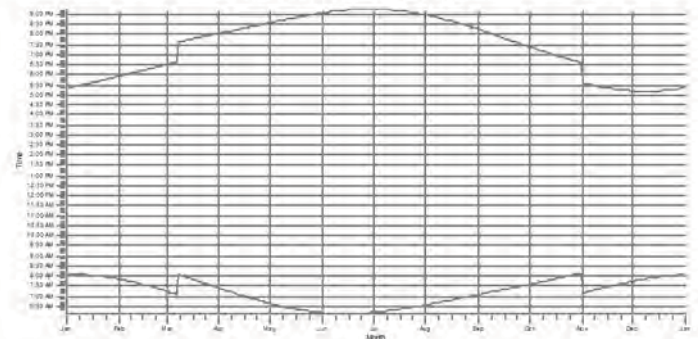
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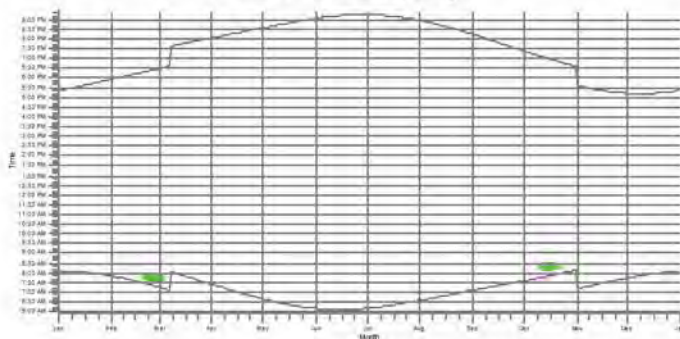
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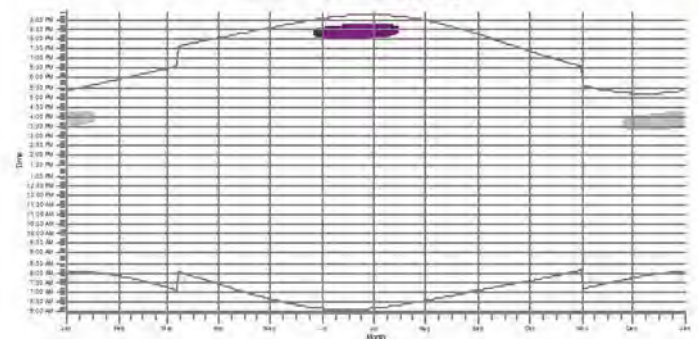
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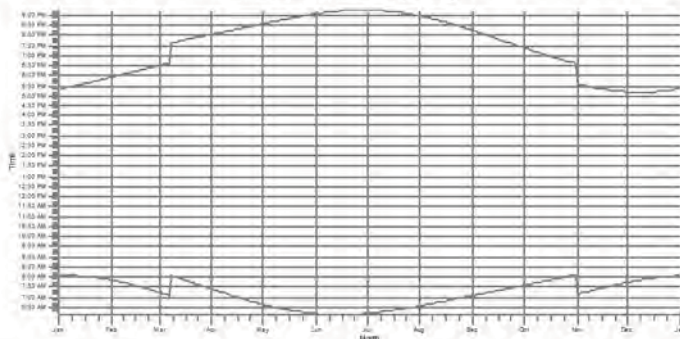
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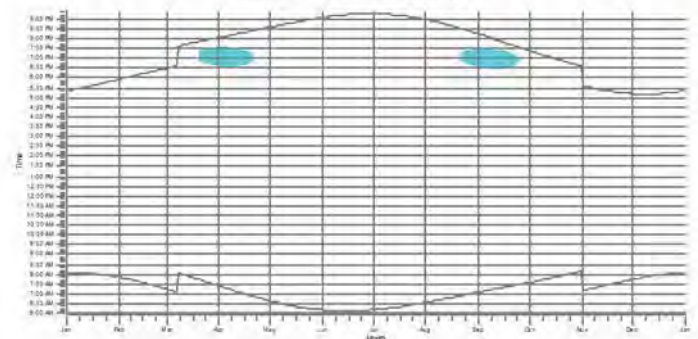
SR034: Non-Participating



SR035: Non-Participating



SR036: Non-Participating



WTG: T-01 T-01 T-02 T-02 T-03 T-03 T-04 T-04

Project:

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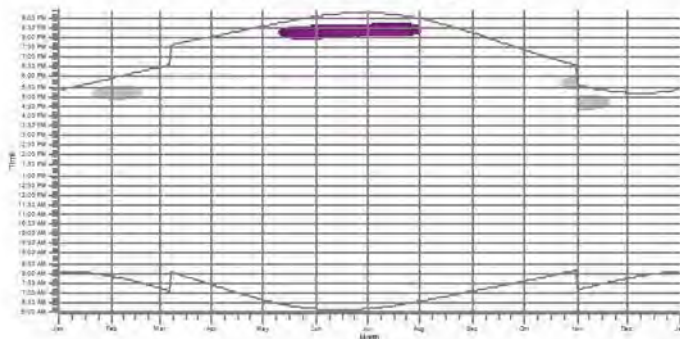
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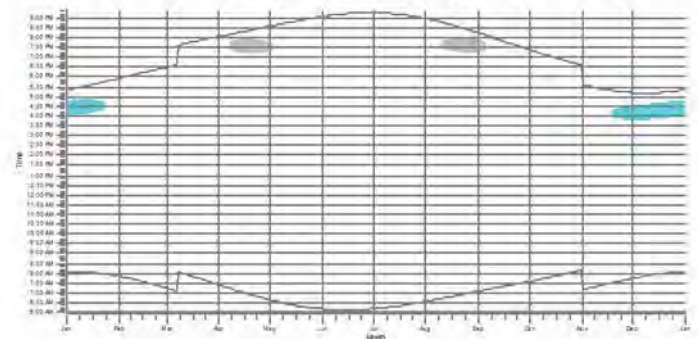
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Calculation: NwOH - Vestas Final Layout - valid 130520

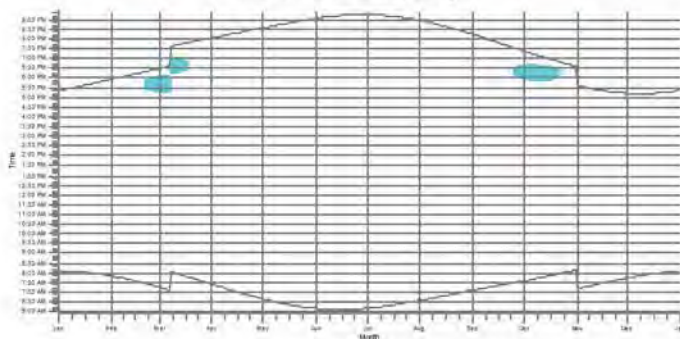
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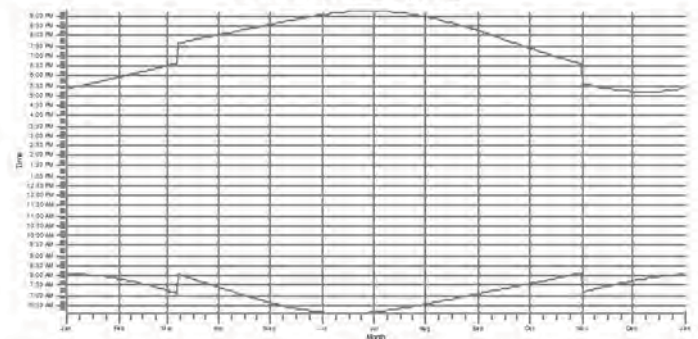
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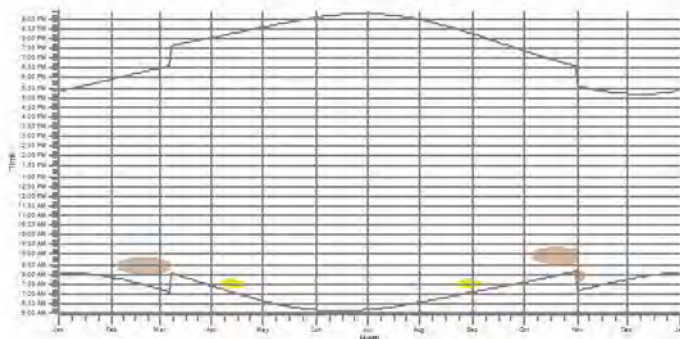
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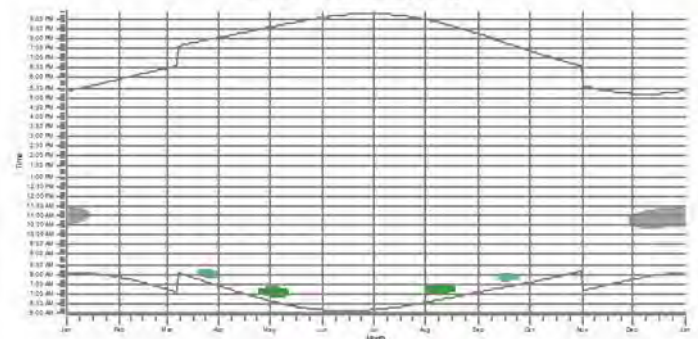
SR040: Non-Participating



SR041: Non-Participating



SR042: Non-Participating



WTGs

AK-02 AK-02 T-01 T-01 T-02 T-02 T-03 T-03 T-06 T-06 T-07 T-07 T-08 T-08 T-10 T-10

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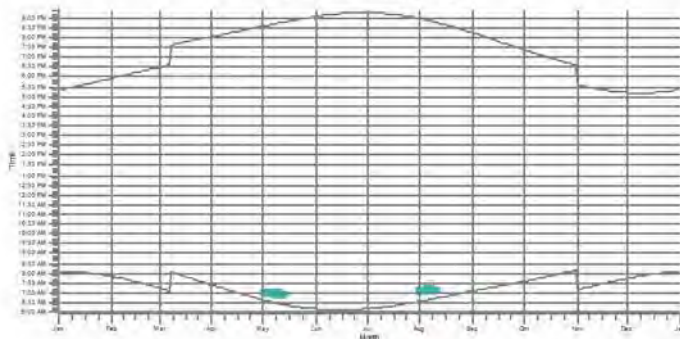
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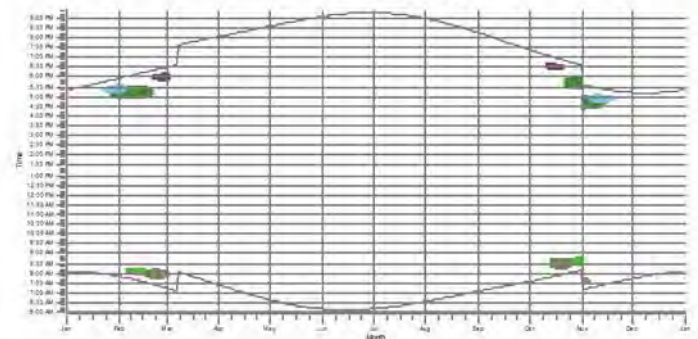
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Calculation: NwOH - Vestas Final Layout - valid 130520

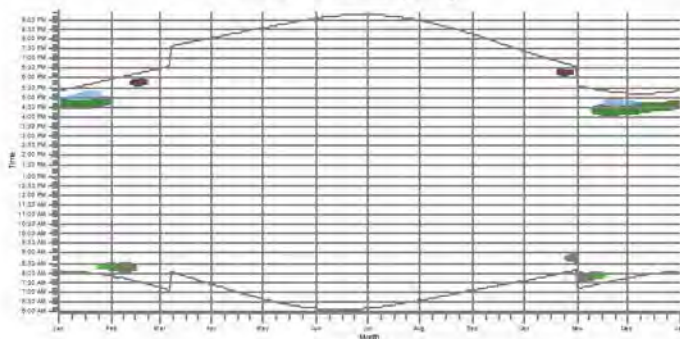
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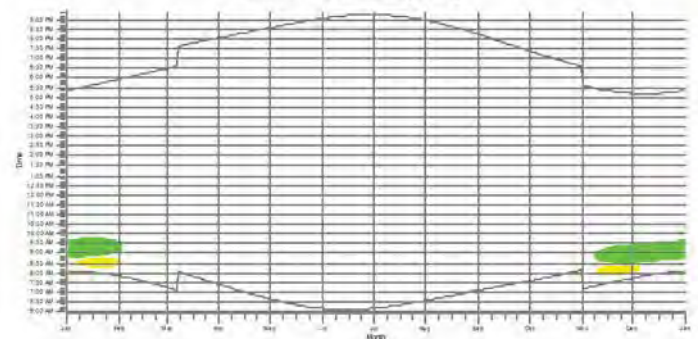
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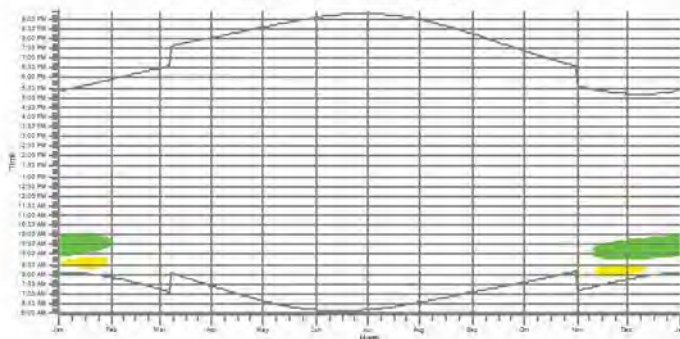
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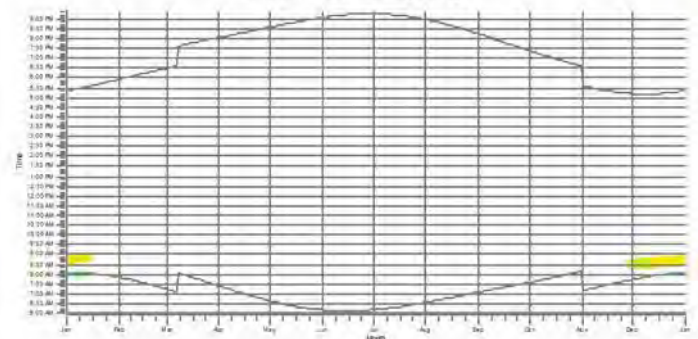
SR046: Non-Participating



SR047: Non-Participating



SR048: Non-Participating



WTG: AR-02 AR-02 T-08 T-08 T-11 T-11 BC031: 39-020452 BC056: 39-020477 BC057: 39-020478 BC071: 39-020482 BC082: 39-020503

Project:

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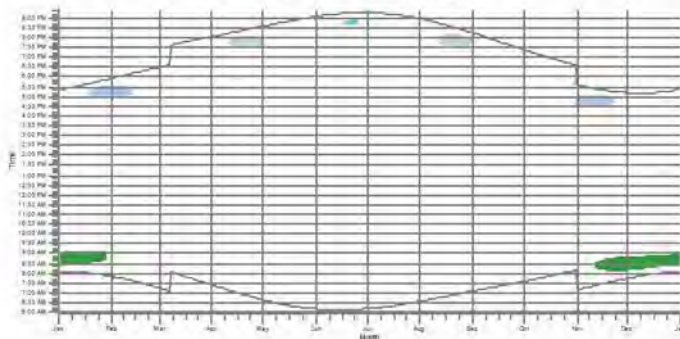
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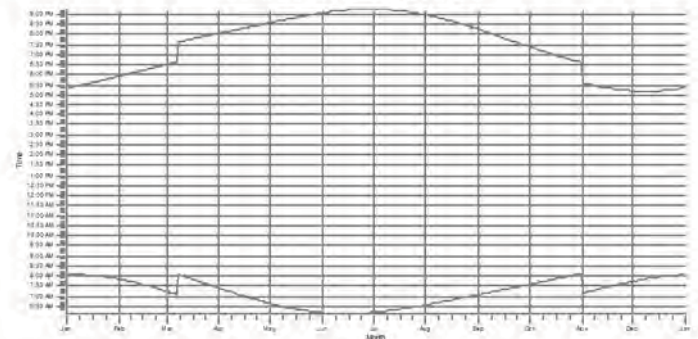
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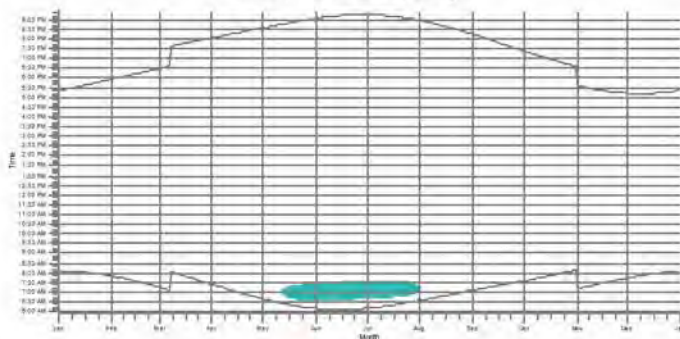
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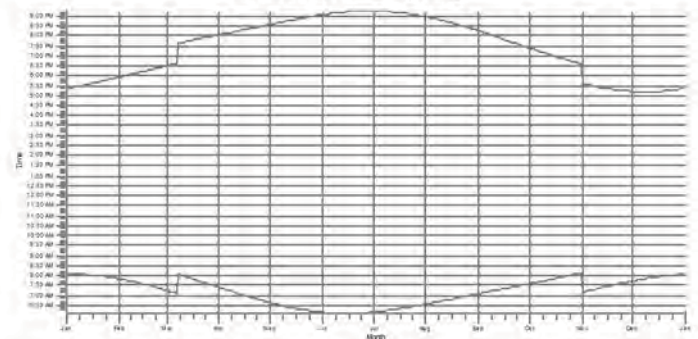
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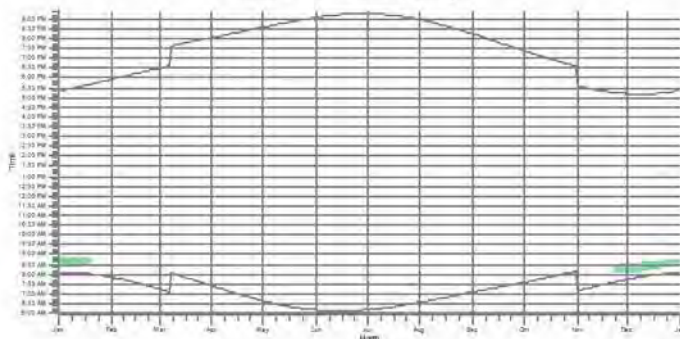
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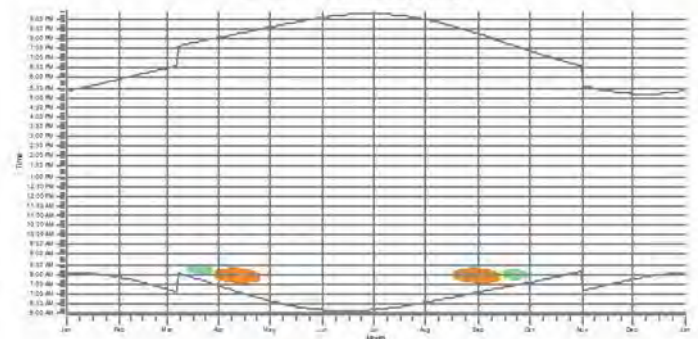
SR052: Non-Participating



SR053: Non-Participating



SR054: Non-Participating



WTG:

T-03 T-03 T-04 T-04 T-05 T-05 T-10 T-10 T-11 T-11 T-12 T-12 T-13 T-13 T-16 T-16

Project:

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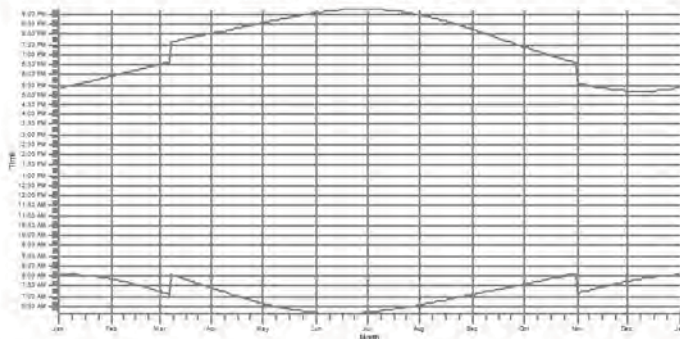
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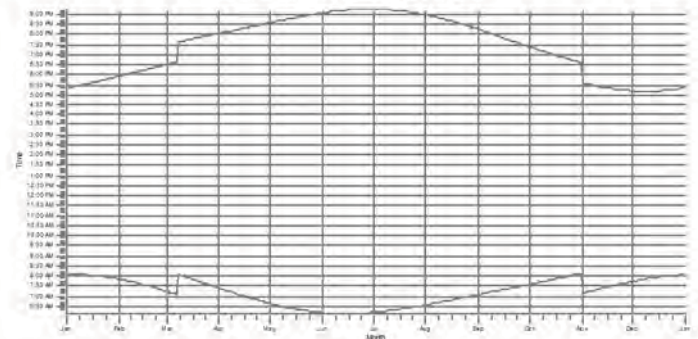
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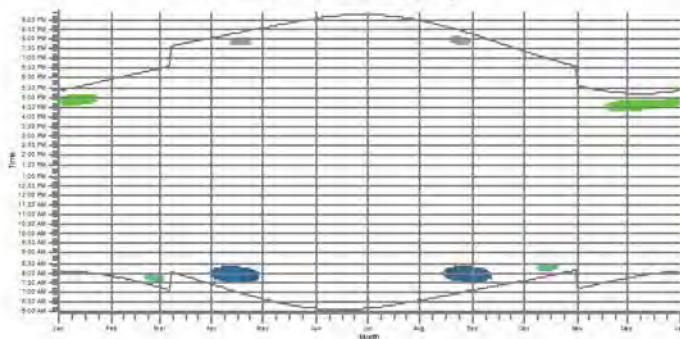
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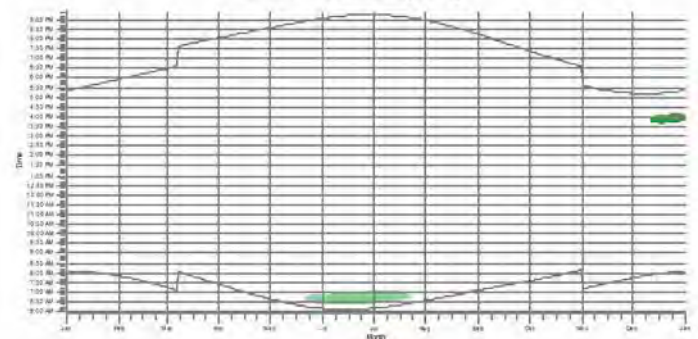
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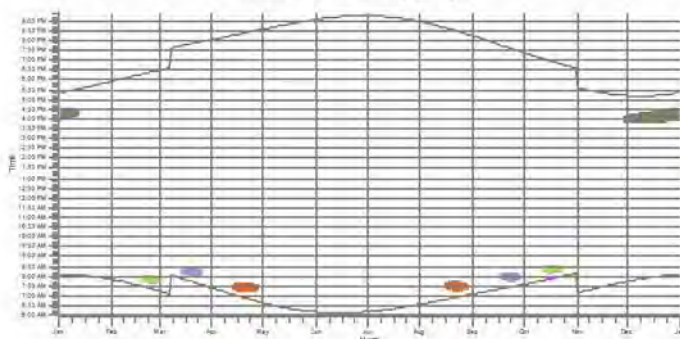
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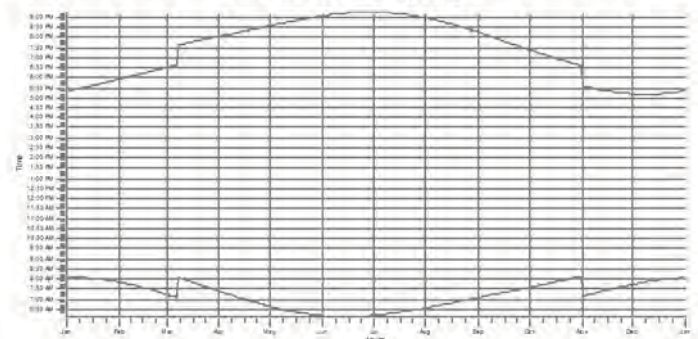
SR058: Non-Participating



SR059: Non-Participating



SR060: Non-Participating



WTG:

T-06 T-06 T-06 T-10 T-10 T-12 T-12 T-16 T-16 T-18 T-18 BC076 39-020489 BC082 39-020503 BC091 39-020512 BC098 39-020519

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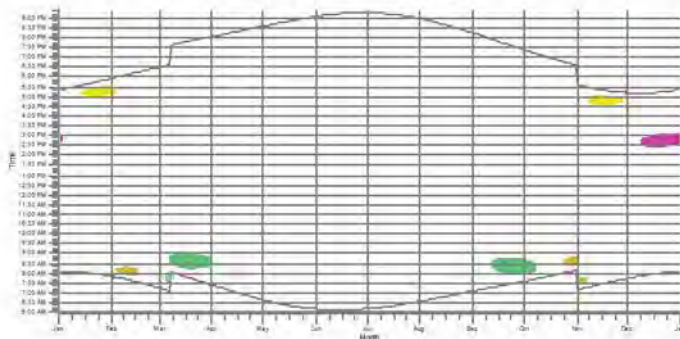
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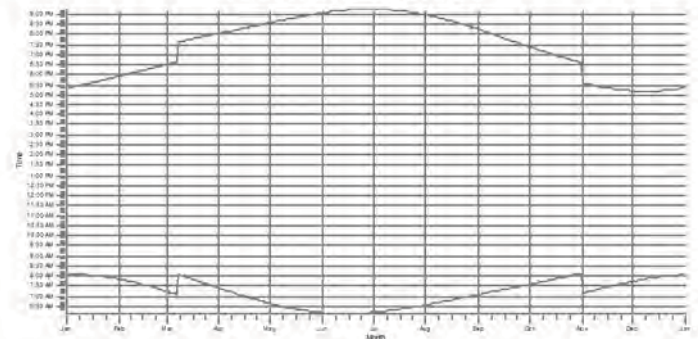
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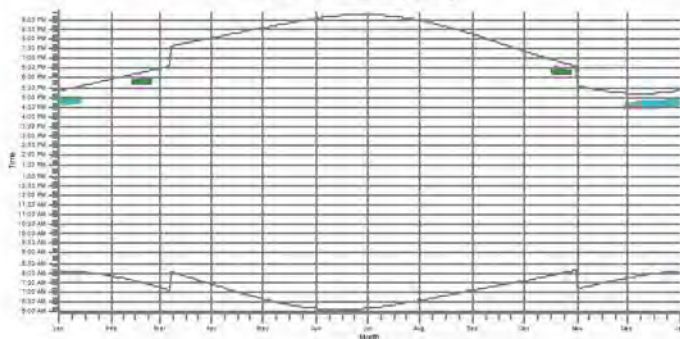
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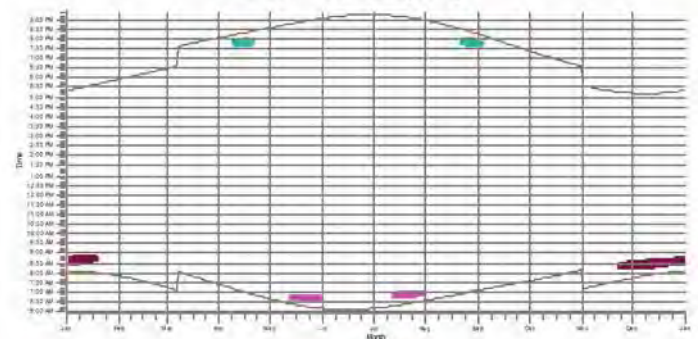
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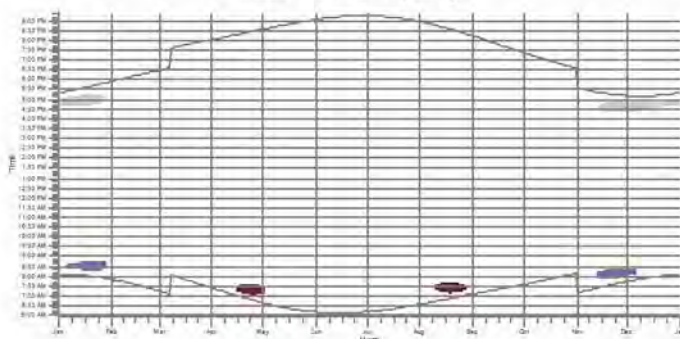
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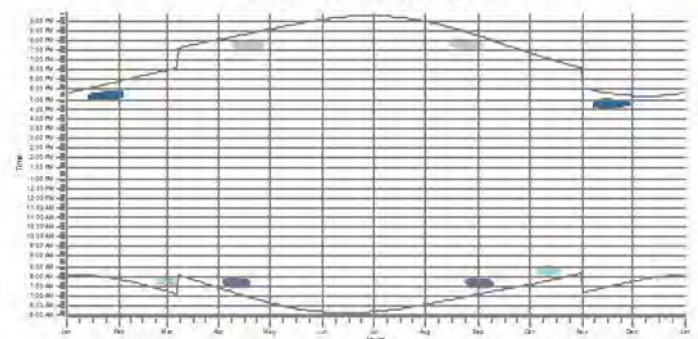
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SR065: Non-Participating



SR066: Non-Participating



WTG
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 Cyan: T-00 T-09
 Green: T-10 T-11
 Blue: T-12 T-13
 Purple: T-14 T-15
 Pink: T-16 T-17
 Red: T-18 T-19
 Dark Red: T-20 T-21
 Light Blue: T-22 T-23
 Dark Blue: T-24 T-24
 BCD47: 39-020488

Project:

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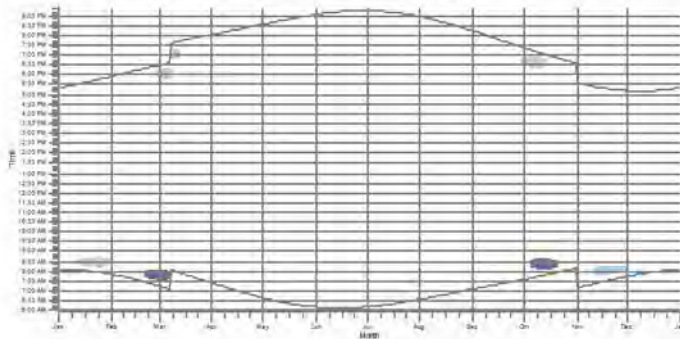
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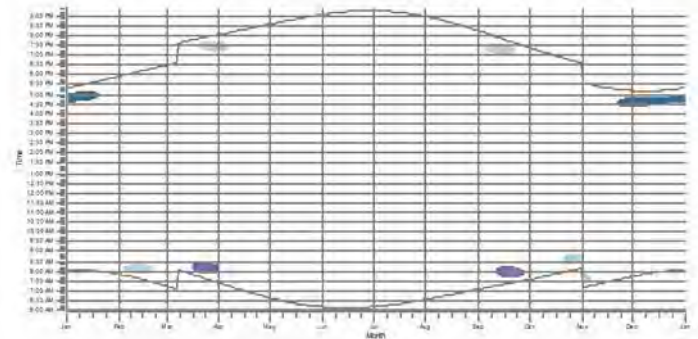
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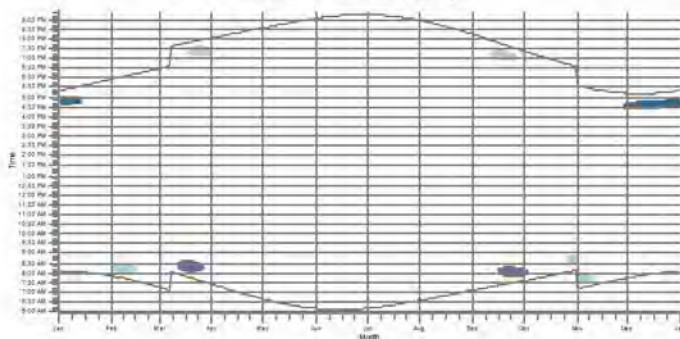
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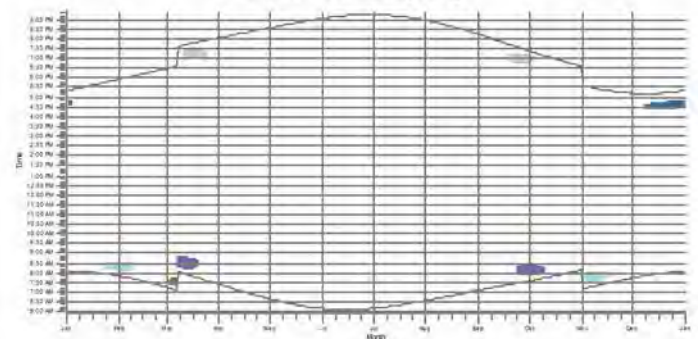
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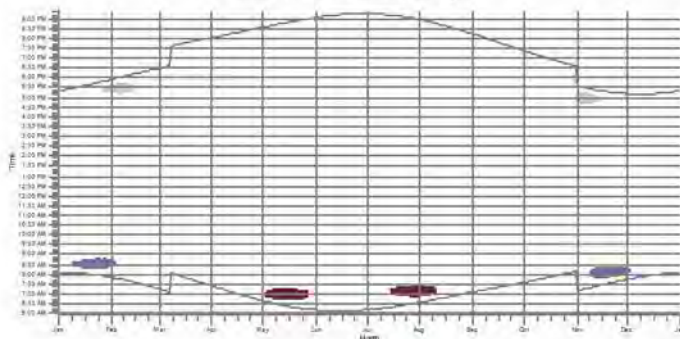
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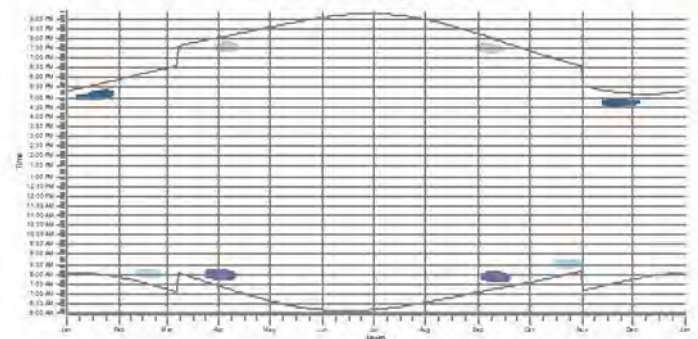
SR070: Non-Participating



SR071: Non-Participating



SR072: Non-Participating



WTG:

T-12 T-12 T-15 T-15 T-22 T-22 T-23 T-23 T-24 T-24

Project:

Northwest Ohio

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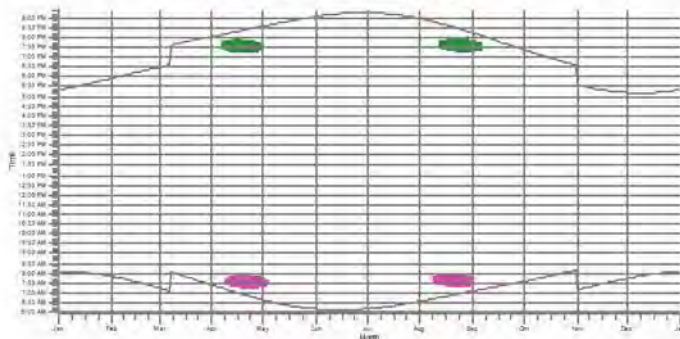
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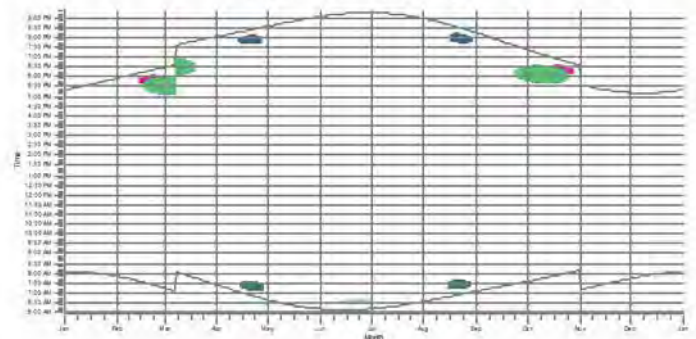
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Calculation: NwOH - Vestas Final Layout - valid 130520

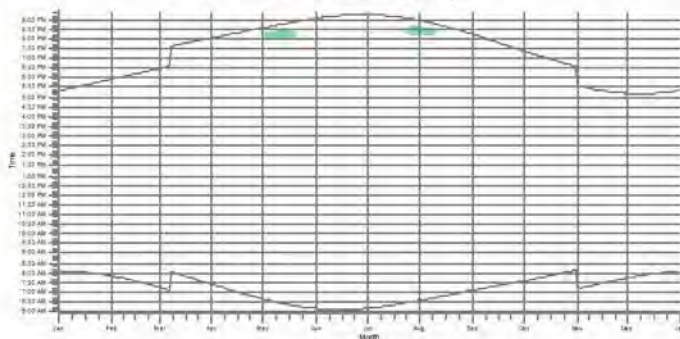
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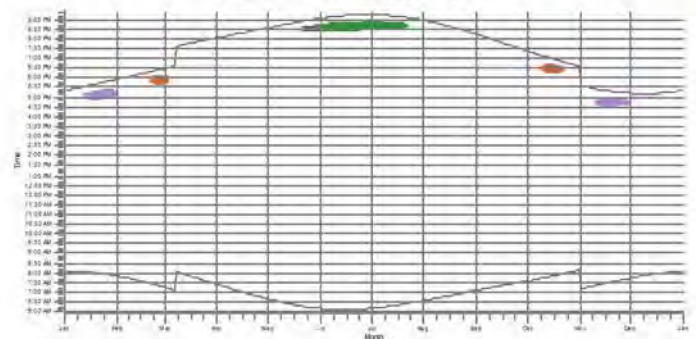
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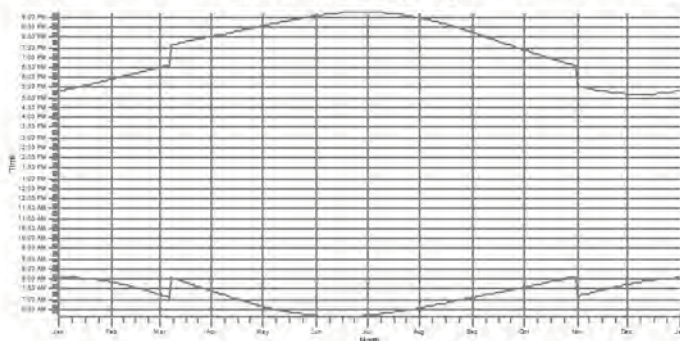
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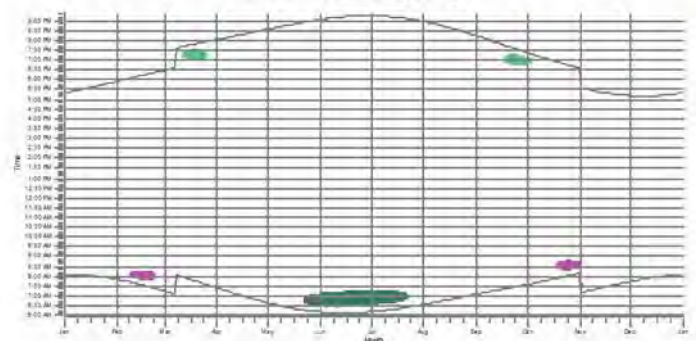
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SR077: Non-Participating



SR078: Non-Participating



WTG:

T-12 T-12 T-14 T-16 T-17 T-18 T-19 T-21 T-23 T-25 BC091: 39-000512 BC098: 39-000519

Project:

Northwest Ohio

Description:

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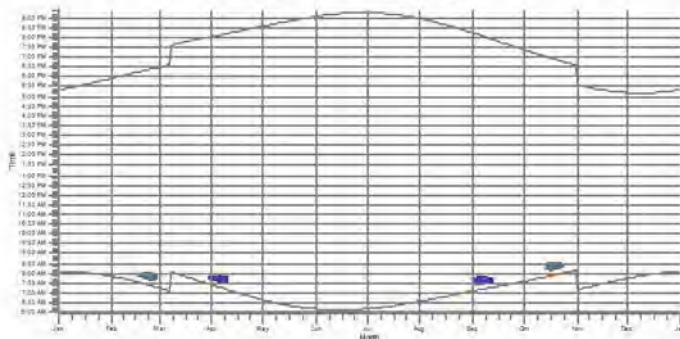
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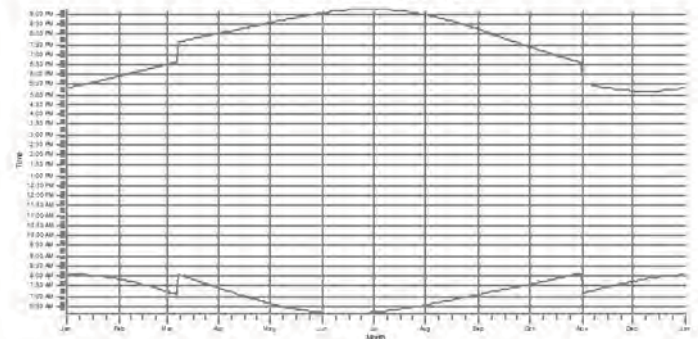
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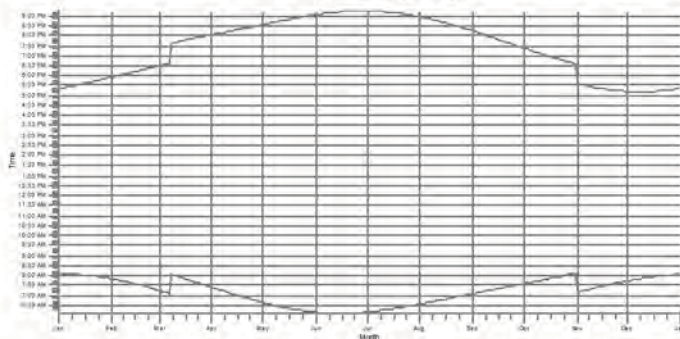
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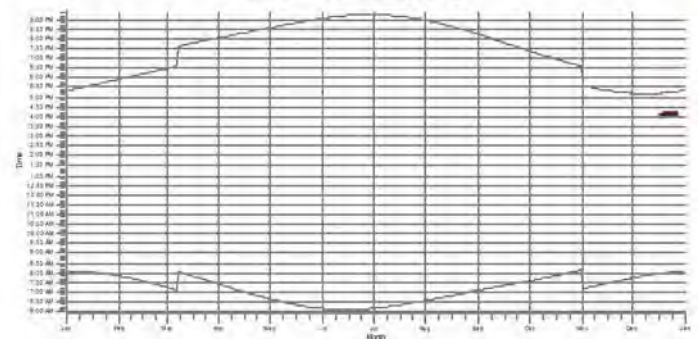
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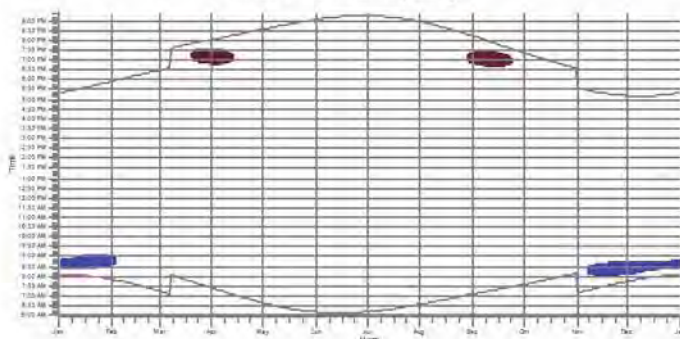
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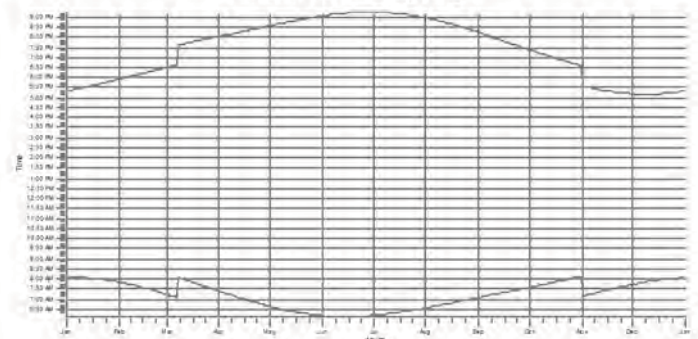
SR082: Non-Participating



SR083: Non-Participating



SR084: Non-Participating



WTG
T.22 T.22 T.26 T.26 T.27 T.27

Project:

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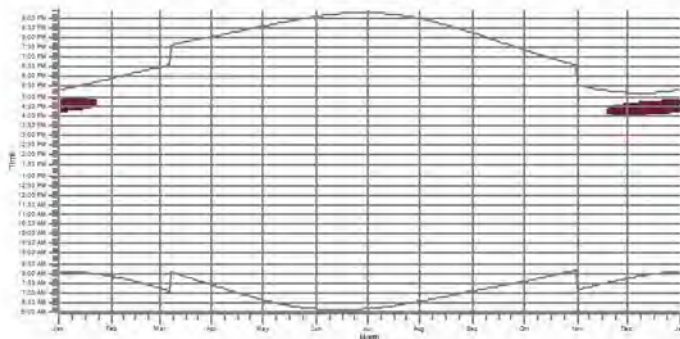
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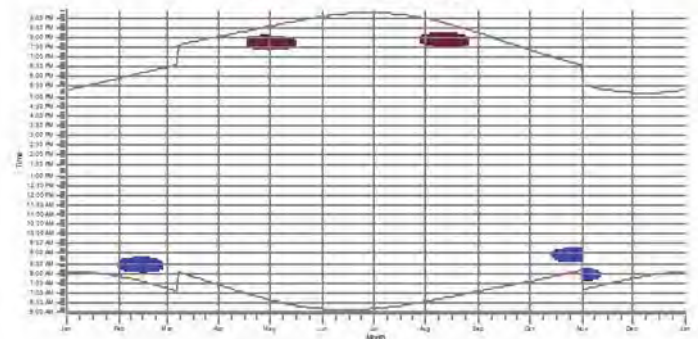
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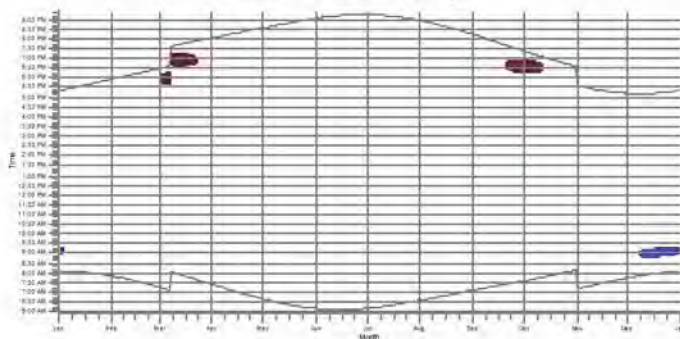
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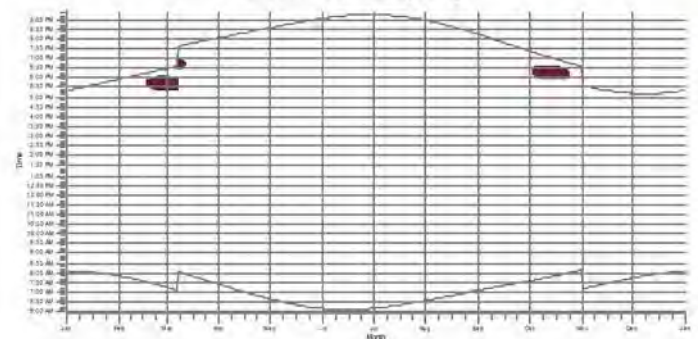
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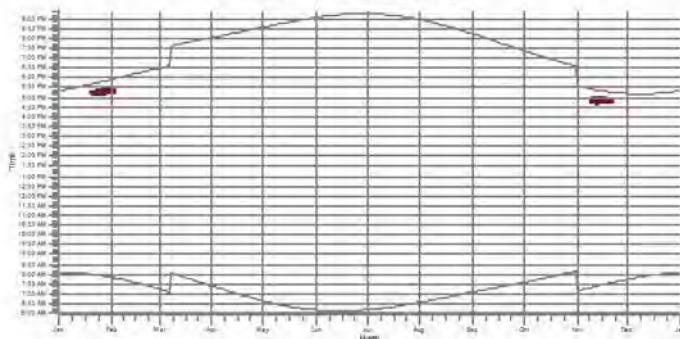
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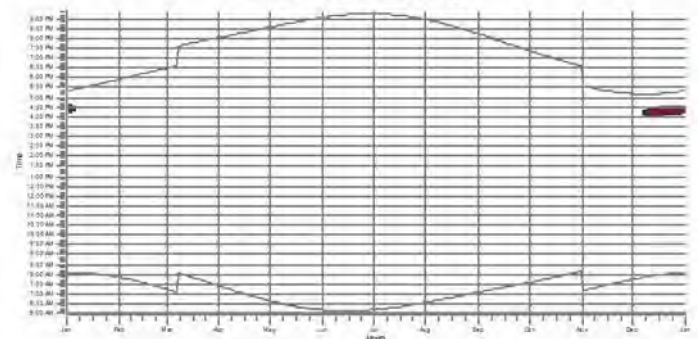
SR088: Non-Participating



SR089: Non-Participating



SR090: Non-Participating



WTG: T-22 T-22 T-26 T-26 BC047/39-020468

Project:

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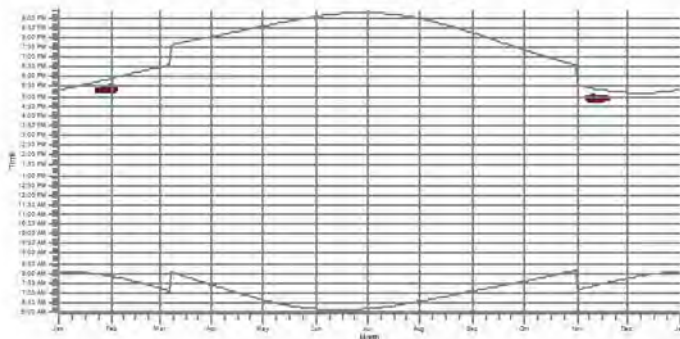
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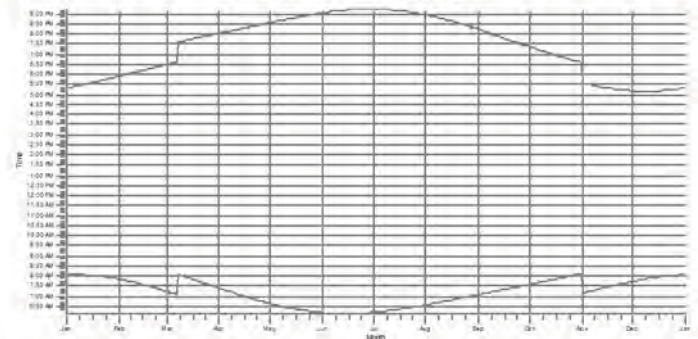
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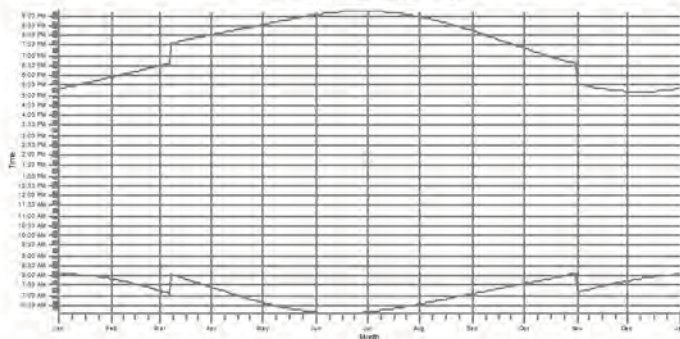
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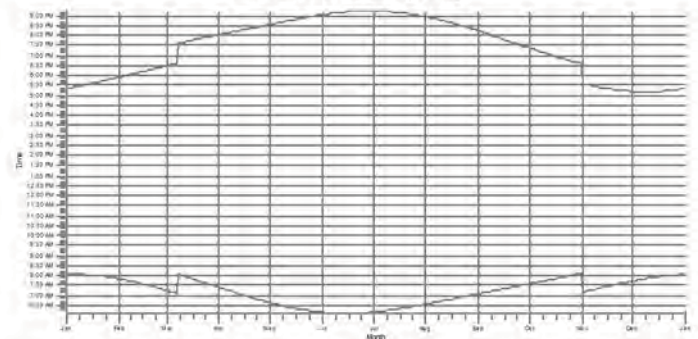
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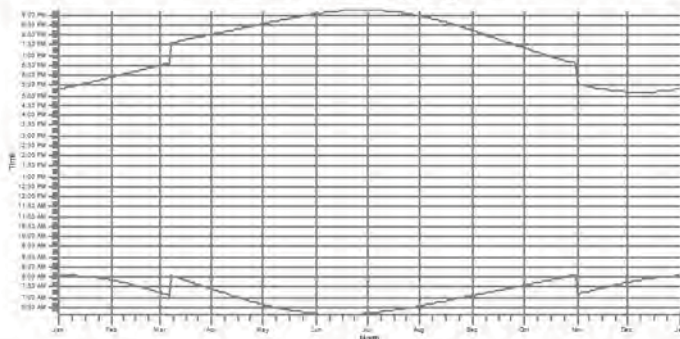
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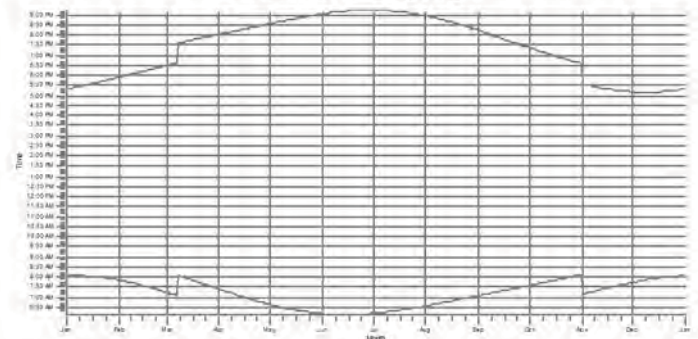
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SR095: Non-Participating



SR096: Non-Participating



WTG
 BCD47: 30.020468

Project:

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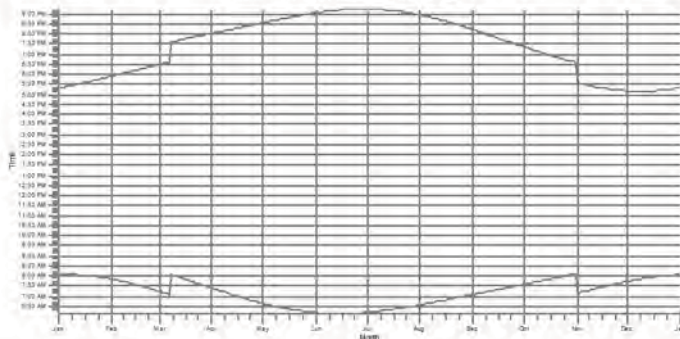
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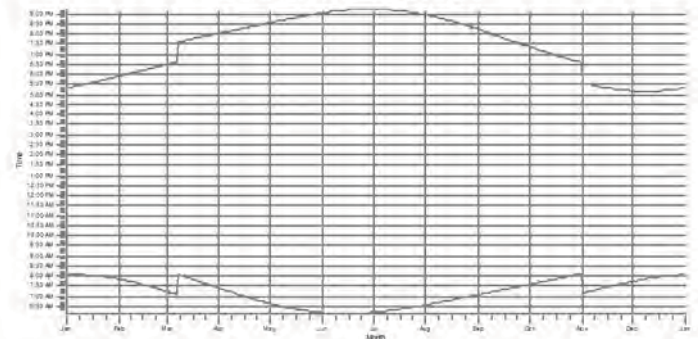
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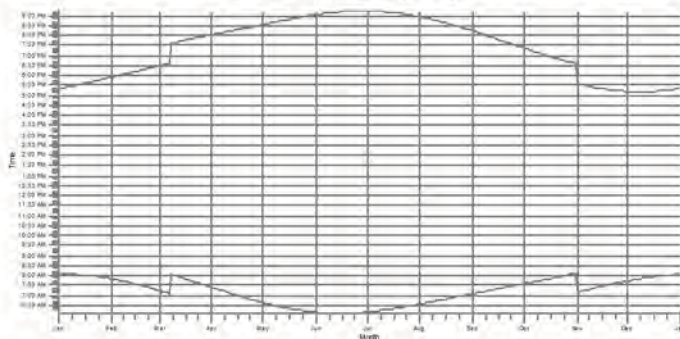
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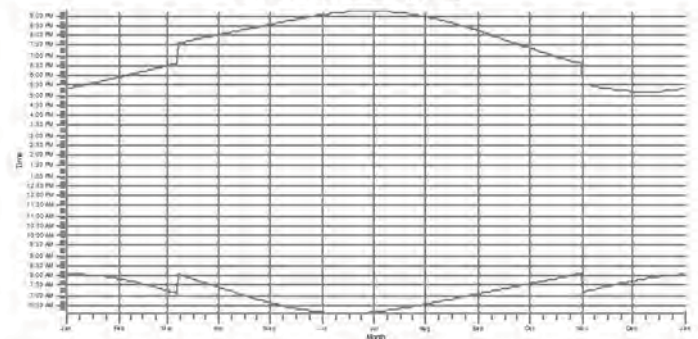
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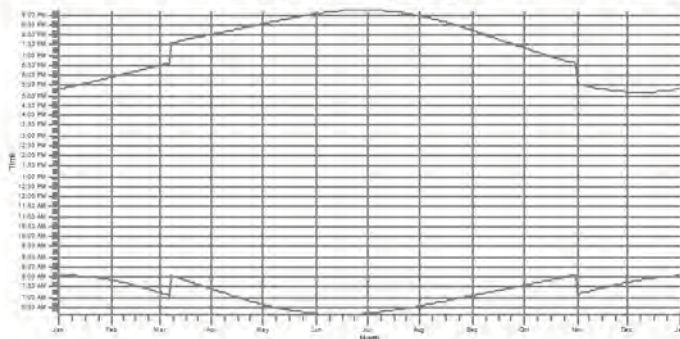
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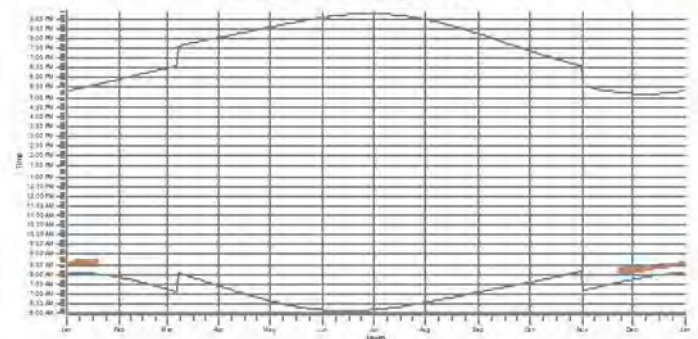
SR100: Non-Participating



SR101: Non-Participating



SR102: Non-Participating



WTG
 B2052 30.000473

Project:

Northwest Ohio

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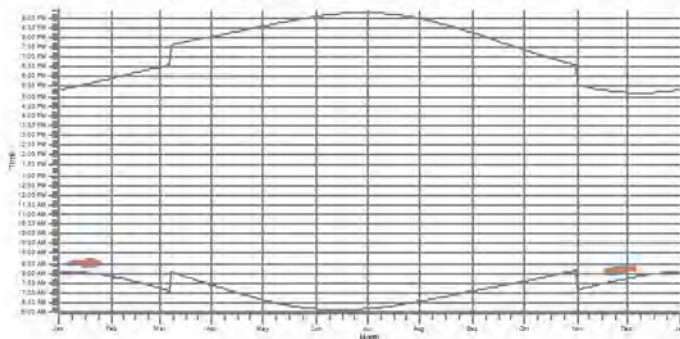
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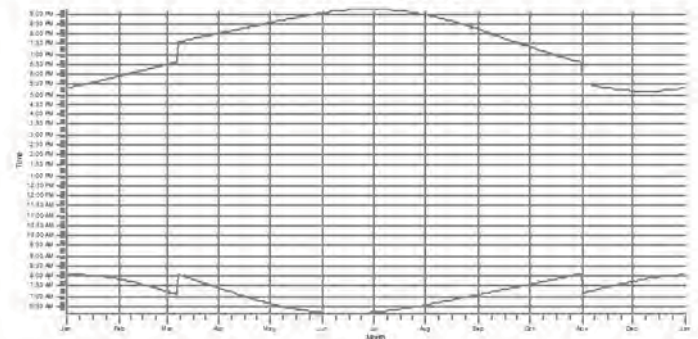
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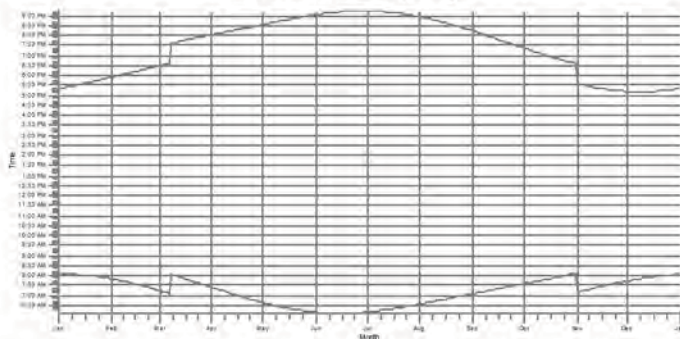
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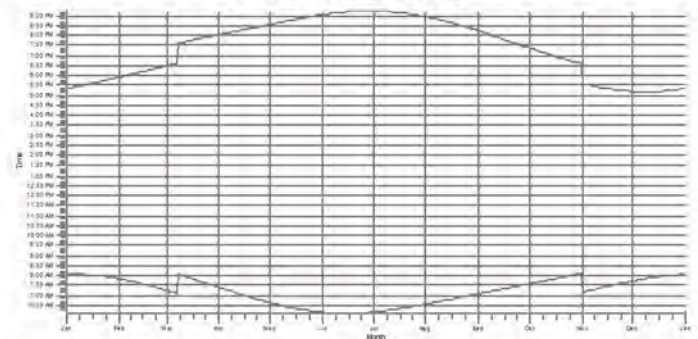
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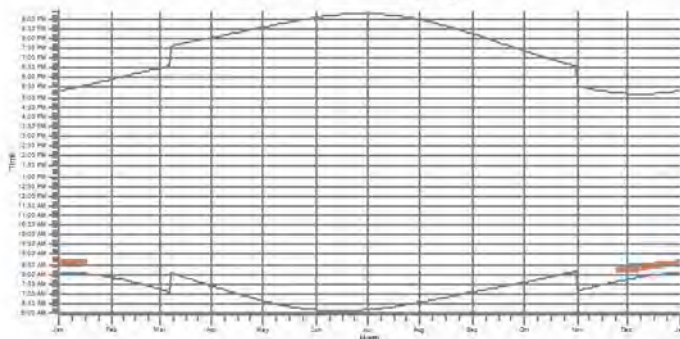
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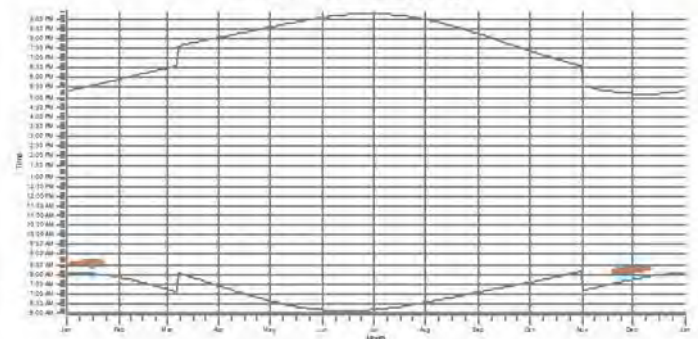
SR106: Non-Participating



SR107: Non-Participating



SR108: Non-Participating



WTG:

BC052: 30.000473

Project:

Northwest Ohio

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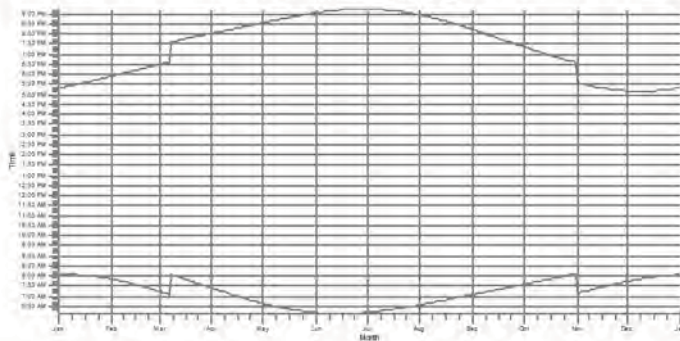
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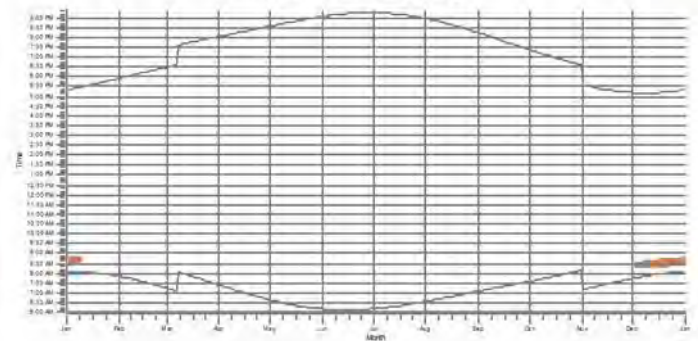
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Calculation: NwOH - Vestas Final Layout - valid 130520

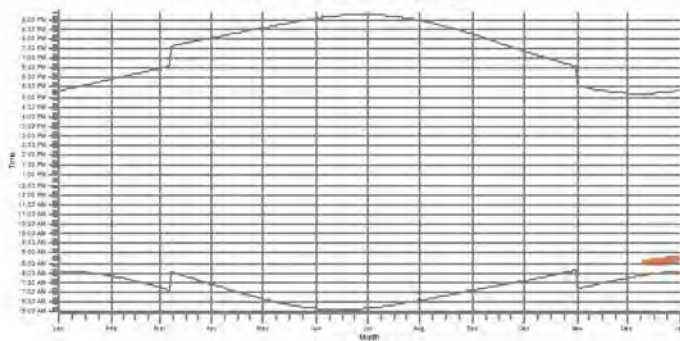
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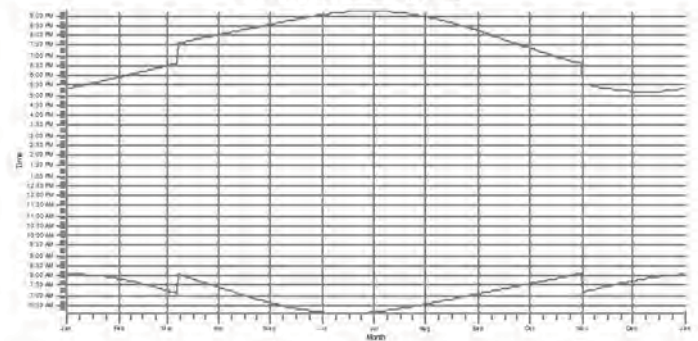
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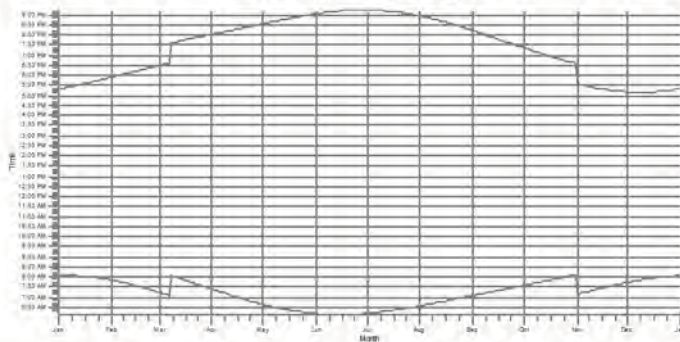
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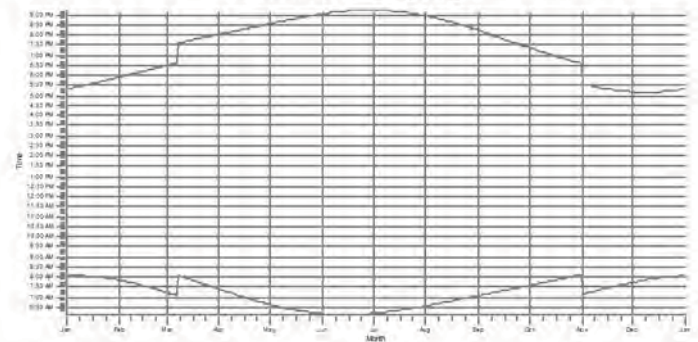
SR112: Non-Participating



SR113: Non-Participating



SR114: Non-Participating



WTG:

BC052 30.000473

Project:

Northwest Ohio

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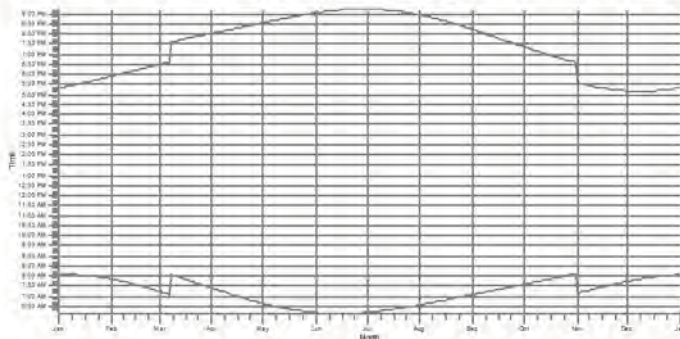
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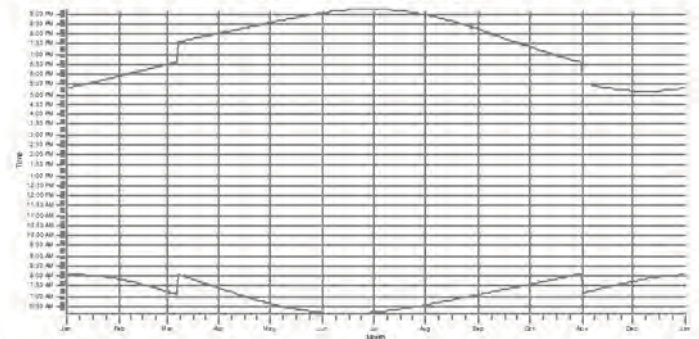
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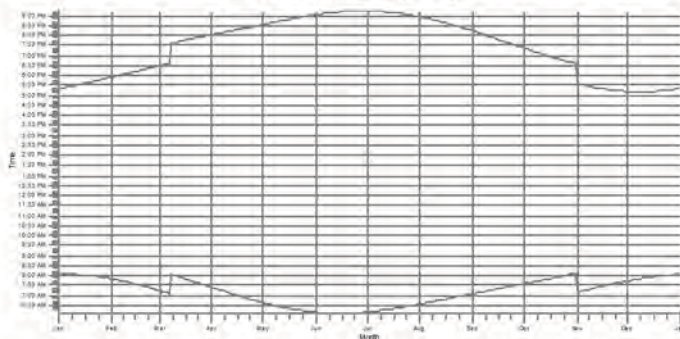
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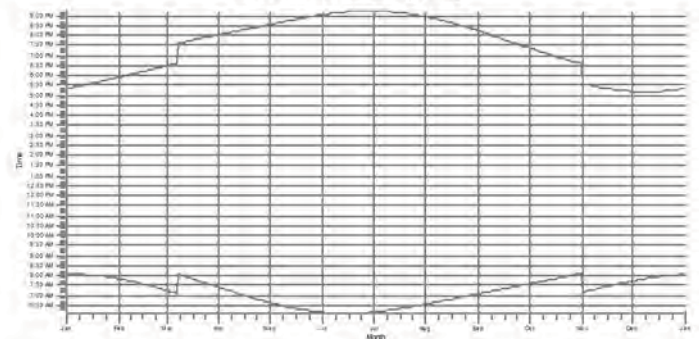
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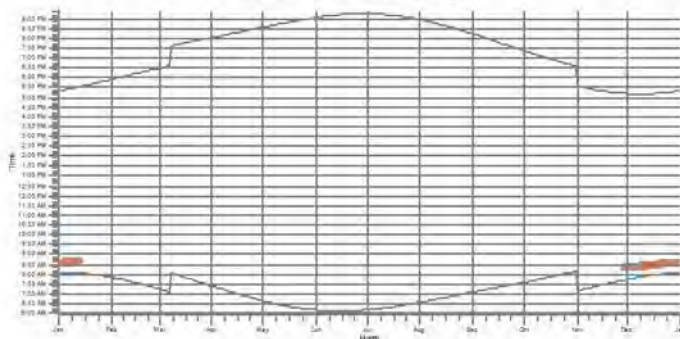
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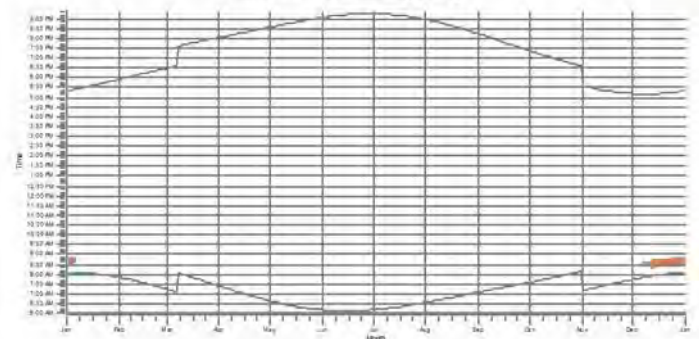
SR118: Non-Participating



SR119: Non-Participating



SR120: Non-Participating



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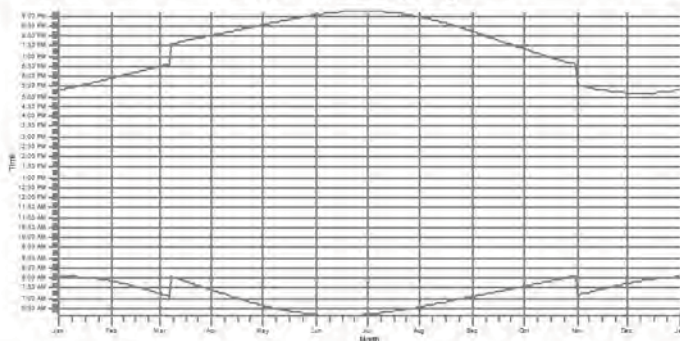
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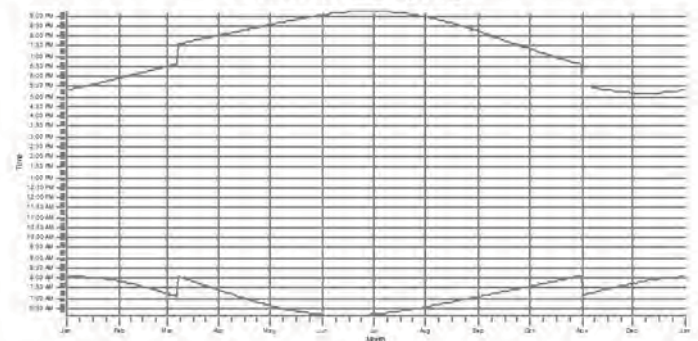
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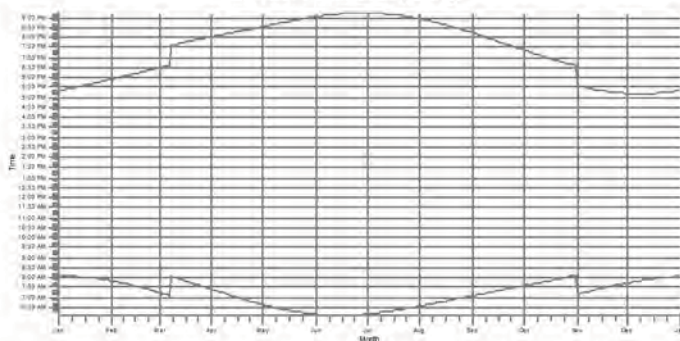
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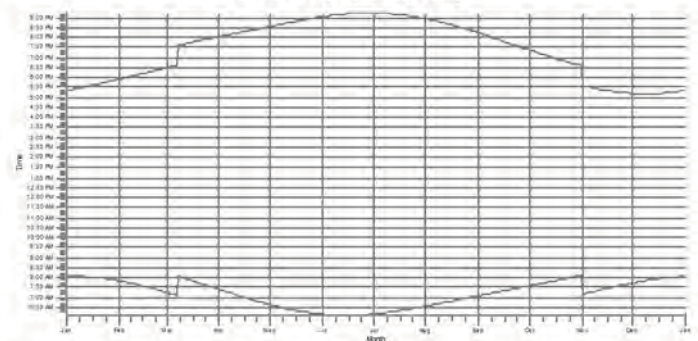
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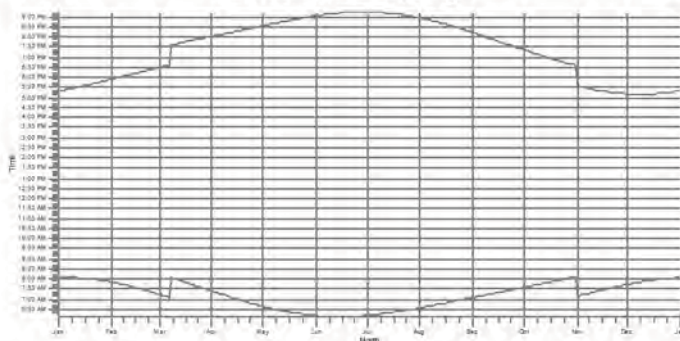
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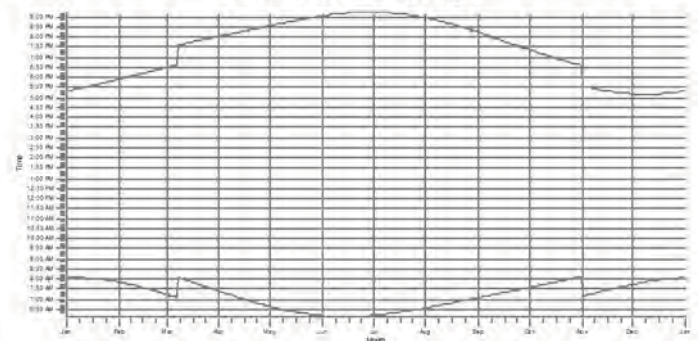
SR124: Non-Participating



SR125: Non-Participating



SR126: Non-Participating



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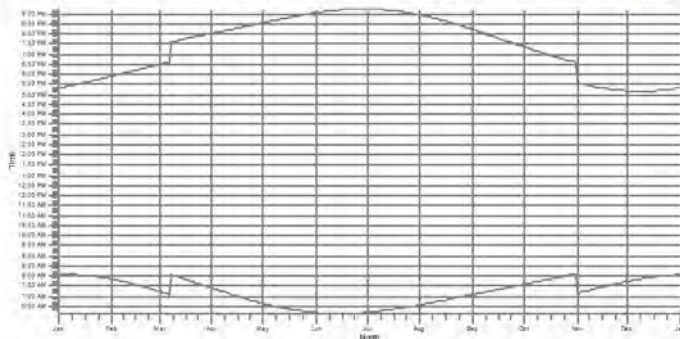
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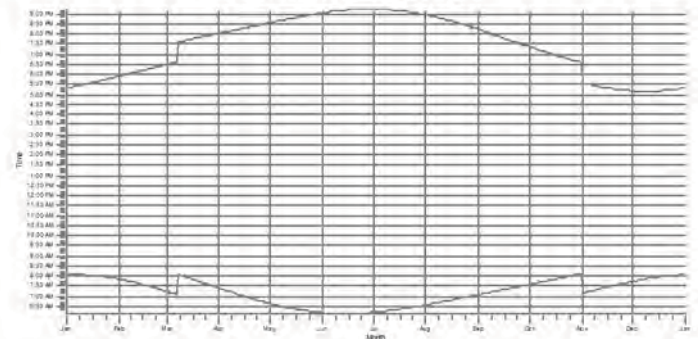
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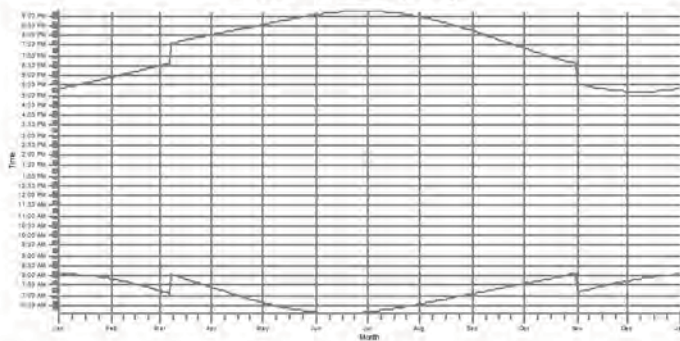
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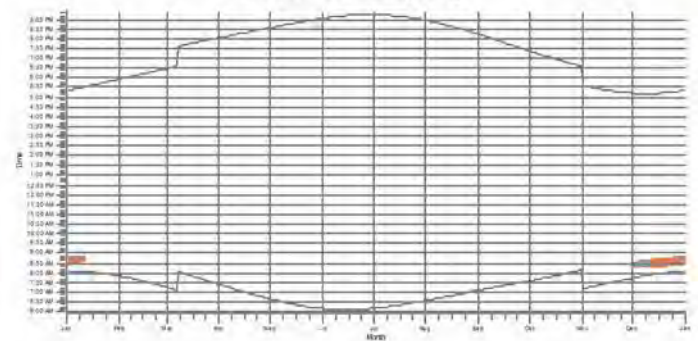
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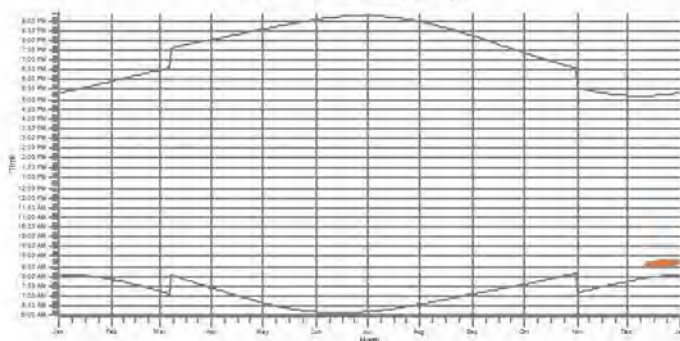
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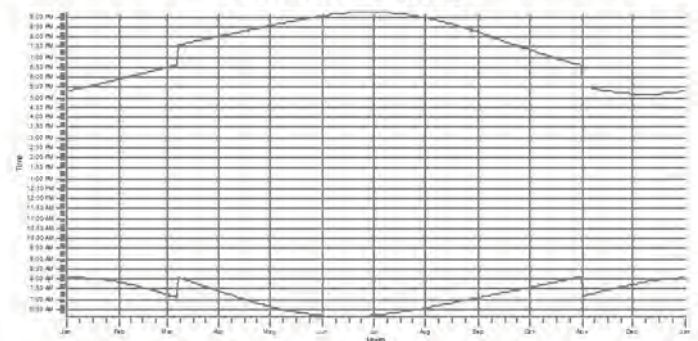
SR130: Non-Participating



SR131: Non-Participating



SR132: Non-Participating



WTG
BC052: 30.000473

Project:

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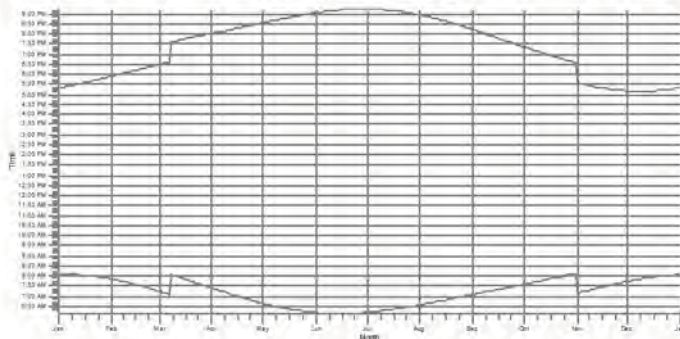
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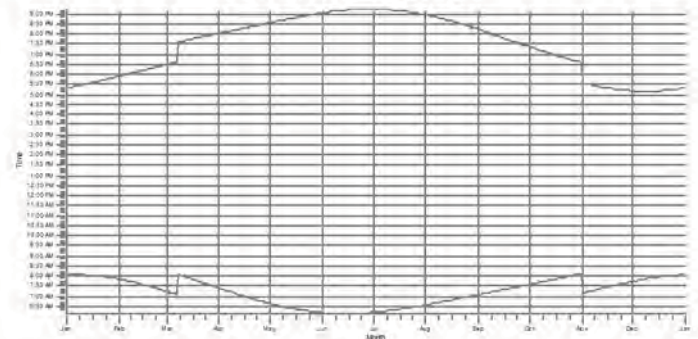
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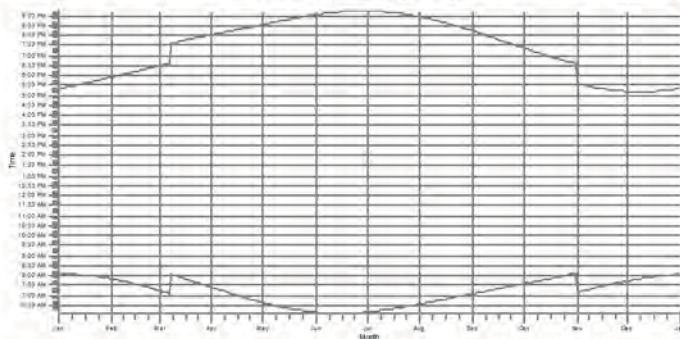
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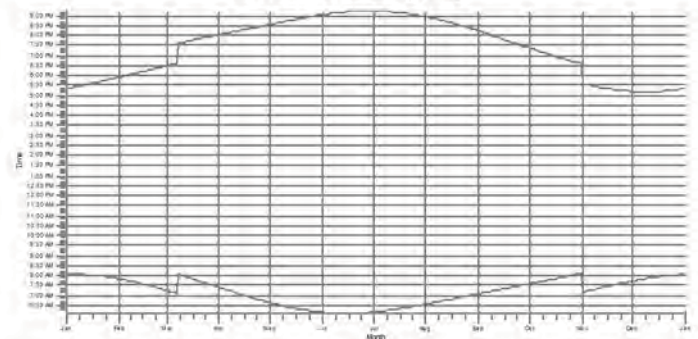
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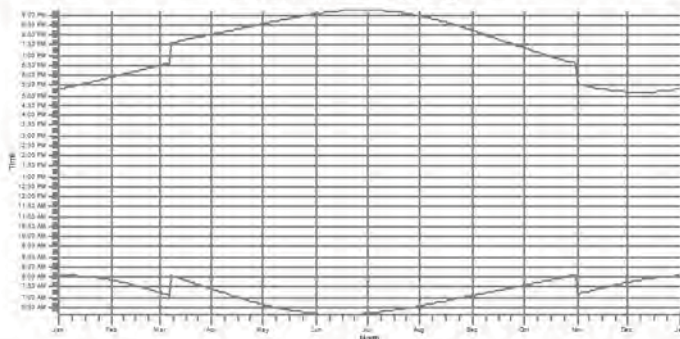
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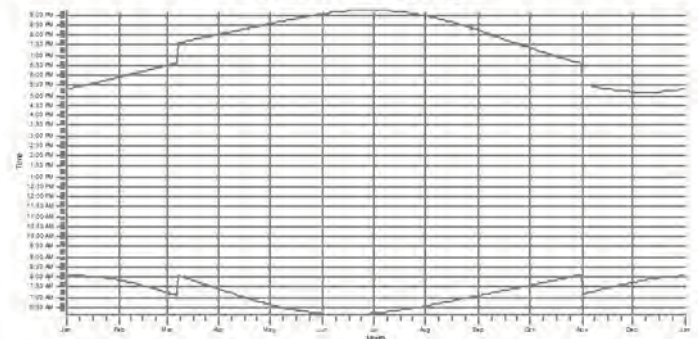
SR136: Non-Participating



SR137: Non-Participating



SR138: Non-Participating



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Project:

Northwest Ohio

Description:

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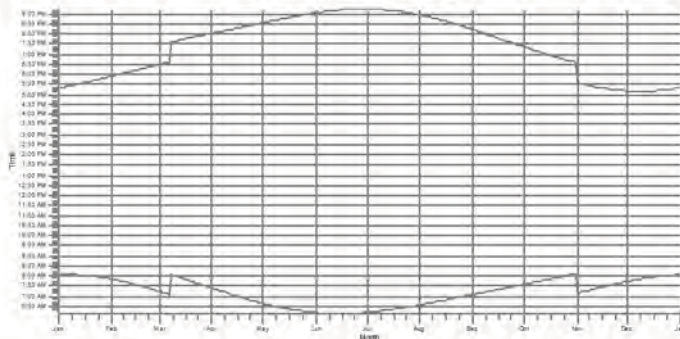
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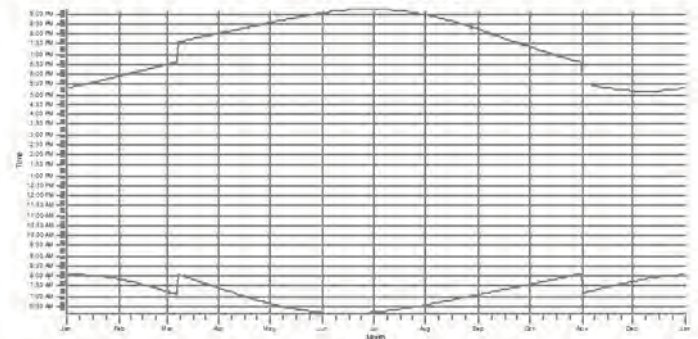
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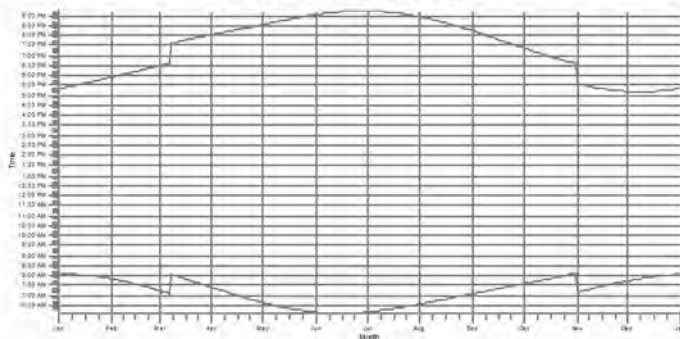
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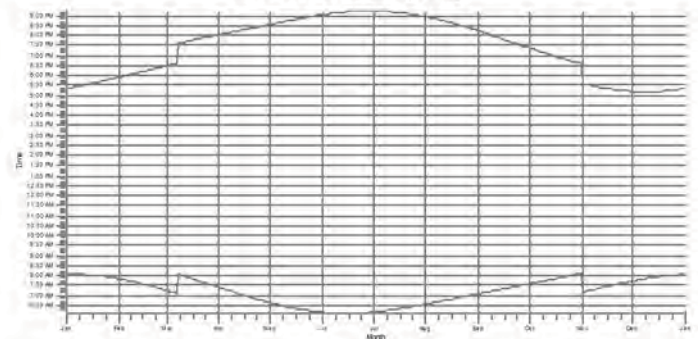
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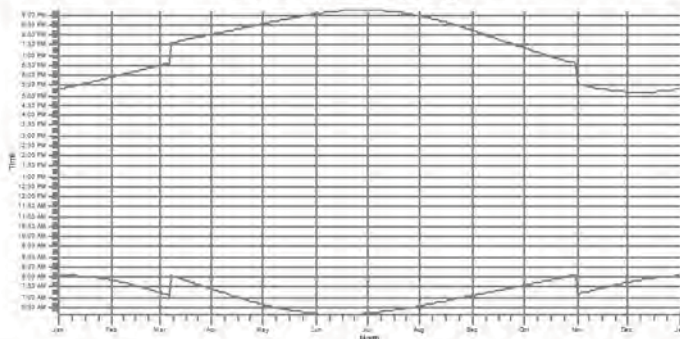
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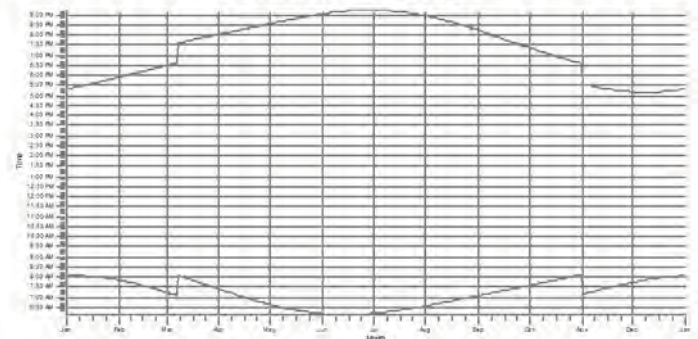
SR142: Non-Participating



SR143: Non-Participating



SR144: Non-Participating



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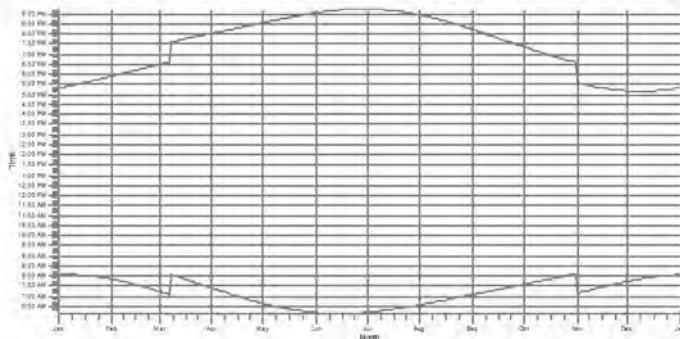
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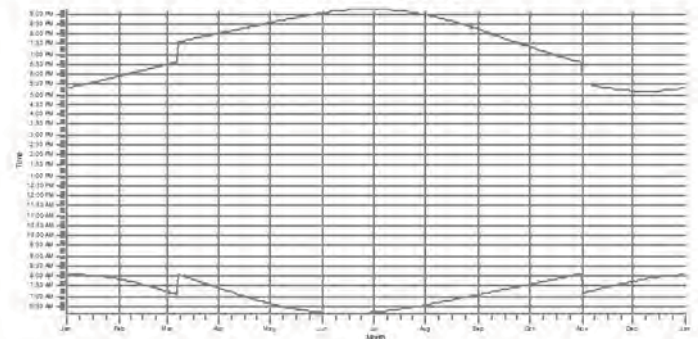
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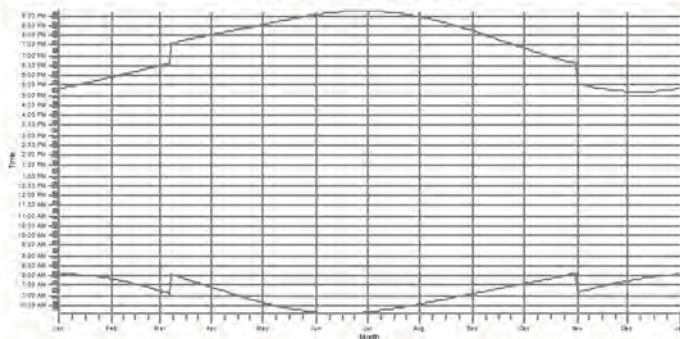
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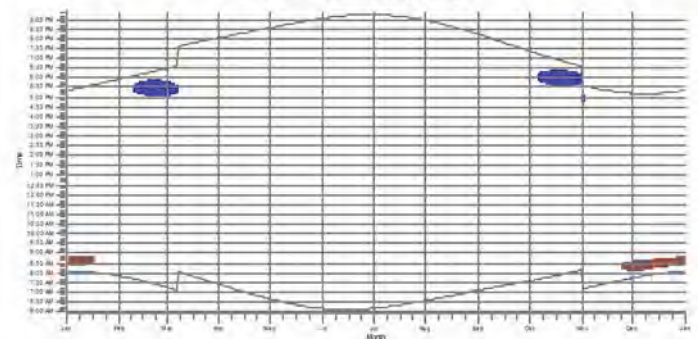
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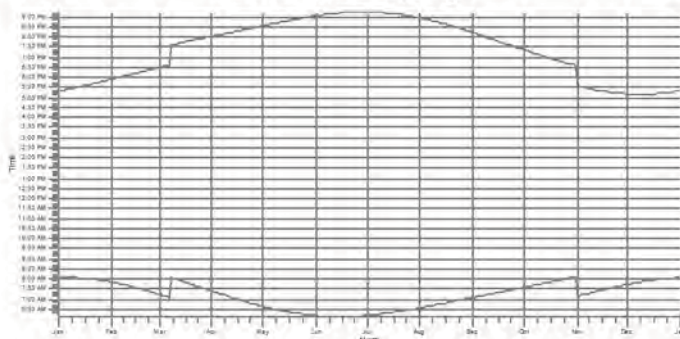
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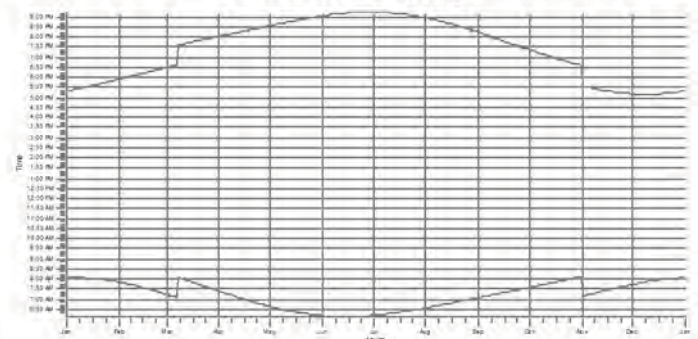
SR148: Non-Participating



SR149: Non-Participating



SR150: Non-Participating



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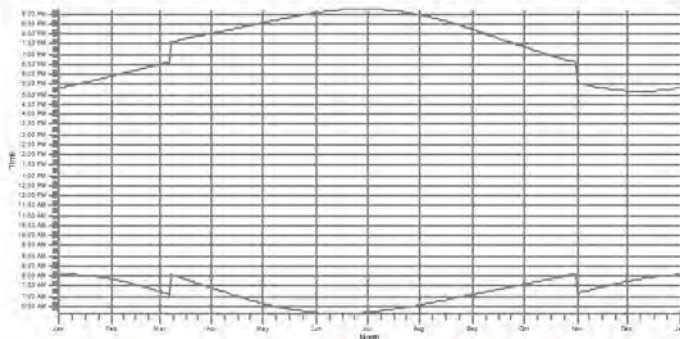
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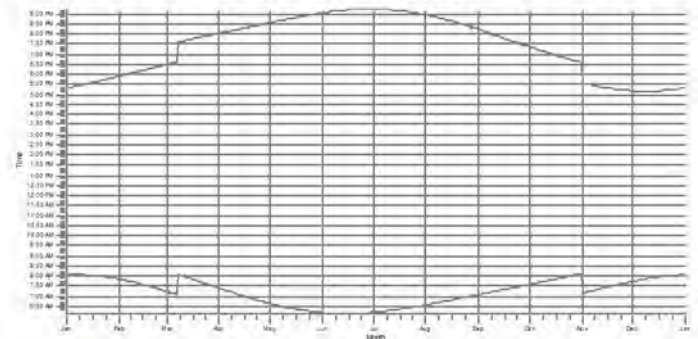
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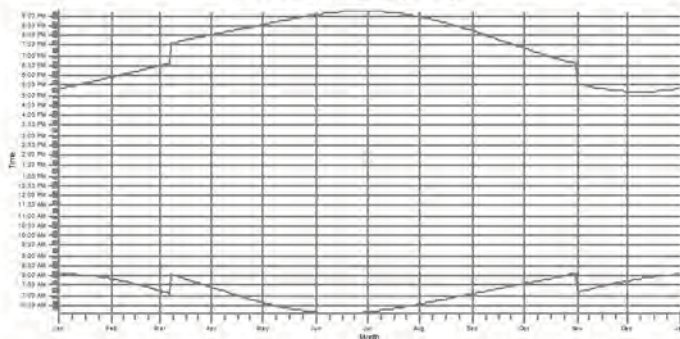
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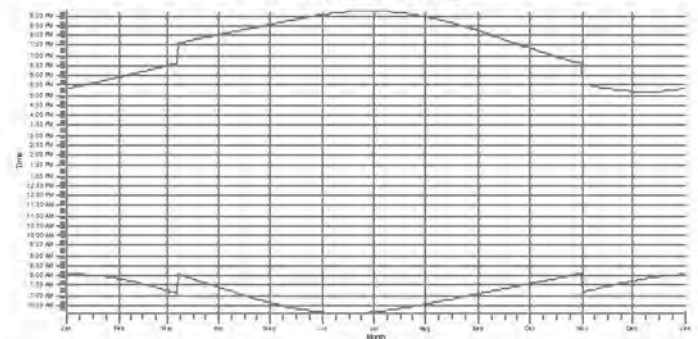
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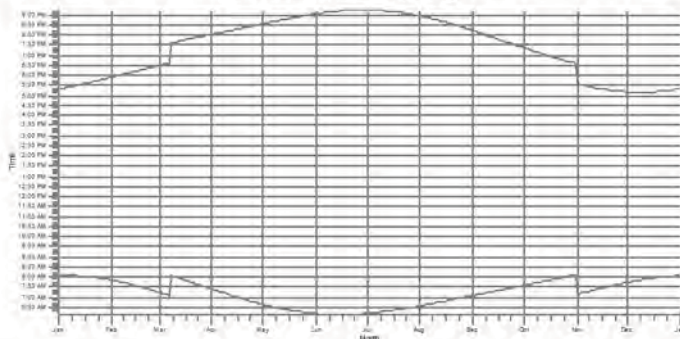
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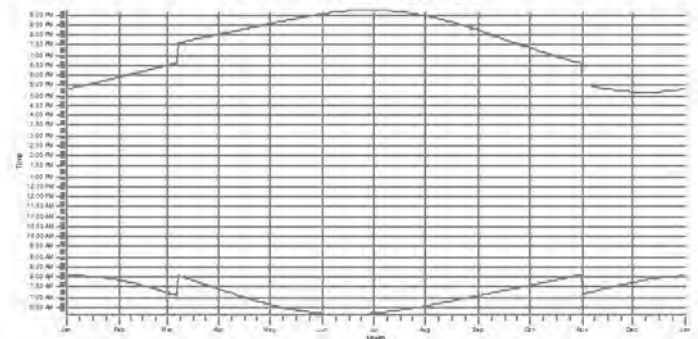
SR154: Non-Participating



SR155: Non-Participating



SR156: Non-Participating



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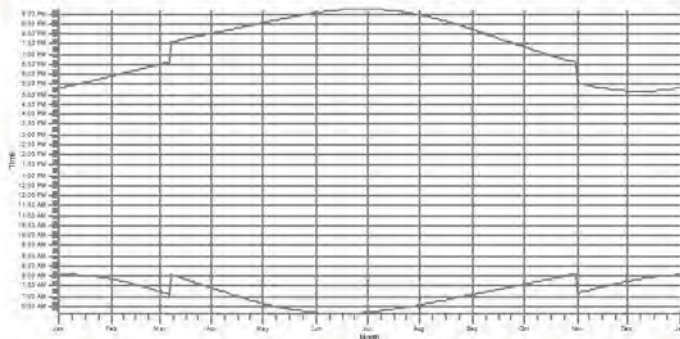
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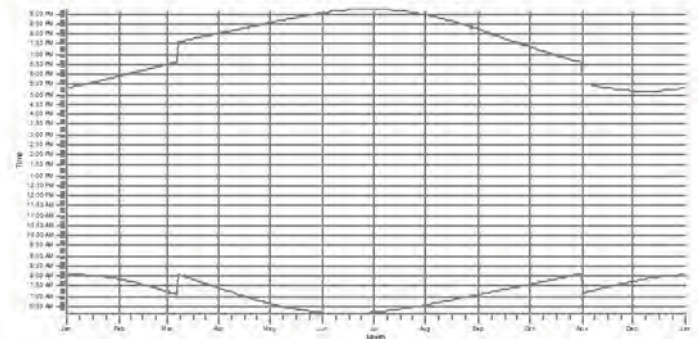
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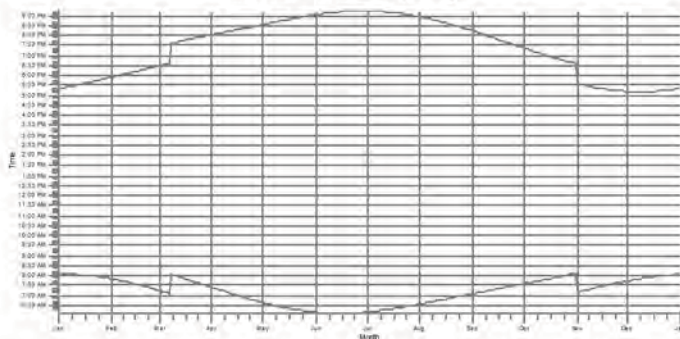
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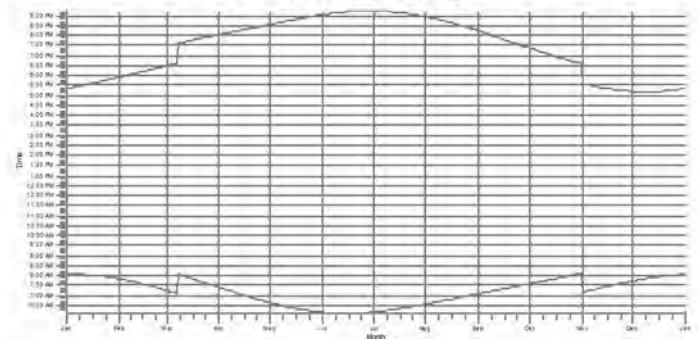
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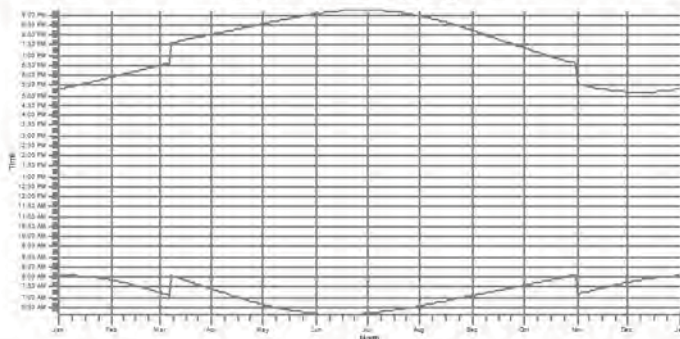
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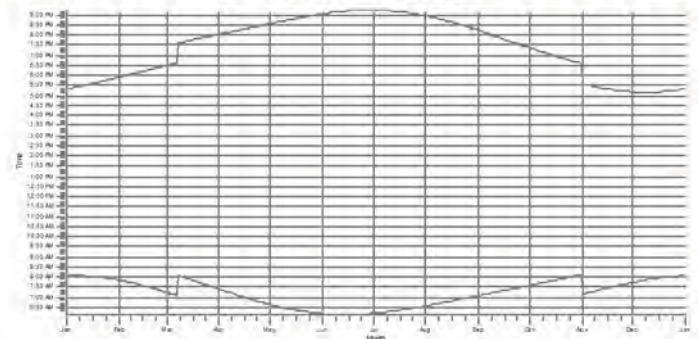
SR160: Non-Participating



SR161: Non-Participating



SR162: Non-Participating



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Case No(s). 13-0197-EL-BGN

Summary: Application of Northwest Ohio Wind Energy - Appendix J Shadow Flicker
Assessment Continued (Part 34) electronically filed by Teresa Orahod on behalf of Sally
Bloomfield