



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -96.5° Slope: 90.0° (32)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June
1	07:44 16:42	07:28 17:19	06:48 17:57	07:52 (LZ06) 08:40 (LZ06)	06:53 19:35	07:17 (LZ02) 20:11
2	07:44 16:43	07:27 17:20	06:46 17:58	07:51 (LZ06) 08:40 (LZ06)	06:51 19:36	07:15 (LZ02) 20:12
3	07:44 16:44	07:25 17:22	06:45 17:59	07:50 (LZ06) 08:40 (LZ06)	06:49 19:38	07:15 (LZ02) 20:14
4	07:44 16:45	07:24 17:23	06:43 18:01	07:50 (LZ06) 08:41 (LZ06)	06:48 19:39	07:14 (LZ02) 20:15
5	07:44 16:46	07:23 17:24	06:41 18:02	07:50 (LZ06) 08:41 (LZ06)	06:46 19:40	07:13 (LZ02) 20:16
6	07:44 16:47	07:22 17:26	06:40 18:03	07:49 (LZ06) 08:40 (LZ06)	06:44 19:41	07:13 (LZ02) 20:17
7	07:44 16:48	07:21 17:27	06:38 18:04	07:48 (LZ06) 08:40 (LZ06)	06:42 19:42	07:12 (LZ02) 20:18
8	07:43 16:49	07:19 17:29	06:36 18:06	07:49 (LZ06) 08:40 (LZ06)	06:40 19:44	07:13 (LZ02) 20:19
9	07:43 16:50	07:18 17:30	06:34 18:07	07:49 (LZ06) 08:39 (LZ06)	06:39 19:45	07:14 (LZ02) 20:20
10	07:43 16:51	07:17 17:31	06:33 18:08	07:48 (LZ06) 08:38 (LZ06)	06:37 19:46	07:14 (LZ02) 20:22
11	07:43 16:52	07:15 17:33	06:31 18:10	07:48 (LZ06) 08:37 (LZ06)	06:35 19:47	07:15 (LZ02) 20:23
12	07:42 16:53	07:14 17:34	06:29 18:11	07:48 (LZ06) 08:36 (LZ06)	06:33 19:48	07:19 (LZ02) 20:24
13	07:42 16:54	07:13 17:35	06:27 18:12	07:49 (LZ06) 08:36 (LZ06)	06:32 19:50	05:47 20:25
14	07:42 16:56	07:11 17:37	06:25 18:13	07:49 (LZ06) 08:35 (LZ06)	06:30 19:51	05:46 20:26
15	07:41 16:57	07:10 17:38	06:24 18:15	07:50 (LZ06) 08:33 (LZ06)	06:28 19:52	05:45 20:27
16	07:41 16:58	07:08 17:40	06:22 18:16	07:50 (LZ06) 08:32 (LZ06)	06:27 19:53	05:44 20:28
17	07:40 16:59	07:07 17:41	06:20 18:17	07:51 (LZ06) 08:30 (LZ06)	06:25 19:54	05:43 20:29
18	07:39 17:00	07:05 17:42	08:17 (LZ06) 08:18 (LZ06)	07:53 (LZ06) 08:29 (LZ06)	06:23 19:56	05:42 20:31
19	07:39 17:02	07:04 17:44	08:09 (LZ06) 08:26 (LZ06)	07:54 (LZ06) 08:27 (LZ06)	06:22 19:57	05:41 20:32
20	07:38 17:03	07:02 17:45	08:06 (LZ06) 08:30 (LZ06)	07:55 (LZ06) 08:24 (LZ06)	06:20 19:58	05:40 20:33
21	07:38 17:04	07:01 17:46	08:03 (LZ06) 08:32 (LZ06)	07:57 (LZ06) 08:21 (LZ06)	06:18 19:59	05:39 20:34
22	07:37 17:06	06:59 17:48	08:00 (LZ06) 08:33 (LZ06)	07:59 (LZ06) 08:17 (LZ06)	06:17 20:00	05:38 20:35
23	07:36 17:07	06:58 17:49	07:59 (LZ06) 08:35 (LZ06)	08:05 (LZ06) 08:11 (LZ06)	06:15 20:02	05:37 20:36
24	07:35 17:08	06:56 17:50	07:57 (LZ06) 08:36 (LZ06)	06:07 18:26	06:14 20:03	05:36 20:37
25	07:34 17:09	06:55 17:52	07:56 (LZ06) 08:38 (LZ06)	06:06 18:27	06:12 20:04	05:36 20:38
26	07:34 17:11	06:53 17:53	07:55 (LZ06) 08:38 (LZ06)	06:04 18:28	06:10 20:05	05:35 20:39
27	07:33 17:12	06:51 17:54	07:54 (LZ06) 08:39 (LZ06)	06:02 18:29	06:09 20:06	05:34 20:40
28	07:32 17:13	06:50 17:55	07:52 (LZ06) 08:39 (LZ06)	06:00 18:30	06:07 20:08	05:33 20:40
29	07:31 17:15		06:58 19:32	06:06 20:09	06:06 20:41	05:33 20:56
30	07:30 17:16		06:57 19:33	07:21 (LZ02) 07:30 (LZ02)	06:04 20:10	05:32 20:42
31	07:29 17:18		06:55 19:34	07:19 (LZ02) 07:32 (LZ02)	20:10 20:43	05:31 20:56
Potential sun hours	289	293	369	402	456	462
Total, worst case		356	985	209		
Sun reduction		0.29	0.31	0.40		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.64	0.64	0.60		
Total reduction		0.19	0.20	0.24		
Total, real		66	194	50		

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -96.5° Slope: 90.0° (32)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July	August	September	October	November	December
1	05:31 20:56	05:57 20:34	06:32 19:47	07:15 (LZ02) 18:52	07:06 18:52	08:28 (LZ06) 17:01
2	05:31 20:55	05:58 20:33	06:33 19:45	07:13 (LZ02) 18:50	07:07 18:50	08:27 (LZ06) 17:00
3	05:32 20:55	05:59 20:32	06:34 19:43	07:12 (LZ02) 18:49	07:08 18:49	08:26 (LZ06) 16:59
4	05:32 20:55	06:00 20:30	06:35 19:42	07:10 (LZ02) 18:47	07:09 18:47	08:26 (LZ06) 16:57
5	05:33 20:55	06:01 20:29	06:36 19:40	07:10 (LZ02) 18:45	07:11 18:45	08:26 (LZ06) 16:50
6	05:33 20:54	06:02 20:28	06:37 19:38	07:09 (LZ02) 18:43	07:12 18:43	08:25 (LZ06) 16:51
7	05:34 20:54	06:03 20:26	06:38 19:36	07:08 (LZ02) 18:42	07:13 18:42	08:25 (LZ06) 16:54
8	05:35 20:54	06:05 20:25	06:40 19:34	07:08 (LZ02) 18:40	07:14 18:40	08:24 (LZ06) 16:52
9	05:35 20:53	06:06 20:24	06:41 19:33	07:08 (LZ02) 18:38	07:15 18:38	08:25 (LZ06) 16:51
10	05:36 20:53	06:07 20:22	06:42 19:31	07:08 (LZ02) 18:36	07:17 18:36	08:25 (LZ06) 16:50
11	05:37 20:52	06:08 20:21	06:43 19:29	07:09 (LZ02) 18:35	07:18 18:35	08:25 (LZ06) 16:49
12	05:38 20:52	06:09 20:19	06:44 19:27	07:11 (LZ02) 18:33	07:19 18:33	08:25 (LZ06) 16:48
13	05:39 20:51	06:10 20:18	06:45 19:25	07:12 (LZ02) 18:31	07:20 18:31	08:26 (LZ06) 16:47
14	05:39 20:51	06:11 20:16	06:46 19:24	07:22 (LZ02) 18:29	07:21 18:29	08:26 (LZ06) 16:46
15	05:40 20:50	06:12 20:15	06:47 19:22	07:23 18:28	07:23 18:28	08:26 (LZ06) 16:45
16	05:41 20:49	06:14 20:13	06:49 19:20	07:24 18:26	07:24 18:26	08:27 (LZ06) 16:44
17	05:42 20:49	06:15 20:12	06:50 19:18	07:25 18:24	07:25 18:24	08:28 (LZ06) 16:43
18	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	07:26 18:23	08:29 (LZ06) 16:42
19	05:44 20:47	06:17 20:09	06:52 19:14	07:28 18:21	07:28 18:21	08:30 (LZ06) 16:41
20	05:45 20:46	06:18 20:07	06:53 19:12	07:29 18:19	07:29 18:19	08:32 (LZ06) 16:40
21	05:46 20:45	06:19 20:06	06:54 19:11	08:46 (LZ06) 18:18	07:30 18:18	08:34 (LZ06) 16:39
22	05:47 20:45	06:20 20:04	06:55 19:09	08:43 (LZ06) 18:16	07:31 18:16	08:36 (LZ06) 16:39
23	05:48 20:44	06:21 20:02	06:57 19:07	08:40 (LZ06) 18:15	07:33 18:15	08:58 (LZ06) 16:38
24	05:49 20:43	06:23 20:01	06:58 19:05	08:38 (LZ06) 18:13	07:34 18:13	08:55 (LZ06) 16:37
25	05:50 20:42	06:24 19:59	06:59 19:03	08:36 (LZ06) 18:12	06:35 17:12	16:37
26	05:51 20:41	06:25 19:57	07:00 19:01	08:34 (LZ06) 18:10	06:36 17:10	16:37
27	05:52 20:40	06:26 19:56	07:01 19:00	08:32 (LZ06) 18:09	06:38 17:09	16:36
28	05:53 20:39	06:27 19:54	07:02 18:58	08:31 (LZ06) 18:07	06:39 17:07	16:35
29	05:54 20:38	06:28 19:52	07:03 18:56	08:30 (LZ06) 18:06	06:40 17:06	16:35
30	05:55 20:36	06:29 19:50	07:05 18:54	08:29 (LZ06) 18:04	06:42 17:04	16:34
31	05:56 20:35	06:31 19:49	07:19 (LZ02) 07:25 (LZ02)	06:43 17:03	16:43 16:41	16:40 16:41
Potential sun hours	468	434	376	342	291	278
Total, worst case		6	576	990		
Sun reduction		0.65	0.59	0.47		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.60	0.63	0.64		
Total reduction		0.39	0.37	0.30		
Total, real		2	214	301		

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -90.0° Slope: 90.0° (33)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:44	07:28	06:48	06:53	07:58 (LZ06)	06:03	05:31	05:31	05:57	06:32	07:51 (LZ06)	07:06	06:44	07:22		
	16:42	17:19	17:57	19:35	46 08:44 (LZ06)	20:11	20:44	20:56	20:34	19:47	52 08:43 (LZ06)	18:52	17:01	16:34		
2	07:44	07:27	06:46	06:51	07:57 (LZ06)	06:02	05:30	05:31	05:58	06:33	07:50 (LZ06)	07:07	06:46	07:24		
	16:43	17:20	17:58	19:36	47 08:44 (LZ06)	20:12	20:45	20:55	20:33	19:45	53 08:43 (LZ06)	18:50	17:00	16:33		
3	07:44	07:25	06:45	06:49	07:57 (LZ06)	06:00	05:30	05:32	05:59	06:34	07:50 (LZ06)	07:08	06:47	07:25		
	16:44	17:22	17:59	19:38	48 08:45 (LZ06)	20:13	20:46	20:55	20:32	19:43	52 08:42 (LZ06)	18:49	16:59	16:33		
4	07:44	07:24	06:43	06:48	07:55 (LZ06)	05:59	05:29	05:32	06:00	06:35	07:50 (LZ06)	07:09	06:48	07:26		
	16:45	17:23	18:01	19:39	50 08:45 (LZ06)	20:15	20:46	20:55	20:30	19:42	52 08:42 (LZ06)	18:47	16:57	16:33		
5	07:44	07:23	06:41	06:46	07:54 (LZ06)	05:57	05:29	05:33	06:01	06:36	07:50 (LZ06)	07:11	06:50	07:27		
	16:46	17:24	18:02	19:40	51 08:45 (LZ06)	20:16	20:47	20:55	20:29	19:40	51 08:41 (LZ06)	18:45	16:56	16:32		
6	07:44	07:22	06:40	06:44	07:53 (LZ06)	05:56	05:28	05:33	06:02	06:37	07:50 (LZ06)	07:12	06:51	07:28		
	16:47	17:26	18:03	19:41	52 08:45 (LZ06)	20:17	20:48	20:54	20:28	19:38	51 08:41 (LZ06)	18:43	16:55	16:32		
7	07:44	07:21	06:38	06:42	07:53 (LZ06)	05:55	05:28	05:34	06:03	06:38	07:49 (LZ06)	07:13	06:52	07:29		
	16:48	17:27	18:04	19:42	51 08:44 (LZ06)	20:18	20:49	20:54	20:26	19:36	51 08:40 (LZ06)	18:42	16:54	16:32		
8	07:43	07:19	06:36	06:40	07:53 (LZ06)	05:53	05:28	05:35	06:05	06:40	07:50 (LZ06)	07:14	06:53	07:30		
	16:49	17:29	18:06	19:44	52 08:45 (LZ06)	20:19	20:49	20:54	20:25	19:34	49 08:39 (LZ06)	18:40	16:52	16:32		
9	07:43	07:18	06:34	06:39	07:52 (LZ06)	05:52	05:28	05:36	06:06	06:41	07:50 (LZ06)	07:15	06:55	07:31		
	16:50	17:30	18:07	19:45	52 08:44 (LZ06)	20:20	20:50	20:53	20:24	19:33	48 08:38 (LZ06)	18:38	16:51	16:32		
10	07:43	07:17	06:33	06:37	07:51 (LZ06)	05:51	05:27	05:36	06:07	06:42	07:50 (LZ06)	07:17	06:56	07:32		
	16:51	17:31	18:08	19:46	53 08:44 (LZ06)	20:22	20:50	20:53	20:22	19:31	47 08:37 (LZ06)	18:36	16:50	16:32		
11	07:43	07:15	06:31	06:35	07:51 (LZ06)	05:50	05:27	05:37	06:08	06:43	07:50 (LZ06)	07:18	06:57	07:33		
	16:52	17:33	18:10	19:47	52 08:43 (LZ06)	20:23	20:51	20:52	20:21	19:29	46 08:36 (LZ06)	18:35	16:49	16:32		
12	07:42	07:14	06:29	06:33	07:51 (LZ06)	05:48	05:27	05:38	06:09	06:44	07:52 (LZ06)	07:19	06:59	07:33		
	16:53	17:34	18:11	19:48	52 08:43 (LZ06)	20:24	20:52	20:52	20:19	19:27	44 08:36 (LZ06)	18:33	16:48	16:32		
13	07:42	07:13	06:27	06:32	07:51 (LZ06)	05:47	05:27	05:39	06:10	06:45	07:53 (LZ06)	07:20	07:00	07:34		
	16:54	17:35	18:12	19:50	51 08:42 (LZ06)	20:25	20:52	20:51	20:18	19:25	41 08:34 (LZ06)	18:31	16:47	16:32		
14	07:42	07:11	06:25	06:30	07:51 (LZ06)	05:46	05:27	05:39	06:11	06:46	07:54 (LZ06)	07:21	07:01	07:35		
	16:56	17:37	18:13	19:51	50 08:41 (LZ06)	20:26	20:53	20:51	20:16	19:24	38 08:32 (LZ06)	18:29	16:46	16:32		
15	07:41	07:10	06:24	06:28	07:52 (LZ06)	05:45	05:27	05:40	06:12	06:47	07:55 (LZ06)	07:23	07:03	07:36		
	16:57	17:38	18:15	19:52	49 08:41 (LZ06)	20:27	20:53	20:50	20:15	14 08:26 (LZ06)	19:22	35 08:30 (LZ06)	18:28	16:45	16:32	
16	07:41	07:08	06:22	06:27	07:51 (LZ06)	05:44	05:27	05:41	06:14	06:49	08:09 (LZ06)	06:49	07:24	07:04	07:37	
	16:58	17:40	18:16	19:53	49 08:40 (LZ06)	20:28	20:53	20:49	20:13	20 08:29 (LZ06)	19:20	32 08:28 (LZ06)	18:26	16:44	16:33	
17	07:40	07:07	06:20	06:25	07:51 (LZ06)	05:43	05:27	05:42	06:15	06:50	08:06 (LZ06)	06:50	07:25	07:05	07:37	
	16:59	17:41	18:17	19:54	47 08:38 (LZ06)	20:29	20:54	20:49	20:12	25 08:31 (LZ06)	19:18	27 08:25 (LZ06)	18:24	16:43	16:33	
18	07:39	07:05	06:18	06:23	07:52 (LZ06)	05:42	05:27	05:43	06:16	06:51	08:04 (LZ06)	06:51	07:26	07:07	07:38	
	17:00	17:42	18:18	19:56	46 08:38 (LZ06)	20:31	20:54	20:48	20:10	29 08:33 (LZ06)	19:16	22 08:22 (LZ06)	18:23	16:42	16:33	
19	07:39	07:04	06:16	06:22	07:52 (LZ06)	05:41	05:27	05:44	06:17	06:52	08:03 (LZ06)	06:52	07:28	07:08	07:39	
	17:02	17:44	18:19	19:57	44 08:36 (LZ06)	20:32	20:54	20:47	20:09	33 08:36 (LZ06)	19:14	13 08:17 (LZ06)	18:21	16:41	16:34	
20	07:38	07:02	06:15	06:20	07:54 (LZ06)	05:40	05:27	05:45	06:18	06:53	08:01 (LZ06)	06:53	07:29	07:09	07:39	
	17:03	17:45	18:21	19:58	42 08:36 (LZ06)	20:33	20:55	20:46	20:07	36 08:37 (LZ06)	19:12	18:19	16:40	16:34		
21	07:37	07:01	06:13	06:18	07:54 (LZ06)	05:39	05:27	05:46	06:19	06:54	08:00 (LZ06)	06:54	07:30	07:10	07:40	
	17:04	17:46	18:22	19:59	40 08:34 (LZ06)	20:34	20:55	20:45	20:06	38 08:38 (LZ06)	19:11	18:18	16:39	16:34		
22	07:37	06:59	06:11	06:17	07:54 (LZ06)	05:38	05:27	05:47	06:20	06:55	07:58 (LZ06)	06:55	07:31	07:12	07:40	
	17:06	17:48	18:23	20:00	38 08:32 (LZ06)	20:35	20:55	20:45	20:04	41 08:39 (LZ06)	19:09	18:16	16:39	16:35		
23	07:36	06:58	06:09	06:15	07:56 (LZ06)	05:37	05:27	05:48	06:22	06:57	07:57 (LZ06)	06:57	07:33	07:13	07:41	
	17:07	17:49	18:24	20:02	35 08:31 (LZ06)	20:36	20:55	20:44	20:02	43 08:40 (LZ06)	19:07	18:15	16:38	16:35		
24	07:35	06:56	06:07	06:14	07:57 (LZ06)	05:36	05:28	05:49	06:23	06:58	07:56 (LZ06)	06:58	07:34	07:14	07:41	
	17:08	17:50	18:26	8 07:28 (LZ06)	20:03	31 08:28 (LZ06)	20:37	20:56	20:43	20:01	44 08:40 (LZ06)	19:05	18:13	16:37	16:36	
25	07:34	06:55	06:06	06:12	07:59 (LZ06)	05:36	05:28	05:50	06:24	06:59	07:55 (LZ06)	06:59	06:35	07:15	07:42	
	17:09	17:52	18:27	20 07:34 (LZ06)	20:04	28 08:27 (LZ06)	20:38	20:56	20:42	19:59	46 08:41 (LZ06)	19:03	17:12	16:37	16:37	
26	07:34	06:53	06:04	06:10	07:10 (LZ06)	06:06	05:28	05:51	06:25	06:54	07:54 (LZ06)	07:00	06:36	07:17	07:42	
	17:11	17:53	18:28	26 07:36 (LZ06)	20:05	24 08:24 (LZ06)	20:39	20:56	20:41	19:57	47 08:41 (LZ06)	19:01	17:10	16:36	16:37	
27	07:33	06:51	06:02	06:09	07:07 (LZ06)	06:09	08:03 (LZ06)	05:34	05:29	05:52	06:26	07:53 (LZ06)	07:01	06:38	07:18	07:43
	17:12	17:54	18:29	31 07:38 (LZ06)	20:06	19 08:22 (LZ06)	20:40	20:56	20:40	19:56	49 08:42 (LZ06)	19:00	17:09	16:36	16:38	
28	07:32	06:50	06:00	06:07	07:05 (LZ06)	06:07	08:06 (LZ06)	05:33	05:29	05:53	06:27	07:52 (LZ06)	07:02	06:39	07:19	07:43
	17:13	17:55	18:30	35 07:40 (LZ06)	20:08	11 08:17 (LZ06)	20:40	20:56	20:39	19:54	50 08:42 (LZ06)	18:58	17:07	16:35	16:39	
29	07:31		06:58	08:04 (LZ06)	06:06		05:33	05:30	05:54	06:28	07:52 (LZ06)	07:03	06:40	07:20	07:43	
	17:15		19:32	38 08:42 (LZ06)	20:09		20:41	20:56	20:38	19:52	50 08:42 (LZ06)	18:56	17:06	16:35	16:39	
30	07:30		06:57	08:02 (LZ06)	06:04		05:32	05:30	05:55	06:29	07:51 (LZ06)	07:05	06:42	07:21	07:43	
	17:16		19:33	41 08:43 (LZ06)	20:10		20:42	20:56	20:36	19:50	51 08:42 (LZ06)	18:54	17:04	16:34	16:40	
31	07:29		06:55	08:00 (LZ06)			05:31		05:56	06:31	07:51 (LZ06)		06:43		07:43	
	17:18		19:34	43 08:43 (LZ06)			20:43		20:35	19:49	52 08:43 (LZ06)		17:03		16:41	
Potential sun hours	289	293	369	402	456	462	468	434		376			342	291	278	
Total, worst case			242	1210				668		804						
Sun reduction			0.31	0.40				0.65		0.59						
Oper. time red.			1.00	1.00				1.00		1.00						
Wind dir. red.			0.61	0.61				0.61		0.61						
Total reduction			0.19	0.24				0.40		0.36						
Total, real			46	295				266		293						

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -87.1° Slope: 90.0° (34)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January		February		March	April	May	June	
1	07:44		07:28	08:04 (LZ17)	06:48	06:53		07:28 (LZ06)
	16:42		17:19	08:25 (LZ17)	17:57	19:35		08:23 (LZ06)
2	07:44		07:27	08:04 (LZ17)	06:46	06:51		07:28 (LZ06)
	16:43		17:20	08:25 (LZ17)	17:58	19:36		08:22 (LZ06)
3	07:44		07:25	08:05 (LZ17)	06:45	06:49		07:29 (LZ06)
	16:44		17:22	08:23 (LZ17)	17:59	19:38		08:22 (LZ06)
4	07:44		07:24	08:06 (LZ17)	06:43	06:48		07:29 (LZ06)
	16:45		17:23	08:23 (LZ17)	18:01	19:39		08:21 (LZ06)
5	07:44		07:23	08:07 (LZ17)	06:41	06:46		07:29 (LZ06)
	16:46		17:24	08:22 (LZ17)	18:02	19:40		08:21 (LZ06)
6	07:44		07:22	08:10 (LZ17)	06:39	06:44		07:30 (LZ06)
	16:47		17:26	08:20 (LZ17)	18:03	19:41		08:21 (LZ06)
7	07:44		07:21	08:13 (LZ17)	06:38	06:42		07:30 (LZ06)
	16:48		17:27	08:15 (LZ17)	18:04	19:42		08:20 (LZ06)
8	07:43		07:19		06:36	06:40		07:31 (LZ06)
	16:49		17:29		18:06	19:44		08:20 (LZ06)
9	07:43		07:18		06:34	06:39		07:31 (LZ06)
	16:50		17:30		18:07	19:45		08:20 (LZ06)
10	07:43		07:17		06:33	06:37		07:32 (LZ06)
	16:51		17:31		18:08	19:46		08:21 (LZ06)
11	07:43		07:15		06:31	06:35		07:33 (LZ06)
	16:52		17:33		18:10	19:47		08:21 (LZ06)
12	07:42		07:14		06:29	06:33		07:32 (LZ06)
	16:53		17:34		18:11	19:48		08:20 (LZ06)
13	07:42		07:13		06:27	06:32		07:33 (LZ06)
	16:54		17:35		18:12	19:50		08:20 (LZ06)
14	07:41		07:11		06:25	06:30		07:33 (LZ06)
	16:56		17:37		18:13	19:51		08:20 (LZ06)
15	07:41		07:10		06:24	06:28		07:34 (LZ06)
	16:57		17:38		18:15	19:52		08:20 (LZ06)
16	07:41		07:08		06:22	06:27		07:34 (LZ06)
	16:58		17:40		18:16	19:53		08:20 (LZ06)
17	07:40		07:07		06:20	06:25		07:34 (LZ06)
	16:59		17:41		18:17	19:54		08:20 (LZ06)
18	07:39	08:08 (LZ17)	07:05		06:18	06:23		07:34 (LZ06)
	17:00	6 08:14 (LZ17)	17:42		18:18	19:56		08:20 (LZ06)
19	07:39	08:06 (LZ17)	07:04		06:16	06:22		07:36 (LZ06)
	17:02	10 08:16 (LZ17)	17:44		18:19	19:57		08:21 (LZ06)
20	07:38	08:04 (LZ17)	07:02		06:15	06:20		07:36 (LZ06)
	17:03	13 08:17 (LZ17)	17:45		18:21	19:58		08:21 (LZ06)
21	07:37	08:04 (LZ17)	07:01		06:13	06:18		07:36 (LZ06)
	17:04	16 08:20 (LZ17)	17:46		18:22	19:59		08:21 (LZ06)
22	07:37	08:03 (LZ17)	06:59		06:11	06:17		07:36 (LZ06)
	17:06	18 08:21 (LZ17)	17:48		18:23	20:00		08:21 (LZ06)
23	07:36	08:03 (LZ17)	06:58		06:09	06:15		07:36 (LZ06)
	17:07	19 08:22 (LZ17)	17:49		18:24	20:02		08:21 (LZ06)
24	07:35	08:02 (LZ17)	06:56		06:07	06:14		07:37 (LZ06)
	17:08	20 08:22 (LZ17)	17:50		18:26	20:03		08:22 (LZ06)
25	07:34	08:02 (LZ17)	06:55		06:06	06:12		07:36 (LZ06)
	17:09	21 08:23 (LZ17)	17:52		18:27	20:04		08:22 (LZ06)
26	07:34	08:02 (LZ17)	06:53		06:04	06:10		07:36 (LZ06)
	17:11	21 08:23 (LZ17)	17:53		18:28	20:05		08:22 (LZ06)
27	07:33	08:02 (LZ17)	06:51		06:02	06:09		07:37 (LZ06)
	17:12	22 08:24 (LZ17)	17:54		18:29	20:06		08:23 (LZ06)
28	07:32	08:02 (LZ17)	06:50		06:00	06:07		07:36 (LZ06)
	17:13	22 08:24 (LZ17)	17:55		18:30	20:08		08:23 (LZ06)
29	07:31	08:02 (LZ17)			06:58	06:06		07:37 (LZ06)
	17:15	23 08:25 (LZ17)			19:32	20:09		08:24 (LZ06)
30	07:30	08:03 (LZ17)			06:56	06:04		07:36 (LZ06)
	17:16	22 08:25 (LZ17)			19:33	20:10		08:24 (LZ06)
31	07:29	08:03 (LZ17)			06:55			
	17:18	22 08:25 (LZ17)			19:34			
Potential sun hours	289		293		369	402	456	462
Total, worst case	255		104			1038	2114	1438
Sun reduction	0.28		0.29			0.40	0.47	0.49
Oper. time red.	1.00		1.00			1.00	1.00	1.00
Wind dir. red.	0.66		0.66			0.59	0.60	0.60
Total reduction	0.19		0.19			0.24	0.28	0.30
Total, real	47		20			245	592	426

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -87.1° Slope: 90.0° (34)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

July			August			September			October			November			December		
1	05:31		07:37 (LZ06)	05:57		07:31 (LZ06)	06:32		07:06			06:44				07:22	
	20:56	48	08:25 (LZ06)	20:34	68	08:39 (LZ06)	19:47		18:52			17:01				16:34	
2	05:31		07:36 (LZ06)	05:58		07:31 (LZ06)	06:33		07:07			06:46				07:24	
	20:55	49	08:25 (LZ06)	20:33	68	08:39 (LZ06)	19:45		18:50			17:00				16:33	
3	05:32		07:37 (LZ06)	05:59		07:31 (LZ06)	06:34		07:08			06:47				07:25	
	20:55	48	08:25 (LZ06)	20:32	68	08:39 (LZ06)	19:43		18:49			16:59				16:33	
4	05:32		07:36 (LZ06)	06:00		07:31 (LZ06)	06:35		07:09			06:48		07:42 (LZ17)		07:26	
	20:55	49	08:25 (LZ06)	20:30	68	08:39 (LZ06)	19:42		18:47			16:57	4	07:46 (LZ17)		16:33	
5	05:33		07:36 (LZ06)	06:01		06:54 (LZ02)	06:36		07:11			06:50		07:39 (LZ17)		07:27	
	20:55	50	08:26 (LZ06)	20:29	73	08:40 (LZ06)	19:40		18:45			16:56	11	07:50 (LZ17)		16:32	
6	05:33		07:37 (LZ06)	06:02		06:51 (LZ02)	06:37		07:12			06:51		07:37 (LZ17)		07:28	
	20:54	50	08:27 (LZ06)	20:28	79	08:40 (LZ06)	19:38		18:43			16:55	15	07:52 (LZ17)		16:32	
7	05:34		07:36 (LZ06)	06:03		06:49 (LZ02)	06:38		07:13			06:52		07:37 (LZ17)		07:29	
	20:54	51	08:27 (LZ06)	20:26	82	08:40 (LZ06)	19:36		18:42			16:54	17	07:54 (LZ17)		16:32	
8	05:35		07:36 (LZ06)	06:05		06:48 (LZ02)	06:40		07:14			06:53		07:35 (LZ17)		07:30	
	20:54	52	08:28 (LZ06)	20:25	84	08:40 (LZ06)	19:34		18:40			16:52	19	07:54 (LZ17)		16:32	
9	05:35		07:36 (LZ06)	06:06		06:47 (LZ02)	06:41		07:15			06:55		07:34 (LZ17)		07:31	
	20:53	53	08:29 (LZ06)	20:24	86	08:40 (LZ06)	19:33		18:38			16:51	21	07:55 (LZ17)		16:32	
10	05:36		07:35 (LZ06)	06:07		06:46 (LZ02)	06:42		07:16			06:56		07:35 (LZ17)		07:32	
	20:53	54	08:29 (LZ06)	20:22	87	08:39 (LZ06)	19:31		18:36			16:50	21	07:56 (LZ17)		16:32	
11	05:37		07:35 (LZ06)	06:08		06:45 (LZ02)	06:43		07:18			06:57		07:34 (LZ17)		07:33	
	20:52	55	08:30 (LZ06)	20:21	88	08:39 (LZ06)	19:29		18:35			16:49	22	07:56 (LZ17)		16:32	
12	05:38		07:35 (LZ06)	06:09		06:44 (LZ02)	06:44		07:19			06:59		07:34 (LZ17)		07:33	
	20:52	56	08:31 (LZ06)	20:19	88	08:38 (LZ06)	19:27		18:33			16:48	23	07:57 (LZ17)		16:32	
13	05:39		07:35 (LZ06)	06:10		06:44 (LZ02)	06:45		07:20			07:00		07:34 (LZ17)		07:34	
	20:51	56	08:31 (LZ06)	20:18	87	08:38 (LZ06)	19:25		18:31			16:47	23	07:57 (LZ17)		16:32	
14	05:39		07:34 (LZ06)	06:11		06:44 (LZ02)	06:46		07:21			07:01		07:34 (LZ17)		07:35	
	20:51	57	08:31 (LZ06)	20:16	86	08:37 (LZ06)	19:24		18:29			16:46	22	07:56 (LZ17)		16:32	
15	05:40		07:34 (LZ06)	06:12		06:43 (LZ02)	06:47		07:23			07:03		07:35 (LZ17)		07:36	
	20:50	58	08:32 (LZ06)	20:15	86	08:36 (LZ06)	19:22		18:28			16:45	22	07:57 (LZ17)		16:32	
16	05:41		07:34 (LZ06)	06:14		06:43 (LZ02)	06:49		07:24			07:04		07:35 (LZ17)		07:37	
	20:49	59	08:33 (LZ06)	20:13	84	08:36 (LZ06)	19:20		18:26			16:44	21	07:56 (LZ17)		16:33	
17	05:42		07:34 (LZ06)	06:15		06:43 (LZ02)	06:50		07:25			07:05		07:36 (LZ17)		07:37	
	20:49	59	08:33 (LZ06)	20:12	83	08:35 (LZ06)	19:18		18:24			16:43	21	07:57 (LZ17)		16:33	
18	05:43		07:34 (LZ06)	06:16		06:44 (LZ02)	06:51		07:26			07:07		07:36 (LZ17)		07:38	
	20:48	60	08:34 (LZ06)	20:10	79	08:34 (LZ06)	19:16		18:23			16:42	20	07:56 (LZ17)		16:33	
19	05:44		07:34 (LZ06)	06:17		06:45 (LZ02)	06:52		07:28			07:08		07:37 (LZ17)		07:39	
	20:47	61	08:35 (LZ06)	20:09	77	08:34 (LZ06)	19:14		18:21			16:41	19	07:56 (LZ17)		16:34	
20	05:45		07:34 (LZ06)	06:18		06:46 (LZ02)	06:53		07:29			07:09		07:38 (LZ17)		07:39	
	20:46	61	08:35 (LZ06)	20:07	73	08:33 (LZ06)	19:12		18:19			16:40	18	07:56 (LZ17)		16:34	
21	05:46		07:34 (LZ06)	06:19		06:47 (LZ02)	06:54		07:30			07:10		07:39 (LZ17)		07:40	
	20:45	62	08:36 (LZ06)	20:06	67	08:31 (LZ06)	19:11		18:18			16:39	16	07:55 (LZ17)		16:34	
22	05:47		07:33 (LZ06)	06:20		06:49 (LZ02)	06:55		07:31			07:12		07:40 (LZ17)		07:40	
	20:45	63	08:36 (LZ06)	20:04	60	08:30 (LZ06)	19:09		18:16			16:39	13	07:53 (LZ17)		16:35	
23	05:48		07:32 (LZ06)	06:21		07:40 (LZ06)	06:57		07:33			07:13		07:43 (LZ17)		07:41	
	20:44	64	08:36 (LZ06)	20:02	48	08:28 (LZ06)	19:07		18:15			16:38	10	07:53 (LZ17)		16:35	
24	05:49		07:32 (LZ06)	06:23		07:41 (LZ06)	06:58		07:34			07:14		07:45 (LZ17)		07:41	
	20:43	65	08:37 (LZ06)	20:01	45	08:26 (LZ06)	19:05		18:13			16:37	6	07:51 (LZ17)		16:36	
25	05:50		07:32 (LZ06)	06:24		07:42 (LZ06)	06:59		06:35			07:15				07:42	
	20:42	65	08:37 (LZ06)	19:59	42	08:24 (LZ06)	19:03		17:12			16:37				16:37	
26	05:51		07:32 (LZ06)	06:25		07:44 (LZ06)	07:00		06:36			07:17				07:42	
	20:41	65	08:37 (LZ06)	19:57	38	08:22 (LZ06)	19:01		17:10			16:36				16:37	
27	05:52		07:32 (LZ06)	06:26		07:46 (LZ06)	07:01		06:38			07:18				07:42	
	20:40	66	08:38 (LZ06)	19:56	33	08:19 (LZ06)	19:00		17:09			16:36				16:38	
28	05:53		07:32 (LZ06)	06:27		07:49 (LZ06)	07:02		06:39			07:19				07:43	
	20:39	66	08:38 (LZ06)	19:54	26	08:15 (LZ06)	18:58		17:07			16:35				16:39	
29	05:54		07:32 (LZ06)	06:28		07:53 (LZ06)	07:03		06:40			07:20				07:43	
	20:37	66	08:38 (LZ06)	19:52	18	08:11 (LZ06)	18:56		17:06			16:35				16:39	
30	05:55		07:31 (LZ06)	06:29			07:05		06:42			07:21				07:43	
	20:36	68	08:39 (LZ06)	19:50			18:54		17:04			16:34				16:40	
31	05:56		07:31 (LZ06)	06:31					06:43							07:43	
	20:35	68	08:39 (LZ06)	19:49					17:03							16:41	
Potential sun hours	468			434			376		342			291				278	
Total, worst case		1804			1971						364						
Sun reduction		0.59			0.65						0.36						
Oper. time red.		1.00			1.00						1.00						
Wind dir. red.		0.60			0.59						0.66						
Total reduction		0.35			0.38						0.24						
Total, real		635			758						88						

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: Real\_Case\_Operational\_Time Shadow receptor: KrU\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -91.1° Slope: 90.0° (35)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	January			February			March			April			May			June			
	1	07:44		09:00 (LZ16)	07:28		07:54 (LZ17)	06:48		06:53			06:03			06:28 (LZ02)	05:31		06:52 (LZ06)
		16:42	26	09:26 (LZ16)	17:19	18	08:12 (LZ17)	17:57		19:35			20:11	17		06:45 (LZ02)	20:44	63	07:55 (LZ06)
	2	07:44		09:01 (LZ16)	07:27		07:54 (LZ17)	06:46		06:51			06:02			06:27 (LZ02)	05:30		06:52 (LZ06)
		16:43	25	09:26 (LZ16)	17:20	20	08:14 (LZ17)	17:58		19:36			20:12	19		06:46 (LZ02)	20:45	63	07:55 (LZ06)
	3	07:44		09:02 (LZ16)	07:25		07:53 (LZ17)	06:45		06:49			06:00			06:27 (LZ02)	05:30		06:52 (LZ06)
		16:44	24	09:26 (LZ16)	17:22	20	08:13 (LZ17)	17:59		19:38			20:13	20		06:47 (LZ02)	20:46	64	07:56 (LZ06)
	4	07:44		09:03 (LZ16)	07:24		07:53 (LZ17)	06:43		06:48			05:59			06:26 (LZ02)	05:29		06:51 (LZ06)
		16:45	23	09:26 (LZ16)	17:23	21	08:14 (LZ17)	18:01		19:39			20:15	21		06:47 (LZ02)	20:46	65	07:56 (LZ06)
	5	07:44		09:03 (LZ16)	07:23		07:53 (LZ17)	06:41		06:46			05:57			06:26 (LZ02)	05:29		06:52 (LZ06)
		16:46	22	09:25 (LZ16)	17:24	22	08:15 (LZ17)	18:02		19:40			20:16	21		06:47 (LZ02)	20:47	64	07:56 (LZ06)
	6	07:44		09:04 (LZ16)	07:22		07:53 (LZ17)	06:39		06:44			05:56			06:26 (LZ02)	05:28		06:52 (LZ06)
		16:47	21	09:25 (LZ16)	17:26	22	08:15 (LZ17)	18:03		19:41			20:17	22		06:48 (LZ02)	20:48	65	07:57 (LZ06)
	7	07:44		09:05 (LZ16)	07:21		07:52 (LZ17)	06:38		06:42			05:55			06:25 (LZ02)	05:28		06:51 (LZ06)
		16:48	20	09:25 (LZ16)	17:27	23	08:15 (LZ17)	18:04		19:42			20:18	22		06:47 (LZ02)	20:48	65	07:56 (LZ06)
	8	07:43		09:07 (LZ16)	07:19		07:53 (LZ17)	06:36		06:40			05:53			06:25 (LZ02)	05:28		06:52 (LZ06)
		16:49	18	09:25 (LZ16)	17:29	22	08:15 (LZ17)	18:06		19:44			20:19	28		07:26 (LZ06)	20:49	65	07:57 (LZ06)
	9	07:43		09:08 (LZ16)	07:18		07:54 (LZ17)	06:34		06:39			05:52			06:25 (LZ02)	05:28		06:52 (LZ06)
		16:50	15	09:23 (LZ16)	17:30	21	08:15 (LZ17)	18:07		19:45			20:20	40		07:32 (LZ06)	20:50	65	07:57 (LZ06)
	10	07:43		09:10 (LZ16)	07:17		07:53 (LZ17)	06:33		06:37			05:51			06:26 (LZ02)	05:27		06:52 (LZ06)
		16:51	13	09:23 (LZ16)	17:31	21	08:14 (LZ17)	18:08		19:46			20:22	47		07:36 (LZ06)	20:50	66	07:58 (LZ06)
	11	07:43		09:13 (LZ16)	07:15		07:55 (LZ17)	06:31		06:35			05:50			06:26 (LZ02)	05:27		06:52 (LZ06)
		16:52	8	09:21 (LZ16)	17:33	19	08:14 (LZ17)	18:10		19:47			20:23	50		07:38 (LZ06)	20:51	66	07:58 (LZ06)
	12	07:42			17:14		07:56 (LZ17)	06:29		06:33			05:48			06:27 (LZ02)	05:27		06:52 (LZ06)
		16:53			17:34	17	08:13 (LZ17)	18:11		19:48			20:24	53		07:40 (LZ06)	20:52	65	07:57 (LZ06)
	13	07:42			17:13		07:57 (LZ17)	06:27		06:32			05:47			06:27 (LZ02)	05:27		06:52 (LZ06)
		16:54			17:35	14	08:11 (LZ17)	18:12		19:50			20:25	55		07:41 (LZ06)	20:52	66	07:58 (LZ06)
	14	07:41			17:11		07:59 (LZ17)	06:25		06:30			05:46			06:28 (LZ02)	05:27		06:52 (LZ06)
		16:56			17:37	10	08:09 (LZ17)	18:13		19:51			20:26	56		07:43 (LZ06)	20:53	66	07:58 (LZ06)
	15	07:41			17:10			06:24		06:28			05:45			06:29 (LZ02)	05:27		06:52 (LZ06)
		16:57			17:38			18:15		19:52			20:27	56		07:44 (LZ06)	20:53	66	07:58 (LZ06)
	16	07:41			17:08			06:22		06:27			05:44			06:31 (LZ02)	05:27		06:52 (LZ06)
		16:58			17:40			18:16		19:53			20:28	55		07:45 (LZ06)	20:53	66	07:58 (LZ06)
	17	07:40			17:07			06:20		06:25			05:43			06:34 (LZ02)	05:27		06:53 (LZ06)
		16:59			17:41			18:17		19:54			20:29	51		07:46 (LZ06)	20:54	66	07:59 (LZ06)
	18	07:39			17:05			06:18		06:23			05:42			06:57 (LZ06)	05:27		06:53 (LZ06)
		17:00			17:42			18:18		19:56			20:30	50		07:47 (LZ06)	20:54	66	07:59 (LZ06)
	19	07:39			17:04			06:16		06:22			05:41			06:57 (LZ06)	05:27		06:54 (LZ06)
		17:02			17:44			18:19		19:57			20:32	52		07:49 (LZ06)	20:54	66	08:00 (LZ06)
	20	07:38			17:02			06:15		06:20			05:40			06:57 (LZ06)	05:27		06:54 (LZ06)
		17:03			17:45			18:21		19:58			20:33	52		07:49 (LZ06)	20:55	66	08:00 (LZ06)
	21	07:37			17:01			06:13		06:18			05:39			06:56 (LZ06)	05:27		06:54 (LZ06)
		17:04			17:46			18:22		19:59			20:34	54		07:50 (LZ06)	20:55	66	08:00 (LZ06)
	22	07:37			17:06			06:11		06:17			05:38			06:55 (LZ06)	05:27		06:54 (LZ06)
		17:06			17:48			18:23		20:00			20:35	55		07:50 (LZ06)	20:55	66	08:00 (LZ06)
	23	07:36			17:06			06:09		06:15			05:37			06:54 (LZ06)	05:27		06:54 (LZ06)
		17:07			17:49			18:24		20:02			20:36	57		07:51 (LZ06)	20:55	66	08:00 (LZ06)
	24	07:35			17:08			06:07		06:14			05:36			06:53 (LZ06)	05:28		06:55 (LZ06)
		17:08			17:50			18:26		20:03			20:37	58		07:51 (LZ06)	20:56	66	08:01 (LZ06)
	25	07:34			17:09			06:06		06:12			05:36			06:54 (LZ06)	05:28		06:55 (LZ06)
		17:09			17:52			18:27		20:04			20:38	58		07:52 (LZ06)	20:56	66	08:01 (LZ06)
	26	07:34			17:11			06:04		06:10			05:35			06:53 (LZ06)	05:28		06:54 (LZ06)
		17:11			17:53			18:28		20:05			20:39	59		07:52 (LZ06)	20:56	67	08:01 (LZ06)
	27	07:33			17:12			06:02		06:09			05:34			06:52 (LZ06)	05:29		06:55 (LZ06)
		17:12			17:54			18:29		20:06			20:40	61		07:53 (LZ06)	20:56	66	08:01 (LZ06)
	28	07:32			17:13			06:00		06:07			05:33			06:53 (LZ06)	05:29		06:55 (LZ06)
		17:13			17:55			18:30		20:08			20:40	61		07:54 (LZ06)	20:56	66	08:01 (LZ06)
	29	07:31		07:58 (LZ17)			06:58	06:06					05:33			06:52 (LZ06)	05:30		06:56 (LZ06)
		17:15	9	08:07 (LZ17)			19:32	20:09	12	06:43 (LZ02)			20:41	62		07:54 (LZ06)	20:56	66	08:02 (LZ06)
	30	07:30		07:56 (LZ17)			06:56	06:04					05:32			06:53 (LZ06)	05:30		06:56 (LZ06)
		17:16	13	08:09 (LZ17)			19:33	20:10	15	06:45 (LZ02)			20:42	62		07:55 (LZ06)	20:56	66	08:02 (LZ06)
	31	07:29		07:55 (LZ17)			06:55						05:31			06:52 (LZ06)			
		17:18	16	08:11 (LZ17)			19:34						20:43	62		07:54 (LZ06)			
Potential sun hours		289			293			369		402			456				462		
Total, worst case		253			270					33			1436					1965	
Sun reduction		0.28			0.29					0.40			0.47					0.49	
Oper. time red.		1.00			1.00					1.00			1.00					1.00	
Wind dir. red.		0.67			0.66					0.57			0.57					0.57	
Total reduction		0.19			0.19					0.23			0.27					0.28	
Total, real		47			51					8			384					554	

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)





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -91.1° Slope: 90.0° (35)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

July		August		September		October		November		December	
1	05:31	06:57 (LZ06)	05:57	06:36 (LZ02)	06:32	07:06		06:44		07:23 (LZ17)	07:22
	20:56	08:02 (LZ06)	20:34	07:49 (LZ06)	19:47	18:52		17:01	21	07:44 (LZ17)	16:34
2	05:31	06:56 (LZ06)	05:58	06:36 (LZ02)	06:33	07:07		06:46		07:22 (LZ17)	07:24
	20:55	08:02 (LZ06)	20:33	07:47 (LZ06)	19:45	18:50		17:00	22	07:44 (LZ17)	16:33
3	05:32	06:57 (LZ06)	05:59	06:35 (LZ02)	06:34	07:08		06:47		07:23 (LZ17)	07:25
	20:55	08:02 (LZ06)	20:32	07:44 (LZ06)	19:43	18:49		16:59	22	07:45 (LZ17)	16:33
4	05:32	06:57 (LZ06)	06:00	06:35 (LZ02)	06:35	07:09		06:48		07:22 (LZ17)	07:26
	20:55	08:02 (LZ06)	20:30	07:40 (LZ06)	19:42	18:47		16:57	23	07:45 (LZ17)	16:33
5	05:33	06:58 (LZ06)	06:01	06:35 (LZ02)	06:36	07:11		06:50		07:23 (LZ17)	07:27
	20:55	08:03 (LZ06)	20:29	06:58 (LZ02)	19:40	18:45		16:56	22	07:45 (LZ17)	16:32
6	05:33	06:58 (LZ06)	06:02	06:35 (LZ02)	06:37	07:12		06:51		07:22 (LZ17)	07:28
	20:54	08:03 (LZ06)	20:28	06:57 (LZ02)	19:38	18:43		16:55	23	07:45 (LZ17)	16:32
7	05:34	06:58 (LZ06)	06:03	06:35 (LZ02)	06:38	07:13		06:52		07:23 (LZ17)	07:29
	20:54	08:02 (LZ06)	20:26	06:57 (LZ02)	19:36	18:42		16:54	22	07:45 (LZ17)	16:32
8	05:35	06:59 (LZ06)	06:05	06:35 (LZ02)	06:40	07:14		06:53		07:24 (LZ17)	07:30
	20:54	08:03 (LZ06)	20:25	06:57 (LZ02)	19:34	18:40		16:52	20	07:44 (LZ17)	16:32
9	05:36	06:59 (LZ06)	06:06	06:35 (LZ02)	06:41	07:15		06:55		07:24 (LZ17)	07:31
	20:53	08:03 (LZ06)	20:24	06:56 (LZ02)	19:33	18:38		16:51	19	07:43 (LZ17)	16:32
10	05:36	06:59 (LZ06)	06:07	06:36 (LZ02)	06:42	07:16		06:56		07:25 (LZ17)	07:32
	20:53	08:02 (LZ06)	20:22	06:56 (LZ02)	19:31	18:36		16:50	18	07:43 (LZ17)	16:32
11	05:37	06:59 (LZ06)	06:08	06:36 (LZ02)	06:43	07:18		06:57		07:26 (LZ17)	07:33
	20:52	08:03 (LZ06)	20:21	06:55 (LZ02)	19:29	18:35		16:49	16	07:42 (LZ17)	16:32
12	05:38	07:00 (LZ06)	06:09	06:37 (LZ02)	06:44	07:19		06:59		07:28 (LZ17)	07:33
	20:52	08:03 (LZ06)	20:19	06:54 (LZ02)	19:27	18:33		16:48	13	07:41 (LZ17)	16:32
13	05:39	07:01 (LZ06)	06:10	06:38 (LZ02)	06:45	07:20		07:00		07:30 (LZ17)	07:34
	20:51	08:03 (LZ06)	20:18	06:52 (LZ02)	19:25	18:31		16:47	9	07:39 (LZ17)	16:32
14	05:39	07:00 (LZ06)	06:11	06:39 (LZ02)	06:46	07:21		07:01			07:35
	20:51	08:02 (LZ06)	20:16	06:50 (LZ02)	19:24	18:29		16:46			16:32
15	05:40	07:01 (LZ06)	06:12	06:43 (LZ02)	06:47	07:23		07:03			07:36
	20:50	08:02 (LZ06)	20:15	06:46 (LZ02)	19:22	18:28		16:45			16:32
16	05:41	07:02 (LZ06)	06:14		06:49	07:24		07:04			07:37
	20:49	08:02 (LZ06)	20:13		19:20	18:26		16:44			16:33
17	05:42	07:02 (LZ06)	06:15		06:50	07:25		07:05			07:37
	20:49	08:02 (LZ06)	20:12		19:18	18:24		16:43			16:33
18	05:43	07:03 (LZ06)	06:16		06:51	07:26		07:07			07:38
	20:48	08:02 (LZ06)	20:10		19:16	18:23		16:42			16:33
19	05:44	07:04 (LZ06)	06:17		06:52	07:28		07:08			07:39
	20:47	08:02 (LZ06)	20:09		19:14	18:21		16:41			16:34
20	05:45	07:04 (LZ06)	06:18		06:53	07:29		07:09			07:39
	20:46	08:01 (LZ06)	20:07		19:12	18:19		16:40			16:34
21	05:46	07:05 (LZ06)	06:19		06:54	07:30		07:10			07:40
	20:45	08:01 (LZ06)	20:06		19:11	18:18		16:39			16:34
22	05:47	07:05 (LZ06)	06:20		06:55	07:31		07:12			07:40
	20:45	08:00 (LZ06)	20:04		19:09	18:16		16:39			16:35
23	05:48	07:06 (LZ06)	06:21		06:57	07:33		07:13			07:41
	20:44	07:59 (LZ06)	20:02		19:07	18:15		16:38			16:35
24	05:49	07:06 (LZ06)	06:23		06:58	07:34		07:14			07:41
	20:43	07:59 (LZ06)	20:01		19:05	18:13		16:37			16:36
25	05:50	07:07 (LZ06)	06:24		06:59	06:35		07:15			07:42
	20:42	07:58 (LZ06)	19:59		19:03	17:12		16:37			16:37
26	05:51	07:08 (LZ06)	06:25		07:00	06:36		07:17			07:42
	20:41	07:57 (LZ06)	19:57		19:01	17:10		16:36			16:37
27	05:52	06:43 (LZ02)	06:26		07:01	06:38		07:18			07:42
	20:40	07:56 (LZ06)	19:56		19:00	17:09	3	07:35 (LZ17)			16:36
28	05:53	06:40 (LZ02)	06:27		07:02	06:39		07:19			07:43
	20:39	07:55 (LZ06)	19:54		18:58	17:07	11	07:40 (LZ17)			16:35
29	05:54	06:39 (LZ02)	06:28		07:03	06:40		07:26 (LZ17)			07:20
	20:37	07:54 (LZ06)	19:52		18:56	17:06	15	07:41 (LZ17)			16:35
30	05:55	06:38 (LZ02)	06:29		07:05	06:42		07:25 (LZ17)			07:21
	20:36	07:53 (LZ06)	19:50		18:54	17:04	17	07:42 (LZ17)			16:34
31	05:56	06:37 (LZ02)	06:31			06:43		07:24 (LZ17)			07:43
	20:35	07:51 (LZ06)	19:49			17:03	20	07:44 (LZ17)			16:41
Potential sun hours	468		434		376	342		291			278
Total, worst case	1845		375			66		250			773
Sun reduction	0.59		0.65			0.47		0.36			0.26
Oper. time red.	1.00		1.00			1.00		1.00			1.00
Wind dir. red.	0.57		0.57			0.66		0.66			0.67
Total reduction	0.33		0.37			0.31		0.24			0.18
Total, real	617		139			20		60			137

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: Real\_Case\_Operational\_Time Shadow receptor: KrU\_05 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -89.3° Slope: 90.0° (36)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January			February			March			April			May			June		
1	07:44		08:44 (LZ16)	07:28		06:48	06:53	06:03							05:31		
	16:42	36	09:20 (LZ16)	17:19			17:57	19:35	20:11						20:44		
2	07:44		08:45 (LZ16)	07:27		06:46	06:51	06:02							05:30		
	16:43	35	09:20 (LZ16)	17:20			17:58	19:36	20:12						20:45	6	06:57 (LZ06)
3	07:44		08:45 (LZ16)	07:25		06:45	06:49	06:00							05:30		06:54 (LZ06)
	16:44	36	09:21 (LZ16)	17:22			17:59	19:38	20:13						20:46	14	07:08 (LZ06)
4	07:44		08:46 (LZ16)	07:24		07:55 (LZ17)	06:43	06:48		06:25 (LZ02)	05:29				05:29		06:51 (LZ06)
	16:45	35	09:21 (LZ16)	17:23	1	07:56 (LZ17)	18:01	19:39	20:15	8	06:33 (LZ02)	20:46			18	07:09 (LZ06)	
5	07:44		08:45 (LZ16)	07:23		07:51 (LZ17)	06:41	06:46		06:23 (LZ02)	05:29				05:29		06:50 (LZ06)
	16:46	36	09:21 (LZ16)	17:24	10	08:01 (LZ17)	18:02	19:40	20:16	12	06:35 (LZ02)	20:47			22	07:12 (LZ06)	
6	07:44		08:46 (LZ16)	07:22		07:49 (LZ17)	06:39	06:44		06:22 (LZ02)	05:28				05:28		06:49 (LZ06)
	16:47	35	09:21 (LZ16)	17:26	14	08:03 (LZ17)	18:03	19:41	20:17	15	06:37 (LZ02)	20:48			24	07:13 (LZ06)	
7	07:44		08:47 (LZ16)	07:21		07:47 (LZ17)	06:38	06:42		06:20 (LZ02)	05:28				05:28		06:48 (LZ06)
	16:48	35	09:22 (LZ16)	17:27	17	08:04 (LZ17)	18:04	19:42	20:18	17	06:37 (LZ02)	20:48			26	07:14 (LZ06)	
8	07:43		08:48 (LZ16)	07:19		07:46 (LZ17)	06:36	06:40		06:19 (LZ02)	05:28				05:28		06:47 (LZ06)
	16:49	34	09:22 (LZ16)	17:29	19	08:05 (LZ17)	18:06	19:44	20:19	19	06:38 (LZ02)	20:49			28	07:15 (LZ06)	
9	07:43		08:48 (LZ16)	07:18		07:46 (LZ17)	06:34	06:39		06:19 (LZ02)	05:28				05:28		06:47 (LZ06)
	16:50	34	09:22 (LZ16)	17:30	21	08:07 (LZ17)	18:07	19:45	20:20	20	06:39 (LZ02)	20:50			29	07:16 (LZ06)	
10	07:43		08:49 (LZ16)	07:17		07:45 (LZ17)	06:33	06:37		06:19 (LZ02)	05:27				05:27		06:47 (LZ06)
	16:51	33	09:22 (LZ16)	17:31	22	08:07 (LZ17)	18:08	19:46	20:22	20	06:39 (LZ02)	20:50			30	07:17 (LZ06)	
11	07:43		08:50 (LZ16)	07:15		07:45 (LZ17)	06:31	06:35		06:18 (LZ02)	05:27				05:27		06:46 (LZ06)
	16:52	33	09:23 (LZ16)	17:33	22	08:07 (LZ17)	18:10	19:47	20:23	22	06:40 (LZ02)	20:51			32	07:18 (LZ06)	
12	07:42		08:50 (LZ16)	07:14		07:45 (LZ17)	06:29	06:33		06:18 (LZ02)	05:27				05:27		06:45 (LZ06)
	16:53	32	09:22 (LZ16)	17:34	23	08:08 (LZ17)	18:11	19:48	20:24	22	06:40 (LZ02)	20:52			33	07:18 (LZ06)	
13	07:42		08:51 (LZ16)	07:13		07:45 (LZ17)	06:27	06:32		06:17 (LZ02)	05:27				05:27		06:45 (LZ06)
	16:54	32	09:23 (LZ16)	17:35	22	08:07 (LZ17)	18:12	19:50	20:25	22	06:39 (LZ02)	20:52			34	07:19 (LZ06)	
14	07:41		08:51 (LZ16)	07:11		07:45 (LZ17)	06:25	06:30		06:17 (LZ02)	05:27				05:27		06:45 (LZ06)
	16:56	31	09:22 (LZ16)	17:37	23	08:08 (LZ17)	18:13	19:51	20:26	22	06:39 (LZ02)	20:53			35	07:20 (LZ06)	
15	07:41		08:53 (LZ16)	07:10		07:45 (LZ17)	06:24	06:28		06:18 (LZ02)	05:27				05:27		06:45 (LZ06)
	16:57	29	09:22 (LZ16)	17:38	22	08:07 (LZ17)	18:15	19:52	20:27	21	06:39 (LZ02)	20:53			35	07:20 (LZ06)	
16	07:41		08:53 (LZ16)	07:08		07:46 (LZ17)	06:22	06:27		06:18 (LZ02)	05:27				05:27		06:45 (LZ06)
	16:58	29	09:22 (LZ16)	17:40	21	08:07 (LZ17)	18:16	19:53	20:28	21	06:39 (LZ02)	20:53			36	07:21 (LZ06)	
17	07:40		08:54 (LZ16)	07:07		07:46 (LZ17)	06:20	06:25		06:18 (LZ02)	05:27				05:27		06:45 (LZ06)
	16:59	27	09:21 (LZ16)	17:41	19	08:05 (LZ17)	18:17	19:54	20:29	20	06:38 (LZ02)	20:54			36	07:21 (LZ06)	
18	07:39		08:55 (LZ16)	07:05		07:48 (LZ17)	06:18	06:23		06:18 (LZ02)	05:27				05:27		06:44 (LZ06)
	17:00	26	09:21 (LZ16)	17:42	17	08:05 (LZ17)	18:18	19:56	20:30	20	06:38 (LZ02)	20:54			37	07:21 (LZ06)	
19	07:39		08:56 (LZ16)	07:04		07:49 (LZ17)	06:16	06:22		06:20 (LZ02)	05:27				05:27		06:45 (LZ06)
	17:02	24	09:20 (LZ16)	17:44	14	08:03 (LZ17)	18:19	19:57	20:32	18	06:38 (LZ02)	20:54			37	07:22 (LZ06)	
20	07:38		08:57 (LZ16)	07:02		07:52 (LZ17)	06:15	06:20		06:20 (LZ02)	05:27				05:27		06:45 (LZ06)
	17:03	22	09:19 (LZ16)	17:45	9	08:01 (LZ17)	18:21	19:58	20:33	18	06:38 (LZ02)	20:55			38	07:23 (LZ06)	
21	07:37		09:00 (LZ16)	07:01		06:13	06:18	05:39		06:21 (LZ02)	05:27				05:27		06:45 (LZ06)
	17:04	19	09:19 (LZ16)	17:46		18:22	19:59	20:34	16	06:37 (LZ02)	20:55				38	07:23 (LZ06)	
22	07:37		09:02 (LZ16)	06:59		06:11	06:17	05:38		06:22 (LZ02)	05:27				05:27		06:45 (LZ06)
	17:06	15	09:17 (LZ16)	17:48		18:23	20:00	20:35	14	06:36 (LZ02)	20:55				38	07:23 (LZ06)	
23	07:36		09:04 (LZ16)	06:58		06:09	06:15	05:37		06:23 (LZ02)	05:27				05:27		06:45 (LZ06)
	17:07	11	09:15 (LZ16)	17:49		18:24	20:02	20:36	12	06:35 (LZ02)	20:55				38	07:23 (LZ06)	
24	07:35			06:56		06:07	06:14	05:36		06:24 (LZ02)	05:28				05:28		06:46 (LZ06)
	17:08			17:50		18:26	20:03	20:37	9	06:33 (LZ02)	20:56				37	07:23 (LZ06)	
25	07:34			06:55		06:06	06:12	05:36		06:27 (LZ02)	05:28				05:28		06:47 (LZ06)
	17:09			17:52		18:27	20:04	20:38	4	06:31 (LZ02)	20:56				36	07:23 (LZ06)	
26	07:33			06:53		06:04	06:10	05:35			05:28				05:28		06:47 (LZ06)
	17:11			17:53		18:28	20:05	20:39			20:56				36	07:23 (LZ06)	
27	07:33			06:51		06:02	06:09	05:34			05:29				05:29		06:48 (LZ06)
	17:12			17:54		18:29	20:06	20:40			20:56				35	07:23 (LZ06)	
28	07:32			06:50		06:00	06:07	05:33			05:29				05:29		06:48 (LZ06)
	17:13			17:55		18:30	20:08	20:40			20:56				35	07:23 (LZ06)	
29	07:31					06:58	06:06	05:33			05:30				05:30		06:49 (LZ06)
	17:15					19:32	20:09	20:41			20:56				34	07:23 (LZ06)	
30	07:30					06:56	06:04	05:32			05:30				05:30		06:49 (LZ06)
	17:16					19:33	20:10	20:42			20:56				34	07:23 (LZ06)	
31	07:29					06:55		05:31									
	17:18					19:34		20:43									
Potential sun hours	289			293		369	402	456							462		
Total, worst case		679		296				372							911		
Sun reduction		0.28		0.29				0.47							0.49		
Oper. time red.		1.00		1.00				1.00							1.00		
Wind dir. red.		0.66		0.65				0.58							0.59		
Total reduction		0.19		0.19				0.27							0.29		
Total, real		126		56				101							267		

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_05 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -89.3° Slope: 90.0° (36)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	July			August			September			October			November			December			
1	05:31		06:50 (LZ06)	05:57		06:28 (LZ02)	06:32		07:06			06:44			07:15 (LZ17)	07:22		08:32 (LZ16)	
	20:56	33	07:23 (LZ06)	20:34		06:50 (LZ02)	19:47		18:52			17:01	21		07:36 (LZ17)	16:34	33	09:05 (LZ16)	
2	05:31		06:50 (LZ06)	05:58		06:28 (LZ02)	06:33		07:07			06:46			07:15 (LZ17)	07:24		08:32 (LZ16)	
	20:55	32	07:22 (LZ06)	20:33		06:49 (LZ02)	19:45		18:50			17:00	20		07:35 (LZ17)	16:33	33	09:05 (LZ16)	
3	05:32		06:52 (LZ06)	05:59		06:28 (LZ02)	06:34		07:08			06:47			07:16 (LZ17)	07:25		08:32 (LZ16)	
	20:55	30	07:22 (LZ06)	20:32		06:49 (LZ02)	19:43		18:49			16:59	19		07:35 (LZ17)	16:33	34	09:06 (LZ16)	
4	05:32		06:52 (LZ06)	06:00		06:29 (LZ02)	06:35		07:09			06:48			07:17 (LZ17)	07:26		08:32 (LZ16)	
	20:55	29	07:21 (LZ06)	20:30		06:48 (LZ02)	19:42		18:47			16:57	17		07:34 (LZ17)	16:33	34	09:06 (LZ16)	
5	05:33		06:54 (LZ06)	06:01		06:30 (LZ02)	06:36		07:11			06:50			07:19 (LZ17)	07:27		08:32 (LZ16)	
	20:55	26	07:20 (LZ06)	20:29		06:48 (LZ02)	19:40		18:45			16:56	14		07:33 (LZ17)	16:32	35	09:07 (LZ16)	
6	05:33		06:55 (LZ06)	06:02		06:31 (LZ02)	06:37		07:12			06:51			07:21 (LZ17)	07:28		08:32 (LZ16)	
	20:54	25	07:20 (LZ06)	20:28		06:47 (LZ02)	19:38		18:43			16:55	9		07:30 (LZ17)	16:32	35	09:07 (LZ16)	
7	05:34		06:56 (LZ06)	06:03		06:32 (LZ02)	06:38		07:13			06:52				07:29		08:32 (LZ16)	
	20:54	22	07:18 (LZ06)	20:26		06:46 (LZ02)	19:36		18:42			16:54				16:32	36	09:08 (LZ16)	
8	05:35		06:58 (LZ06)	06:05		06:33 (LZ02)	06:40		07:14			06:53				07:30		08:33 (LZ16)	
	20:54	19	07:17 (LZ06)	20:25		06:44 (LZ02)	19:34		18:40			16:52				16:32	35	09:08 (LZ16)	
9	05:36		07:00 (LZ06)	06:06		06:36 (LZ02)	06:41		07:15			06:55				07:31		08:33 (LZ16)	
	20:53	16	07:16 (LZ06)	20:24		06:41 (LZ02)	19:33		18:38			16:51				16:32	36	09:09 (LZ16)	
10	05:36		07:02 (LZ06)	06:07			06:42		07:16			06:56				07:32		08:34 (LZ16)	
	20:53	11	07:13 (LZ06)	20:22			19:31		18:36			16:50				16:32	35	09:09 (LZ16)	
11	05:37			06:08			06:43		07:18			06:57				07:33		08:34 (LZ16)	
	20:52			20:21			19:29		18:35			16:49				16:32	36	09:10 (LZ16)	
12	05:38			06:09			06:44		07:19			06:59				07:33		08:35 (LZ16)	
	20:52			20:19			19:27		18:33			16:48				16:32	35	09:10 (LZ16)	
13	05:39			06:10			06:45		07:20			07:00				07:34		08:35 (LZ16)	
	20:51			20:18			19:25		18:31			16:47				16:32	36	09:11 (LZ16)	
14	05:39			06:11			06:46		07:21			07:01				07:35		08:35 (LZ16)	
	20:51			20:16			19:24		18:29			16:46				16:32	36	09:11 (LZ16)	
15	05:40			06:12			06:47		07:23			07:03				07:36		08:36 (LZ16)	
	20:50			20:15			19:22		18:28			16:45				16:32	35	09:11 (LZ16)	
16	05:41			06:14			06:49		07:24			07:04				07:37		08:36 (LZ16)	
	20:49			20:13			19:20		18:26			16:44				16:33	36	09:12 (LZ16)	
17	05:42			06:15			06:50		07:25			07:05				07:37		08:37 (LZ16)	
	20:49			20:12			19:18		18:24			16:43				16:33	36	09:13 (LZ16)	
18	05:43			06:16			06:51		07:26			07:07				07:38		08:37 (LZ16)	
	20:48			20:10			19:16		18:23			16:42				16:33	36	09:13 (LZ16)	
19	05:44		06:35 (LZ02)	06:17			06:52		07:28			07:08			08:38 (LZ16)	07:39		08:38 (LZ16)	
	20:47	7	06:42 (LZ02)	20:09			19:14		18:21			16:41	11		08:49 (LZ16)	16:34	36	09:14 (LZ16)	
20	05:45		06:34 (LZ02)	06:18			06:53		07:29			07:09			08:37 (LZ16)	07:39		08:38 (LZ16)	
	20:46	10	06:44 (LZ02)	20:07			19:12		18:19			16:40	15		08:52 (LZ16)	16:34	36	09:14 (LZ16)	
21	05:46		06:33 (LZ02)	06:19			06:54		07:30			07:10			08:35 (LZ16)	07:40		08:39 (LZ16)	
	20:45	13	06:46 (LZ02)	20:06			19:11		18:18			16:39	19		08:54 (LZ16)	16:34	36	09:15 (LZ16)	
22	05:47		06:31 (LZ02)	06:20			06:55		07:31		08:21 (LZ17)	07:12			08:33 (LZ16)	07:40		08:39 (LZ16)	
	20:45	15	06:46 (LZ02)	20:04			19:09		18:16		10	08:31 (LZ17)	16:39	22		08:55 (LZ16)	16:35	36	09:15 (LZ16)
23	05:48		06:30 (LZ02)	06:21			06:57		07:33			08:19 (LZ17)	07:13		08:33 (LZ16)	07:41		08:40 (LZ16)	
	20:44	17	06:47 (LZ02)	20:02			19:07		18:15		15	08:34 (LZ17)	16:38	24		08:57 (LZ16)	16:35	36	09:16 (LZ16)
24	05:49		06:30 (LZ02)	06:23			06:58		07:34			08:17 (LZ17)	07:14		08:32 (LZ16)	07:41		08:40 (LZ16)	
	20:43	18	06:48 (LZ02)	20:01			19:05		18:13		18	08:35 (LZ17)	16:37	26		08:58 (LZ16)	16:36	36	09:16 (LZ16)
25	05:50		06:29 (LZ02)	06:24			06:59		06:35			07:16 (LZ17)	07:15		08:32 (LZ16)	07:42		08:41 (LZ16)	
	20:42	19	06:48 (LZ02)	19:59			19:03		17:12		19	07:35 (LZ17)	16:37	27		08:59 (LZ16)	16:37	36	09:17 (LZ16)
26	05:51		06:29 (LZ02)	06:25			07:00		06:36			07:16 (LZ17)	07:17		08:32 (LZ16)	07:42		08:41 (LZ16)	
	20:41	20	06:49 (LZ02)	19:57			19:01		17:10		21	07:37 (LZ17)	16:36	29		09:01 (LZ16)	16:37	36	09:17 (LZ16)
27	05:52		06:28 (LZ02)	06:26			07:01		06:38			07:15 (LZ17)	07:18		08:32 (LZ16)	07:42		08:41 (LZ16)	
	20:40	21	06:49 (LZ02)	19:56			19:00		17:09		22	07:37 (LZ17)	16:36	29		09:01 (LZ16)	16:38	36	09:17 (LZ16)
28	05:53		06:28 (LZ02)	06:27			07:02		06:39			07:15 (LZ17)	07:19		08:31 (LZ16)	07:43		08:42 (LZ16)	
	20:39	21	06:49 (LZ02)	19:54			18:58		17:07		22	07:37 (LZ17)	16:35	31		09:02 (LZ16)	16:39	35	09:17 (LZ16)
29	05:54		06:28 (LZ02)	06:28			07:03		06:40			07:14 (LZ17)	07:20		08:31 (LZ16)	07:43		08:42 (LZ16)	
	20:37	22	06:50 (LZ02)	19:52			18:56		17:06		23	07:37 (LZ17)	16:35	32		09:03 (LZ16)	16:39	36	09:18 (LZ16)
30	05:55		06:28 (LZ02)	06:29			07:05		06:42			07:14 (LZ17)	07:21		08:32 (LZ16)	07:43		08:43 (LZ16)	
	20:36	22	06:50 (LZ02)	19:50			18:54		17:04		23	07:37 (LZ17)	16:34	32		09:04 (LZ16)	16:40	36	09:19 (LZ16)
31	05:56		06:28 (LZ02)	06:31					06:43			07:15 (LZ17)				07:43		08:44 (LZ16)	
	20:35	22	06:50 (LZ02)	19:49			17:03		22		07:37 (LZ17)					16:41	35	09:19 (LZ16)	
Potential sun hours	468			434			376		342			291				278			
Total, worst case		470				147				195			397				1098		
Sun reduction		0.59				0.65				0.47			0.36				0.26		
Oper. time red.		1.00				1.00				1.00			1.00				1.00		
Wind dir. red.		0.59				0.58				0.65			0.66				0.66		
Total reduction		0.34				0.38				0.31			0.24				0.18		
Total, real		162				55				60			96				192		

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: Real\_Case\_Operational\_Time Shadow receptor: KrU\_06 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -94.2° Slope: 90.0° (37)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January			February			March			April	May	June
1	07:44		07:28	08:33 (LZ16)	06:48		07:31 (LZ17)	06:53	06:03	05:31	
	16:42		17:19	09:09 (LZ16)	17:57	18	07:49 (LZ17)	19:35	20:11	20:44	
2	07:44		07:27	08:34 (LZ16)	06:46		07:33 (LZ17)	06:51	06:02	05:30	
	16:43		17:20	09:09 (LZ16)	17:58	13	07:46 (LZ17)	19:36	20:12	20:45	
3	07:44		07:25	08:33 (LZ16)	06:45		07:35 (LZ17)	06:49	06:00	05:30	
	16:44		17:22	09:08 (LZ16)	17:59	8	07:43 (LZ17)	19:38	20:13	20:46	
4	07:44	08:39 (LZ16)	07:24	08:34 (LZ16)	06:43			06:48	05:59	05:29	
	16:45	7	08:46 (LZ16)	17:23	34	09:08 (LZ16)		19:39	20:15	20:46	
5	07:44	08:37 (LZ16)	07:23	08:35 (LZ16)	06:41			06:46	05:57	05:29	
	16:46	11	08:48 (LZ16)	17:24	32	09:07 (LZ16)		19:40	20:16	20:47	
6	07:44	08:36 (LZ16)	07:22	08:37 (LZ16)	06:39			06:44	05:56	05:28	
	16:47	14	08:50 (LZ16)	17:26	29	09:06 (LZ16)		19:41	20:17	20:48	
7	07:44	08:35 (LZ16)	07:21	08:37 (LZ16)	06:38			06:42	05:55	05:28	
	16:48	17	08:52 (LZ16)	17:27	28	09:05 (LZ16)		19:42	20:18	20:48	
8	07:43	08:35 (LZ16)	07:19	08:39 (LZ16)	06:36			06:40	05:53	05:28	
	16:49	18	08:53 (LZ16)	17:29	25	09:04 (LZ16)		19:44	20:19	20:49	
9	07:43	08:34 (LZ16)	07:18	08:41 (LZ16)	06:34			06:39	05:52	05:28	
	16:50	20	08:54 (LZ16)	17:30	21	09:02 (LZ16)		19:45	20:20	20:50	
10	07:43	08:33 (LZ16)	07:17	08:42 (LZ16)	06:33			06:37	05:51	05:27	
	16:51	23	08:56 (LZ16)	17:31	18	09:00 (LZ16)		19:46	20:22	20:50	
11	07:43	08:33 (LZ16)	07:15	08:46 (LZ16)	06:31			06:35	05:50	05:27	
	16:52	24	08:57 (LZ16)	17:33	10	08:56 (LZ16)		19:47	20:23	20:51	
12	07:42	08:32 (LZ16)	07:14		06:29			06:33	05:49	05:27	
	16:53	26	08:58 (LZ16)	17:34		18:11		19:48	20:24	20:52	
13	07:42	08:32 (LZ16)	07:13		06:27			06:32	05:47	05:27	
	16:54	28	09:00 (LZ16)	17:35		18:12		19:50	20:25	20:52	
14	07:41	08:32 (LZ16)	07:11		06:25			06:30	05:46	05:27	
	16:56	28	09:00 (LZ16)	17:37		18:13		19:51	20:26	20:53	
15	07:41	08:32 (LZ16)	07:10		06:24			06:28	05:45	05:27	
	16:57	30	09:02 (LZ16)	17:38		18:15		19:52	20:27	20:53	
16	07:41	08:31 (LZ16)	07:08		06:22			06:27	05:44	05:27	
	16:58	31	09:02 (LZ16)	17:40		18:16		19:53	20:28	20:53	
17	07:40	08:31 (LZ16)	07:07		07:35 (LZ17)	06:20		06:25	05:43	05:27	
	16:59	32	09:03 (LZ16)	17:41	11	07:46 (LZ17)		19:54	20:29	20:54	
18	07:39	08:31 (LZ16)	07:05		07:34 (LZ17)	06:18		06:23	05:42	05:27	
	17:00	33	09:04 (LZ16)	17:42	15	07:49 (LZ17)		19:56	20:30	20:54	
19	07:39	08:31 (LZ16)	07:04		07:32 (LZ17)	06:16		06:22	05:41	05:27	
	17:02	34	09:05 (LZ16)	17:44	18	07:50 (LZ17)		19:57	20:32	20:54	
20	07:38	08:30 (LZ16)	07:02		07:31 (LZ17)	06:15		06:20	05:40	05:27	
	17:03	35	09:05 (LZ16)	17:45	20	07:51 (LZ17)		19:58	20:33	20:55	
21	07:37	08:31 (LZ16)	07:01		07:30 (LZ17)	06:13		06:18	05:39	05:27	
	17:04	36	09:07 (LZ16)	17:46	22	07:52 (LZ17)		19:59	20:34	20:55	
22	07:37	08:31 (LZ16)	06:59		07:29 (LZ17)	06:11		06:17	05:38	05:27	
	17:06	36	09:07 (LZ16)	17:48	23	07:52 (LZ17)		20:00	20:35	20:55	
23	07:36	08:31 (LZ16)	06:58		07:29 (LZ17)	06:09		06:15	05:37	05:28	
	17:07	37	09:08 (LZ16)	17:49	23	07:52 (LZ17)		20:02	20:36	20:55	
24	07:35	08:31 (LZ16)	06:56		07:29 (LZ17)	06:07		06:14	05:36	05:28	
	17:08	37	09:08 (LZ16)	17:50	23	07:52 (LZ17)		20:03	20:37	20:56	
25	07:34	08:31 (LZ16)	06:55		07:29 (LZ17)	06:06		06:12	05:36	05:28	
	17:09	37	09:08 (LZ16)	17:52	22	07:51 (LZ17)		20:04	20:38	20:56	
26	07:33	08:31 (LZ16)	06:53		07:29 (LZ17)	06:04		06:10	05:35	05:28	
	17:11	38	09:09 (LZ16)	17:53	23	07:52 (LZ17)		20:05	20:39	20:56	
27	07:33	08:31 (LZ16)	06:51		07:29 (LZ17)	06:02		06:09	05:34	05:29	
	17:12	38	09:09 (LZ16)	17:54	21	07:50 (LZ17)		20:06	20:40	20:56	
28	07:32	08:31 (LZ16)	06:50		07:30 (LZ17)	06:00		06:07	05:33	05:29	
	17:13	38	09:09 (LZ16)	17:55	19	07:49 (LZ17)		20:08	20:40	20:56	
29	07:31	08:31 (LZ16)				06:58		06:06	05:33	05:30	
	17:15	38	09:09 (LZ16)			19:32		20:09	20:41	20:56	
30	07:30	08:32 (LZ16)				06:57		06:04	05:32	05:30	
	17:16	37	09:09 (LZ16)			19:33		20:10	20:42	20:56	
31	07:29	08:32 (LZ16)				06:55			05:31		
	17:18	37	09:09 (LZ16)			19:34			20:43		
Potential sun hours	289		293		369			402	456	462	
Total, worst case	820		543		39						
Sun reduction	0.28		0.29		0.31						
Oper. time red.	1.00		1.00		1.00						
Wind dir. red.	0.67		0.65		0.63						
Total reduction	0.19		0.19		0.19						
Total, real	153		102		8						

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)





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_06 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -94.2° Slope: 90.0° (37)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	July	August	September	October	November	December
1	05:31 20:56	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	08:12 (LZ16) 16:34
2	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:50	06:46 17:00	08:09 (LZ16) 16:33
3	05:32 20:55	05:59 20:32	06:34 19:43	07:08 18:49	06:47 16:59	08:08 (LZ16) 16:33
4	05:32 20:55	06:00 20:30	06:35 19:42	07:09 18:47	06:48 16:57	08:07 (LZ16) 16:33
5	05:33 20:55	06:01 20:29	06:36 19:40	07:11 18:45	06:50 16:56	08:06 (LZ16) 16:32
6	05:33 20:54	06:02 20:28	06:37 19:38	07:12 18:43	06:51 16:55	08:05 (LZ16) 16:32
7	05:34 20:54	06:03 20:26	06:38 19:36	07:13 18:42	06:52 16:54	08:05 (LZ16) 16:32
8	05:35 20:54	06:05 20:25	06:40 19:34	07:14 18:40	06:53 16:52	08:04 (LZ16) 16:32
9	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	06:55 16:51	08:03 (LZ16) 16:32
10	05:36 20:53	06:07 20:22	06:42 19:31	07:16 18:36	06:56 16:50	08:04 (LZ16) 16:32
11	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:35	08:08 (LZ17) 08:19 (LZ17)	06:57 16:49
12	05:38 20:52	06:09 20:19	06:44 19:27	07:19 18:33	08:05 (LZ17) 08:21 (LZ17)	06:59 16:48
13	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	08:04 (LZ17) 08:22 (LZ17)	07:00 16:47
14	05:39 20:51	06:11 20:16	06:46 19:24	07:21 18:29	08:03 (LZ17) 08:23 (LZ17)	07:01 16:46
15	05:40 20:50	06:12 20:15	06:47 19:22	07:23 18:28	08:02 (LZ17) 08:23 (LZ17)	07:03 16:45
16	05:41 20:49	06:14 20:13	06:49 19:20	07:24 18:26	08:01 (LZ17) 08:23 (LZ17)	07:04 16:44
17	05:42 20:49	06:15 20:12	06:50 19:18	07:25 18:24	08:01 (LZ17) 08:24 (LZ17)	07:05 16:43
18	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	08:00 (LZ17) 08:23 (LZ17)	07:07 16:42
19	05:44 20:47	06:17 20:09	06:52 19:14	07:28 18:21	08:00 (LZ17) 08:23 (LZ17)	07:08 16:41
20	05:45 20:46	06:18 20:07	06:53 19:12	07:29 18:19	08:01 (LZ17) 08:23 (LZ17)	07:09 16:40
21	05:46 20:45	06:19 20:06	06:54 19:11	07:30 18:18	08:01 (LZ17) 08:22 (LZ17)	07:10 16:39
22	05:47 20:44	06:20 20:04	06:55 19:09	07:31 18:16	08:01 (LZ17) 08:21 (LZ17)	07:12 16:39
23	05:48 20:44	06:22 20:02	06:57 19:07	07:33 18:15	08:03 (LZ17) 08:20 (LZ17)	07:13 16:38
24	05:49 20:43	06:23 20:01	06:58 19:05	07:34 18:13	08:04 (LZ17) 08:18 (LZ17)	07:14 16:37
25	05:50 20:42	06:24 19:59	06:59 19:03	07:35 17:12	07:06 (LZ17) 07:15 (LZ17)	07:15 16:37
26	05:51 20:41	06:25 19:57	07:00 19:01	07:36 17:10	07:17 16:36	08:10 (LZ16) 16:37
27	05:52 20:40	06:26 19:56	07:01 19:00	07:38 17:09	07:18 16:36	08:11 (LZ16) 16:38
28	05:53 20:39	06:27 19:54	07:02 18:58	07:39 17:07	07:19 16:35	08:12 (LZ16) 16:39
29	05:54 20:37	06:28 19:52	07:03 18:56	07:40 17:06	07:20 16:35	08:12 (LZ16) 16:39
30	05:55 20:36	06:29 19:50	07:05 18:54	07:42 17:04	07:21 16:34	08:13 (LZ16) 16:40
31	05:56 20:35	06:31 19:49	07:06 17:03	07:43 17:03	08:15 (LZ16) 08:27 (LZ16)	07:43 16:41
Potential sun hours	468	434	376	342	291	278
Total, worst case				292	982	137
Sun reduction				0.47	0.36	0.26
Oper. time red.				1.00	1.00	1.00
Wind dir. red.				0.63	0.67	0.67
Total reduction				0.30	0.24	0.18
Total, real				87	238	24

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)





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_07 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -65.3° Slope: 90.0° (38)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January		February		March		April		May		June		July		August		September		October		November		December	
1	07:44		07:28		08:18 (LZ16)	06:48	07:22 (LZ17)	06:53	06:03	05:31	05:31	05:57	06:32	07:06					06:44		07:47 (LZ16)	07:22		
	16:42		17:19	33	08:51 (LZ16)	17:57	22 07:44 (LZ17)	19:35	20:11	20:44	20:56	20:34	19:47	18:52					17:01	35	08:22 (LZ16)	16:34		
2	07:44		07:27		08:18 (LZ16)	06:46	07:21 (LZ17)	06:51	06:02	05:30	05:31	05:58	06:33	07:07					06:46		07:46 (LZ16)	07:24		
	16:43		17:20	34	08:52 (LZ16)	17:58	22 07:43 (LZ17)	19:36	20:12	20:45	20:55	20:33	19:45	18:50					17:00	36	08:22 (LZ16)	16:33		
3	07:44		07:25		08:17 (LZ16)	06:45	07:21 (LZ17)	06:49	06:00	05:30	05:32	05:59	06:34	07:08					06:47		07:47 (LZ16)	07:25		
	16:44		17:22	34	08:51 (LZ16)	17:59	21 07:42 (LZ17)	19:38	20:13	20:46	20:55	20:32	19:43	18:49					16:59	36	08:23 (LZ16)	16:33		
4	07:44		07:24		08:17 (LZ16)	06:43	07:24 (LZ17)	06:48	05:59	05:29	05:33	06:00	06:35	07:09					06:48		07:47 (LZ16)	07:26		
	16:45		17:23	35	08:52 (LZ16)	18:01	20 07:42 (LZ17)	19:39	20:15	20:46	20:55	20:30	19:42	18:47					16:57	35	08:22 (LZ16)	16:33		
5	07:44		07:23		08:17 (LZ16)	06:41	07:23 (LZ17)	06:46	05:57	05:29	05:33	06:01	06:36	07:11					06:50		07:47 (LZ16)	07:27		
	16:46		17:24	36	08:53 (LZ16)	18:02	18 07:41 (LZ17)	19:40	20:16	20:47	20:55	20:29	19:40	18:45					16:56	36	08:23 (LZ16)	16:33		
6	07:44		07:22		08:17 (LZ16)	06:40	07:24 (LZ17)	06:44	05:56	05:29	05:33	06:02	06:37	07:12				08:04 (LZ17)	06:51		07:47 (LZ16)	07:28		
	16:47		17:26	36	08:53 (LZ16)	18:03	15 07:39 (LZ17)	19:41	20:17	20:48	20:54	20:28	19:38	18:43	7			08:11 (LZ17)	16:55	36	08:23 (LZ16)	16:32		
7	07:44		07:21		08:17 (LZ16)	06:38	07:25 (LZ17)	06:42	05:55	05:28	05:34	06:04	06:38	07:13				08:00 (LZ17)	06:52		07:48 (LZ16)	07:29		
	16:48		17:27	36	08:53 (LZ16)	18:04	11 07:36 (LZ17)	19:42	20:18	20:48	20:54	20:26	19:36	18:42	14			08:14 (LZ17)	16:54	35	08:23 (LZ16)	16:32		
8	07:43		07:19		08:17 (LZ16)	06:36		06:40	05:53	05:28	05:35	06:05	06:40	07:14				07:58 (LZ17)	06:53		07:48 (LZ16)	07:30		
	16:49		17:29	36	08:53 (LZ16)	18:06		19:44	20:19	20:49	20:54	20:25	19:34	18:40				07:55 (LZ17)	16:52	34	08:22 (LZ16)	16:32		
9	07:43		07:18		08:18 (LZ16)	06:35		06:39	05:54	05:29	05:36	06:06	06:41	07:15				07:58 (LZ17)	16:55		07:48 (LZ16)	07:31		
	16:50		17:30	35	08:53 (LZ16)	18:07		19:45	20:20	20:50	20:53	20:24	19:33	18:38	18			08:16 (LZ17)	16:51	34	08:22 (LZ16)	16:32		
10	07:43		07:17		08:17 (LZ16)	06:33		06:37	05:51	05:27	05:36	06:07	06:42	07:17				07:56 (LZ17)	16:56		07:49 (LZ16)	07:32		
	16:51		17:31	35	08:52 (LZ16)	18:08		19:46	20:22	20:50	20:53	20:22	19:31	18:36	21			08:17 (LZ17)	16:50	33	08:22 (LZ16)	16:32		
11	07:43		07:15		08:18 (LZ16)	06:31		06:35	05:50	05:27	05:37	06:08	06:43	07:18				07:55 (LZ17)	16:57		07:50 (LZ16)	07:33		
	16:52		17:33	34	08:52 (LZ16)	18:10		19:47	20:23	20:51	20:52	20:21	19:29	18:35	22			08:17 (LZ17)	16:49	31	08:21 (LZ16)	16:32		
12	07:42		07:14		08:19 (LZ16)	06:29		06:33	05:49	05:27	05:38	06:09	06:44	07:19				07:55 (LZ17)	16:49		07:51 (LZ16)	07:33		
	16:53		17:34	33	08:52 (LZ16)	18:11		19:48	20:24	20:52	20:52	20:19	19:27	18:33	21			08:16 (LZ17)	16:58	30	08:21 (LZ16)	16:32		
13	07:42		07:13		08:19 (LZ16)	06:27		06:32	05:47	05:27	05:39	06:10	06:45	07:20				07:55 (LZ17)	16:47		07:52 (LZ16)	07:34		
	16:54		17:35	32	08:51 (LZ16)	18:12		19:50	20:25	20:52	20:51	20:18	19:25	18:31	22			08:17 (LZ17)	16:50	28	08:20 (LZ16)	16:32		
14	07:41		07:11		08:20 (LZ16)	06:25		06:30	05:46	05:26	05:39	06:11	06:46	07:21				07:55 (LZ17)	16:51		07:53 (LZ16)	07:35		
	16:56		17:37	31	08:51 (LZ16)	18:13		19:51	20:26	20:53	20:51	20:16	19:24	18:29	21			08:16 (LZ17)	16:46	26	08:19 (LZ16)	16:32		
15	07:41		07:10		08:21 (LZ16)	06:24		06:28	05:45	05:27	05:40	06:12	06:47	07:23				07:54 (LZ17)	16:43		07:55 (LZ16)	07:36		
	16:57		17:38	28	08:49 (LZ16)	18:15		19:52	20:27	20:53	20:50	20:15	19:22	18:28	22			08:16 (LZ17)	16:45	23	08:18 (LZ16)	16:32		
16	07:41		07:08		08:22 (LZ16)	06:22		06:27	05:44	05:27	05:41	06:14	06:49	07:24				07:55 (LZ17)	16:44		07:56 (LZ16)	07:37		
	16:58		17:40	26	08:48 (LZ16)	18:16		19:53	20:28	20:53	20:49	20:13	19:20	18:26	19			08:14 (LZ17)	16:44	21	08:17 (LZ16)	16:33		
17	07:40		07:07		08:23 (LZ16)	06:20		06:25	05:43	05:27	05:42	06:15	06:50	07:25				07:56 (LZ17)	16:45		07:58 (LZ16)	07:37		
	16:59		17:41	23	08:46 (LZ16)	18:17		19:54	20:29	20:54	20:49	20:12	19:18	18:24	18			08:14 (LZ17)	16:43	18	08:16 (LZ16)	16:33		
18	07:39		07:05		08:25 (LZ16)	06:18		06:23	05:42	05:27	05:43	06:16	06:51	07:26				07:57 (LZ17)	16:47		08:00 (LZ16)	07:38		
	17:00		17:42	20	08:45 (LZ16)	18:18		19:56	20:30	20:54	20:48	20:10	19:16	18:23	15			08:12 (LZ17)	16:42		08:14 (LZ16)	07:39		
19	07:39		07:04		08:28 (LZ16)	06:16		06:22	05:41	05:27	05:44	06:17	06:52	07:28				07:58 (LZ17)	16:44		08:03 (LZ16)	07:39		
	17:02		17:44	14	08:42 (LZ16)	18:19		19:57	20:32	20:54	20:47	20:09	19:14	18:21	12			08:10 (LZ17)	16:41	7	08:10 (LZ16)	16:34		
20	07:38		07:02		08:34 (LZ16)	06:15		06:20	05:40	05:27	05:45	06:18	06:53	07:29				08:02 (LZ17)	16:40			07:39		
	17:03		17:45	2	08:36 (LZ16)	18:21		19:58	20:33	20:55	20:46	20:07	19:12	18:19	5			08:07 (LZ17)	16:39			16:34		
21	07:37		07:01			06:13		06:18	05:39	05:27	05:46	06:19	06:54	07:30					16:40			07:40		
	17:04		17:46			18:22		19:59	20:34	20:55	20:45	20:06	19:11	18:18					16:40			16:34		
22	07:37		06:59		07:29 (LZ17)	06:11		06:17	05:38	05:27	05:47	06:20	06:55	07:31				09:01 (LZ16)	16:37			07:40		
	17:06		17:48	8	07:37 (LZ17)	18:23		20:00	20:35	20:55	20:45	20:04	19:09	18:16	8			09:09 (LZ16)	16:39			16:35		
23	07:36		06:58		07:27 (LZ17)	06:09		06:15	05:37	05:28	05:48	06:22	06:57	07:33				08:57 (LZ16)	16:13			07:41		
	17:05	7	08:29 (LZ16)		07:49	13		20:02	20:36	20:55	20:44	20:02	19:07	18:14	16			09:13 (LZ16)	16:16			16:35		
24	07:35		06:56		07:25 (LZ17)	06:07		06:14	05:36	05:28	05:49	06:23	06:58	07:34				08:54 (LZ16)	16:14			07:41		
	17:08	14	08:40 (LZ16)	17:50	16	07:41 (LZ17)	18:26	20:03	20:37	20:56	20:43	20:01	19:05	18:13	21			09:15 (LZ16)	16:37			16:36		
25	07:34		08:24 (LZ16)	06:55		07:24 (LZ17)	06:06	20:12	05:36	05:28	05:50	06:24	06:59	06:35				07:52 (LZ16)	16:15			07:42		
	17:09	18	08:42 (LZ16)	17:52	19	07:43 (LZ17)	18:27	20:04	20:38	20:56	20:42	19:59	19:03	17:12	24			08:16 (LZ16)	16:37			16:37		
26	07:33		08:23 (LZ16)	06:53		07:23 (LZ17)	06:04	20:10	05:35	05:28	05:51	06:25	07:00	06:36				07:52 (LZ16)	16:17			07:42		
	17:11	21	08:44 (LZ16)	17:53	20	07:43 (LZ17)	18:28	20:05	20:39	20:56	20:41	19:57	19:01	17:10	26			08:18 (LZ16)	16:36			16:37		
27	07:33		08:22 (LZ16)	06:51		07:22 (LZ17)	06:02	20:09	05:34	05:29	05:52	06:26	07:01	06:38				07:50 (LZ16)	16:18			07:42		
	17:12	23	08:45 (LZ16)	17:54	21	07:43 (LZ17)	18:29	20:06	20:40															



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_08 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 79.3° Slope: 90.0° (39)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March		April	May	June	July	August	September		October		November	December
1	07:44	07:28	06:48		06:53	06:03	05:31	05:31	05:57	06:32		07:06	18:06 (LZ07)	06:44	07:23
	16:42	17:19	17:57		19:35	20:11	20:44	20:56	20:34	19:47		18:52	19 18:25 (LZ07)	17:01	16:34
2	07:44	07:27	06:46		06:51	06:02	05:30	05:31	05:58	06:33		07:07	18:06 (LZ07)	06:46	07:24
	16:43	17:20	17:58		19:36	20:12	20:45	20:55	20:33	19:45		18:51	18 18:24 (LZ07)	17:00	16:33
3	07:44	07:25	06:45		06:49	06:00	05:30	05:32	05:59	06:34		07:08	18:07 (LZ07)	06:47	07:25
	16:44	17:22	17:59		19:38	20:14	20:46	20:55	20:32	19:44		18:49	15 18:22 (LZ07)	16:59	16:33
4	07:44	07:24	06:43		06:48	05:59	05:29	05:32	06:00	06:35		07:09	18:10 (LZ07)	06:48	07:26
	16:45	17:23	18:01		19:39	20:15	20:46	20:55	20:30	19:42		18:47	10 18:20 (LZ07)	16:57	16:33
5	07:44	07:23	06:41		06:46	05:57	05:29	05:33	06:01	06:36		07:11		06:50	07:27
	16:46	17:25	18:02		19:40	20:16	20:47	20:55	20:29	19:40		18:45		16:56	16:33
6	07:44	07:22	06:40		06:44	05:56	05:29	05:33	06:02	06:37		07:12		06:51	07:28
	16:47	17:26	18:03		19:41	20:17	20:48	20:54	20:28	19:38		18:43		16:55	16:32
7	07:44	07:21	06:38		06:42	05:55	05:28	05:34	06:04	06:39		07:13		06:52	07:29
	16:48	17:27	18:05		19:42	20:18	20:49	20:54	20:26	19:36		18:42		16:54	16:32
8	07:43	07:19	06:36		06:40	05:54	05:28	05:35	06:05	06:40		07:14		06:54	07:30
	16:49	17:29	18:06		19:44	20:19	20:49	20:54	20:25	19:35		18:40		16:52	16:32
9	07:43	07:18	06:34		17:34 (LZ07)	06:39	05:52	05:28	05:36	06:41		07:15		06:55	07:31
	16:50	17:30	18:07	6	17:40 (LZ07)	19:45	20:21	20:50	20:53	20:24	19:33	18:38		16:51	16:32
10	07:43	07:17	06:33		17:30 (LZ07)	06:37	05:51	05:27	05:36	06:42	06:42	07:17		06:56	07:32
	16:51	17:31	18:08	13	17:43 (LZ07)	19:46	20:22	20:50	20:53	20:22	19:31	18:36		16:50	16:32
11	07:43	07:16	06:31		17:28 (LZ07)	06:35	05:50	05:27	05:37	06:43	06:43	07:18		06:57	07:33
	16:52	17:33	18:10	16	17:44 (LZ07)	19:47	20:23	20:51	20:52	20:21	19:29	18:35		16:49	16:32
12	07:42	07:14	06:29		17:27 (LZ07)	06:34	05:49	05:27	05:38	06:44	06:44	07:19		06:59	07:34
	16:53	17:34	18:11	19	17:46 (LZ07)	19:48	20:24	20:52	20:52	20:19	19:27	18:33		16:48	16:32
13	07:42	07:13	06:27		17:26 (LZ07)	06:32	05:47	05:27	05:39	06:10	06:45	07:20		07:00	07:34
	16:54	17:35	18:12	20	17:46 (LZ07)	19:50	20:25	20:52	20:51	20:18	19:25	18:31		16:47	16:32
14	07:42	07:11	06:25		17:25 (LZ07)	06:30	05:46	05:27	05:39	06:11	06:46	07:21		07:01	07:35
	16:56	17:37	18:13	22	17:47 (LZ07)	19:51	20:26	20:53	20:51	20:17	19:24	18:29		16:46	16:32
15	07:41	07:10	06:24		17:24 (LZ07)	06:28	05:45	05:27	05:40	06:13	06:48	07:23		07:03	07:36
	16:57	17:38	18:15	22	17:46 (LZ07)	19:52	20:27	20:53	20:50	20:15	19:22	18:28		16:45	16:32
16	07:41	07:08	06:22		17:24 (LZ07)	06:27	05:44	05:27	05:41	06:14	06:49	07:24		07:04	07:37
	16:58	17:40	18:16	22	17:46 (LZ07)	19:53	20:28	20:53	20:49	20:14	19:20	18:26		16:44	16:33
17	07:40	07:07	06:20		17:24 (LZ07)	06:25	05:43	05:27	05:42	06:15	06:50	07:25		07:05	07:37
	16:59	17:41	18:17	21	17:45 (LZ07)	19:54	20:29	20:54	20:49	20:12	19:18	18:24		16:43	16:33
18	07:39	07:06	06:18		17:25 (LZ07)	06:23	05:42	05:27	05:43	06:16	06:51	07:26		07:07	07:38
	17:00	17:42	18:18	20	17:45 (LZ07)	19:56	20:31	20:54	20:48	20:10	19:16	18:23		16:42	16:33
19	07:39	07:04	06:16		17:25 (LZ07)	06:22	05:41	05:27	05:44	06:17	06:52	07:28		07:08	07:39
	17:02	17:44	18:19	19	17:44 (LZ07)	19:57	20:32	20:55	20:47	20:09	19:14	18:21		16:41	16:34
20	07:38	07:03	06:15		17:25 (LZ07)	06:20	05:40	05:27	05:45	06:18	06:53	07:29		07:09	07:39
	17:03	17:45	18:21	18	17:43 (LZ07)	19:58	20:33	20:55	20:46	20:07	19:13	18:19		16:40	16:34
21	07:38	07:01	06:13		17:27 (LZ07)	06:18	05:39	05:27	05:46	06:19	06:54	07:30		07:10	07:40
	17:04	17:46	18:22	14	17:41 (LZ07)	19:59	20:34	20:55	20:45	20:06	19:11	18:18		16:40	16:34
22	07:37	06:59	06:11		17:28 (LZ07)	06:17	05:38	05:27	05:47	06:20	06:55	07:31		07:12	07:40
	17:06	17:48	18:23	10	17:38 (LZ07)	20:00	20:35	20:55	20:45	20:04	19:09	18:16		16:39	16:35
23	07:36	06:58	06:09		17:28 (LZ07)	06:15	05:37	05:28	05:48	06:22	06:57	07:33		07:13	07:41
	17:07	17:49	18:24		20:02	20:36	20:55	20:44	20:02	19:07	18:15	18:15		16:38	16:35
24	07:35	06:56	06:07		17:28 (LZ07)	06:14	05:36	05:28	05:49	06:23	06:58	07:34		07:14	07:41
	17:08	17:50	18:26		20:03	20:37	20:56	20:43	20:01	19:05	18:13	18:13		16:37	16:36
25	07:34	06:55	06:06		17:28 (LZ07)	06:12	05:36	05:28	05:50	06:24	06:59	07:35		07:15	07:42
	17:10	17:52	18:27		20:04	20:38	20:56	20:42	19:59	19:03	18:11	18:12		16:37	16:37
26	07:34	06:53	06:04		17:28 (LZ07)	06:11	05:35	05:28	05:51	06:25	07:00	07:37		07:17	07:42
	17:11	17:53	18:28		20:05	20:39	20:56	20:41	19:57	19:01	18:10	18:10		16:36	16:37
27	07:33	06:51	06:02		17:28 (LZ07)	06:09	05:34	05:29	05:52	06:26	07:01	07:38		07:18	07:43
	17:12	17:54	18:29		20:06	20:40	20:56	20:40	19:56	19:00	18:10	18:10		16:36	16:38
28	07:32	06:50	06:00		17:28 (LZ07)	06:07	05:33	05:29	05:53	06:27	07:02	07:39		07:19	07:43
	17:14	17:56	18:30		20:08	20:41	20:56	20:39	19:54	18:58	18:10	18:10		16:35	16:39
29	07:31		06:58		17:28 (LZ07)	06:06	05:33	05:30	05:54	06:28	07:04	07:40		07:20	07:43
	17:15		19:32		20:09	20:41	20:56	20:38	19:52	18:56	18:10	18:10		16:35	16:39
30	07:30		06:57		17:28 (LZ07)	06:05	05:32	05:30	05:55	06:29	07:05	07:41		07:21	07:43
	17:16		19:33		20:10	20:42	20:56	20:36	19:51	18:54	18:10	18:10		16:34	16:40
31	07:29		06:55			05:31		05:56	06:31			06:43		07:44	
	17:18		19:34			20:43		20:35	19:49			17:03		16:41	
Potential sun hours	289	293	369		402	456	462	468	434	376		342		291	278
Total, worst case											183	62			10
Sun reduction											0.59	0.47			0.26
Oper. time red.											1.00	1.00			1.00
Wind dir. red.											0.59	0.59			0.61
Total reduction											0.35	0.28			0.16
Total, real											64	17			2

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_09 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 77.7° Slope: 90.0° (40)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January		February		March		April		May		June		July		August		September		October		November		December	
1	07:44		15:26 (LZ15)	07:28	06:48		06:53	06:03	05:31	05:31	05:57	06:32			07:06	06:44			07:23			15:17 (LZ15)		
	16:42	25	15:51 (LZ15)	17:19	17:57		19:35	20:11	20:44	20:56	20:34	19:47			18:52	17:01			16:34	16		15:33 (LZ15)		
2	07:44		15:27 (LZ15)	07:27	06:46		06:51	06:02	05:30	05:31	05:58	06:33			07:07	06:46			07:24			15:17 (LZ15)		
	16:43	24	15:51 (LZ15)	17:20	17:58		19:36	20:12	20:45	20:55	20:33	19:45			18:51	17:00			16:33	17		15:34 (LZ15)		
3	07:44		15:28 (LZ15)	07:25	06:45		06:49	06:00	05:30	05:32	05:59	06:34			07:08	06:47			07:25			15:16 (LZ15)		
	16:44	24	15:52 (LZ15)	17:22	17:59		19:38	20:14	20:46	20:55	20:32	19:44			18:49	16:59			16:33	19		15:35 (LZ15)		
4	07:44		15:28 (LZ15)	07:24	06:43		06:48	05:59	05:29	05:32	06:00	06:35			07:09	06:48			07:26			15:16 (LZ15)		
	16:45	24	15:52 (LZ15)	17:23	18:01		19:39	20:15	20:46	20:55	20:30	19:42			18:47	16:57			16:33	20		15:36 (LZ15)		
5	07:44		15:28 (LZ15)	07:23	06:41		06:46	05:57	05:29	05:33	06:01	06:36			07:11	06:50			07:27			15:16 (LZ15)		
	16:46	23	15:51 (LZ15)	17:25	18:02		19:40	20:16	20:47	20:55	20:29	19:40			18:45	16:56			16:33	21		15:37 (LZ15)		
6	07:44		15:29 (LZ15)	07:22	06:40		06:44	05:56	05:29	05:33	06:02	06:37			07:12	06:51			07:28			15:16 (LZ15)		
	16:47	22	15:51 (LZ15)	17:26	18:03		19:41	20:17	20:48	20:54	20:28	19:38			18:43	16:55			16:32	21		15:37 (LZ15)		
7	07:44		15:31 (LZ15)	07:21	06:38		06:42	05:55	05:28	05:34	06:04	06:39			07:13	06:52			07:29			15:15 (LZ15)		
	16:48	21	15:52 (LZ15)	17:27	18:05		19:42	20:18	20:49	20:54	20:26	19:36			18:42	16:54			16:32	23		15:38 (LZ15)		
8	07:43		15:32 (LZ15)	07:19	06:36		06:40	05:54	05:28	05:35	06:05	06:40			07:14	06:54			07:30			15:16 (LZ15)		
	16:49	20	15:52 (LZ15)	17:29	18:06		19:44	20:19	20:49	20:54	20:25	19:35			18:40	16:52			16:32	23		15:39 (LZ15)		
9	07:43		15:32 (LZ15)	07:18	06:34		06:39	05:52	05:28	05:36	06:06	06:41			07:15	06:55			07:31			15:16 (LZ15)		
	16:50	19	15:51 (LZ15)	17:30	18:07		19:45	20:21	20:50	20:53	20:24	19:33			18:38	16:51			16:32	24		15:40 (LZ15)		
10	07:43		15:34 (LZ15)	07:17	06:33		06:37	05:51	05:27	05:36	06:07	06:42			07:17	06:56			07:32			15:16 (LZ15)		
	16:51	17	15:51 (LZ15)	17:31	18:08		19:46	20:22	20:50	20:53	20:22	19:31			18:36	16:50			16:32	24		15:40 (LZ15)		
11	07:43		15:35 (LZ15)	07:16	06:31		06:35	05:50	05:27	05:37	06:08	06:43			07:18	06:57			07:33			15:16 (LZ15)		
	16:52	16	15:51 (LZ15)	17:33	18:10		19:47	20:23	20:51	20:52	20:21	19:29			18:35	16:49			16:32	25		15:41 (LZ15)		
12	07:42		15:36 (LZ15)	07:14	06:29		06:34	05:49	05:27	05:38	06:09	06:44			07:19	06:59			07:34			15:17 (LZ15)		
	16:53	13	15:49 (LZ15)	17:34	18:11		19:48	20:24	20:52	20:52	20:19	19:27			18:33	16:48			16:32	25		15:42 (LZ15)		
13	07:42		15:39 (LZ15)	07:13	06:27		06:32	05:47	05:27	05:39	06:10	06:45			07:20	07:00			07:34			15:17 (LZ15)		
	16:54	10	15:49 (LZ15)	17:35	18:12		19:50	20:25	20:52	20:51	20:18	19:25			18:31	16:47			16:32	26		15:43 (LZ15)		
14	07:42		15:42 (LZ15)	07:11	06:25		06:30	05:46	05:27	05:39	06:11	06:46			07:21	07:01			07:35			15:17 (LZ15)		
	16:56	4	15:46 (LZ15)	17:37	18:13		19:51	20:26	20:53	20:51	20:17	19:24			18:29	16:46			16:32	25		15:42 (LZ15)		
15	07:41			07:10	06:24			17:42 (LZ07)	06:28	05:45	05:27	05:40	06:13	06:48		18:28 (LZ07)	07:23	07:03	07:36			15:17 (LZ15)		
	16:57			17:38	18:15	6		17:48 (LZ07)	19:52	20:27	20:53	20:50	20:15	19:22	7	18:35 (LZ07)	18:28	16:45	16:32	26		15:43 (LZ15)		
16	07:41			07:08	06:22			17:39 (LZ07)	06:27	05:44	05:27	05:41	06:14	06:49		18:24 (LZ07)	07:24	07:04	07:37			15:18 (LZ15)		
	16:58			17:40	18:16	12		17:51 (LZ07)	19:53	20:28	20:53	20:49	20:14	19:20	13	18:37 (LZ07)	18:26	16:44	16:33	26		15:44 (LZ15)		
17	07:40			07:07	06:20			17:36 (LZ07)	06:25	05:43	05:27	05:42	06:15	06:50		18:22 (LZ07)	07:25	07:05	07:37			15:19 (LZ15)		
	16:59			17:41	18:17	16		17:52 (LZ07)	19:54	20:29	20:54	20:49	20:12	19:18	17	18:39 (LZ07)	18:24	16:43	16:33	26		15:45 (LZ15)		
18	07:39			07:06	06:18			17:36 (LZ07)	06:23	05:42	05:27	05:43	06:16	06:51		18:21 (LZ07)	07:26	07:07	07:38			15:18 (LZ15)		
	17:00			17:42	18:18	18		17:54 (LZ07)	19:56	20:31	20:54	20:48	20:10	19:16	18	18:39 (LZ07)	18:23	16:42	16:33	27		15:45 (LZ15)		
19	07:39			07:04	06:16			17:34 (LZ07)	06:22	05:41	05:27	05:44	06:17	06:52		18:19 (LZ07)	07:28	07:08	07:39			15:19 (LZ15)		
	17:02			17:44	18:19	20		17:54 (LZ07)	19:57	20:32	20:55	20:47	20:09	19:14	20	18:39 (LZ07)	18:21	16:41	16:34	27		15:46 (LZ15)		
20	07:38			07:03	06:15			17:33 (LZ07)	06:20	05:40	05:27	05:45	06:18	06:53		18:18 (LZ07)	07:29	07:09	07:39			15:19 (LZ15)		
	17:03			17:45	18:21	22		17:55 (LZ07)	19:58	20:33	20:55	20:46	20:07	19:13	21	18:39 (LZ07)	18:19	16:40	16:34	27		15:46 (LZ15)		
21	07:38			07:01	06:13			17:33 (LZ07)	06:18	05:39	05:27	05:46	06:19	06:54		18:19 (LZ07)	07:30	07:10	07:40			15:20 (LZ15)		
	17:04			17:46	18:22	21		17:54 (LZ07)	19:59	20:34	20:55	20:45	20:06	19:11	21	18:40 (LZ07)	18:18	16:40	16:34	27		15:47 (LZ15)		
22	07:37			06:59	06:11			17:32 (LZ07)	06:17	05:38	05:27	05:47	06:20	06:55		18:18 (LZ07)	07:31	07:12	07:40			15:20 (LZ15)		
	17:06			17:48	18:23	22		17:54 (LZ07)	20:00	20:35	20:55	20:45	20:04	19:09	22	18:40 (LZ07)	18:16	16:39	16:35	27		15:47 (LZ15)		
23	07:36			06:58	06:09			17:33 (LZ07)	06:15	05:37	05:28	05:48	06:22	06:57		18:18 (LZ07)	07:33	07:13	07:41			15:21 (LZ15)		
	17:07			17:49	18:24	21		17:54 (LZ07)	20:02	20:36	20:55	20:44	20:02	19:07	21	18:39 (LZ07)	18:15	16:38	16:35	27		15:48 (LZ15)		
24	07:35			06:56	06:07			17:33 (LZ07)	06:14	05:36	05:28	05:49	06:23	06:58		18:18 (LZ07)	07:34	07:14	07:41			15:21 (LZ15)		
	17:08			17:50	18:26	20		17:53 (LZ07)	20:03	20:37	20:56	20:43	20:01	19:05	20	18:38 (LZ07)	18:13	16:37	16:36	27		15:48 (LZ15)		
25	07:34			06:55	06:06			17:33 (LZ07)	06:12	05:36	05:28	05:50	06:24	06:59		18:18 (LZ07)	06:35	07:15	07:42			15:22 (LZ15)		
	17:10			17:52	18:27	19		17:52 (LZ07)	20:04	20:38	20:56	20:42	19:59	19:03	19	18:37 (LZ07)	17:12	16:37	16:37	27		15:49 (LZ15)		
26	07:34			06:53	06:04			17:34 (LZ07)	06:11	05:35	05:28	05:51	06:25	07:00		18:18 (LZ07)	06:37	07:17	07:42			15:23 (LZ15)		
	17:11			17:53	18:28	17		17:51 (LZ07)	20:05	20:39	20:56	20:41	19:57	19:01	17	18:35 (LZ07)	17:10	16:36	16:37	26		15:49 (LZ15)		
27	07:33			06:51	06:02			17:35 (LZ07)	06:09	05:34	05:29	05:52	06:26	07:01		18:19 (LZ07)	06:38	07:18	07:43			15:23 (LZ15)		
	17:12			17:54	18:29	14		17:49 (LZ07)	20:06	20:40	20:56	20:40	19:56	19:00	14	18:33 (LZ07)	17:09	16:36	16:38	26		15:49 (LZ15)		
28	07:32			06:50	06:00			17:37 (LZ07)	06:07	05:33	05:29	05:53												



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_10 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 83.7° Slope: 90.0° (41)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January			February			March			April			May			June		
1	07:44		15:27 (LZ15)	07:28	06:48				06:53		18:41 (LZ07)	06:03		05:31			
	16:42	29	15:56 (LZ15)	17:19	17:57				19:35		18:49 (LZ07)	20:11		20:44			
2	07:44		15:28 (LZ15)	07:27	06:46				06:51			06:02		05:30			
	16:43	28	15:56 (LZ15)	17:20	17:58				19:36			20:12		20:45			
3	07:44		15:28 (LZ15)	07:25	06:45				06:49			06:00		05:30			
	16:44	28	15:56 (LZ15)	17:22	17:59				19:38			20:14		20:46			
4	07:44		15:29 (LZ15)	07:24	06:43				06:48			05:59		05:29			
	16:45	28	15:57 (LZ15)	17:23	18:01				19:39			20:15		20:46			
5	07:44		15:29 (LZ15)	07:23	06:41				06:46			05:57		05:29			
	16:46	27	15:56 (LZ15)	17:25	18:02				19:40			20:16		20:47			
6	07:44		15:29 (LZ15)	07:22	06:40				06:44			05:56		05:29			
	16:47	28	15:57 (LZ15)	17:26	18:03				19:41			20:17		20:48			
7	07:44		15:30 (LZ15)	07:21	06:38				06:42			05:55		05:28			
	16:48	27	15:57 (LZ15)	17:27	18:05				19:42			20:18		20:49			
8	07:43		15:31 (LZ15)	07:19	06:36				06:40			05:54		05:28			
	16:49	27	15:58 (LZ15)	17:29	18:06				19:44			20:19		20:49			
9	07:43		15:31 (LZ15)	07:18	06:34				06:39			05:52		05:28			
	16:50	26	15:57 (LZ15)	17:30	18:07				19:45			20:21		20:50			
10	07:43		15:32 (LZ15)	07:17	06:33				06:37			05:51		05:27			
	16:51	25	15:57 (LZ15)	17:31	18:08				19:46			20:22		20:50			
11	07:43		15:34 (LZ15)	07:16	06:31				06:35			05:50		05:27			
	16:52	24	15:58 (LZ15)	17:33	18:10				19:47			20:23		20:51			
12	07:42		15:34 (LZ15)	07:14	06:29				06:34			05:49		05:27			
	16:53	23	15:57 (LZ15)	17:34	18:11				19:48			20:24		20:52			
13	07:42		15:36 (LZ15)	07:13	06:27				06:32			05:47		05:27			
	16:54	21	15:57 (LZ15)	17:36	18:12				19:50			20:25		20:52			
14	07:42		15:36 (LZ15)	07:11	06:25				06:30			05:46		05:27			
	16:56	21	15:57 (LZ15)	17:37	18:13				19:51			20:26		20:53			
15	07:41		15:38 (LZ15)	07:10	06:24				06:28			05:45		05:27			
	16:57	19	15:57 (LZ15)	17:38	18:15				19:52			20:27		20:53			
16	07:41		15:39 (LZ15)	07:08	06:22				06:27			05:44		05:27			
	16:58	17	15:56 (LZ15)	17:40	18:16				19:53			20:28		20:53			
17	07:40		15:41 (LZ15)	07:07	06:20				06:25			05:43		05:27			
	16:59	14	15:55 (LZ15)	17:41	18:17				19:54			20:29		20:54			
18	07:39		15:43 (LZ15)	07:06	06:18				06:23			05:42		05:27			
	17:00	10	15:53 (LZ15)	17:42	18:18				19:56			20:31		20:54			
19	07:39		15:47 (LZ15)	07:04	06:16			17:45 (LZ07)	06:22			05:41		05:27			
	17:02	3	15:50 (LZ15)	17:44	18:19		9	17:54 (LZ07)	19:57			20:32		20:55			
20	07:38			07:03	06:15			17:42 (LZ07)	06:20			05:40		05:27			
	17:03			17:45	18:21		14	17:56 (LZ07)	19:58			20:33		20:55			
21	07:38			07:01	06:13			17:40 (LZ07)	06:18			05:39		05:27			
	17:04			17:46	18:22		17	17:57 (LZ07)	19:59			20:34		20:55			
22	07:37			06:59	06:11			17:38 (LZ07)	06:17			05:38		05:27			
	17:06			17:48	18:23		20	17:58 (LZ07)	20:00			20:35		20:55			
23	07:36			06:58	06:09			17:38 (LZ07)	06:15			05:37		05:28			
	17:07			17:49	18:24		21	17:59 (LZ07)	20:02			20:36		20:55			
24	07:35			06:56	06:07			17:37 (LZ07)	06:14			05:36		05:28			
	17:08			17:50	18:26		22	17:59 (LZ07)	20:03			20:37		20:56			
25	07:34			06:55	06:06			17:36 (LZ07)	06:12			05:36		05:28			
	17:10			17:52	18:27		23	17:59 (LZ07)	20:04			20:38		20:56			
26	07:34			06:53	06:04			17:36 (LZ07)	06:11			05:35		05:28			
	17:11			17:53	18:28		22	17:58 (LZ07)	20:05			20:39		20:56			
27	07:33			06:51	06:02			17:36 (LZ07)	06:09			05:34		05:29			
	17:12			17:54	18:29		21	17:57 (LZ07)	20:06			20:40		20:56			
28	07:32			06:50	06:00			17:36 (LZ07)	06:07			05:33		05:29			
	17:14			17:56	18:30		20	17:56 (LZ07)	20:08			20:41		20:56			
29	07:31				06:58			18:37 (LZ07)	06:06			05:33		05:30			
	17:15				19:32		19	18:56 (LZ07)	20:09			20:41		20:56			
30	07:30				06:57			18:38 (LZ07)	06:05			05:32		05:30			
	17:16				19:33		17	18:55 (LZ07)	20:10			20:42		20:56			
31	07:29				06:55			18:39 (LZ07)				05:31					
	17:18				19:34		14	18:53 (LZ07)				20:43					
Potential sun hours	289			293	369			402				456		462			
Total, worst case		425			239				8								
Sun reduction		0.28			0.31				0.40								
Oper. time red.		1.00			1.00				1.00								
Wind dir. red.		0.60			0.60				0.60								
Total reduction		0.17			0.18				0.24								
Total, real		72			44				2								

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: Real\_Case\_Operational\_Time Shadow receptor: KrU\_10 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 83.7° Slope: 90.0° (41)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July	August	September	October	November	December
1	05:31 20:56	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	07:23 16:34 24 15:16 (LZ15)
2	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:51	06:46 17:00	07:24 16:33 24 15:16 (LZ15)
3	05:32 20:55	05:59 20:32	06:34 19:44	07:08 18:49	06:47 16:59	07:25 16:33 26 15:15 (LZ15)
4	05:32 20:55	06:00 20:30	06:35 19:42	07:09 18:47	06:48 16:57	07:26 16:33 27 15:15 (LZ15)
5	05:33 20:55	06:01 20:29	06:36 19:40	07:11 18:45	06:50 16:56	07:27 16:33 27 15:15 (LZ15)
6	05:34 20:54	06:02 20:28	06:37 19:38	07:12 18:43	06:51 16:55	07:28 16:32 27 15:16 (LZ15)
7	05:34 20:54	06:04 20:26	06:39 19:36	07:13 18:42	06:52 16:54	07:29 16:32 27 15:16 (LZ15)
8	05:35 20:54	06:05 20:25	06:40 19:35	07:14 18:40	06:54 16:52	07:30 16:32 28 15:16 (LZ15)
9	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	06:55 16:51	07:31 16:32 29 15:16 (LZ15)
10	05:36 20:53	06:07 20:22	06:42 19:31	07:17 18:36	06:56 16:50	07:32 16:32 28 15:17 (LZ15)
11	05:37 20:52	06:08 20:21	06:43 19:29	18:34 (LZ07) 18:42 (LZ07) 18:35	07:18 06:57 16:49	07:33 16:32 29 15:17 (LZ15)
12	05:38 20:52	06:09 20:19	06:44 19:27	18:31 (LZ07) 18:44 (LZ07) 18:33	07:19 16:48 16:48	07:34 16:32 28 15:18 (LZ15)
13	05:39 20:51	06:10 20:18	06:45 19:25	18:29 (LZ07) 18:46 (LZ07) 18:31	07:20 16:47 16:47	07:34 16:32 29 15:18 (LZ15)
14	05:39 20:51	06:11 20:17	06:46 19:24	18:27 (LZ07) 18:46 (LZ07) 18:29	07:21 16:46 16:46	07:35 16:32 29 15:18 (LZ15)
15	05:40 20:50	06:13 20:15	06:48 19:22	18:26 (LZ07) 18:47 (LZ07) 18:28	07:23 16:45 16:45	07:36 16:32 28 15:19 (LZ15)
16	05:41 20:49	06:14 20:14	06:49 19:20	18:25 (LZ07) 18:47 (LZ07) 18:26	07:24 16:44 16:44	07:37 16:33 29 15:19 (LZ15)
17	05:42 20:49	06:15 20:12	06:50 19:18	18:24 (LZ07) 18:46 (LZ07) 18:24	07:25 16:43 16:43	07:37 16:33 29 15:20 (LZ15)
18	05:43 20:48	06:16 20:10	06:51 19:16	18:24 (LZ07) 18:46 (LZ07) 18:23	07:26 16:42 16:42	07:38 16:33 29 15:20 (LZ15)
19	05:44 20:47	06:17 20:09	06:52 19:14	18:23 (LZ07) 18:45 (LZ07) 18:21	07:28 16:41 16:41	07:39 16:34 29 15:21 (LZ15)
20	05:45 20:46	06:18 20:07	06:53 19:13	18:23 (LZ07) 18:44 (LZ07) 18:19	07:29 16:40 16:40	07:39 16:34 29 15:21 (LZ15)
21	05:46 20:45	06:19 20:06	06:54 19:11	18:24 (LZ07) 18:44 (LZ07) 18:18	07:30 16:40 16:40	07:40 16:34 30 15:21 (LZ15)
22	05:47 20:45	06:20 20:04	06:55 19:09	18:25 (LZ07) 18:43 (LZ07) 18:16	07:12 16:39 16:39	07:40 16:35 30 15:21 (LZ15)
23	05:48 20:44	06:22 20:02	06:57 19:07	18:26 (LZ07) 18:41 (LZ07) 18:15	07:13 16:38 16:38	07:41 15:24 (LZ15) 3 15:27 (LZ15) 16:35 29 15:23 (LZ15)
24	05:49 20:43	06:23 20:01	06:58 19:05	18:27 (LZ07) 18:38 (LZ07) 18:13	07:14 16:37 16:37	07:41 15:20 (LZ15) 10 15:30 (LZ15) 16:36 29 15:23 (LZ15)
25	05:50 20:42	06:24 19:59	06:59 19:03	06:35 17:12 16:37	07:15 16:37 16:37	07:42 15:18 (LZ15) 14 15:32 (LZ15) 16:37 29 15:24 (LZ15)
26	05:51 20:41	06:25 19:57	07:00 19:01	06:37 17:10 16:36	07:17 16:36 16:36	07:42 15:18 (LZ15) 17 15:35 (LZ15) 16:37 29 15:24 (LZ15)
27	05:52 20:40	06:26 19:56	07:01 19:00	06:38 17:09 16:36	07:18 16:36 16:36	07:43 15:17 (LZ15) 19 15:36 (LZ15) 16:38 29 15:24 (LZ15)
28	05:53 20:39	06:27 19:54	07:02 18:58	06:39 17:07 16:35	07:19 16:35 16:35	07:43 15:16 (LZ15) 21 15:37 (LZ15) 16:39 29 15:24 (LZ15)
29	05:54 20:38	06:28 19:52	07:04 18:56	06:40 17:06 16:35	07:20 16:35 16:35	07:43 15:16 (LZ15) 21 15:37 (LZ15) 16:39 29 15:26 (LZ15)
30	05:55 20:36	06:29 19:51	07:05 18:54	06:42 17:04 16:34	07:21 16:34 16:34	07:43 15:16 (LZ15) 23 15:39 (LZ15) 16:40 29 15:26 (LZ15)
31	05:56 20:35	06:31 19:49		06:43 17:03		07:44 16:41 28 15:27 (LZ15)
Potential sun hours	468	434	376	342	291	278
Total, worst case			251		128	875
Sun reduction			0.59		0.36	0.26
Oper. time red.			1.00		1.00	1.00
Wind dir. red.			0.60		0.60	0.60
Total reduction			0.36		0.22	0.16
Total, real			89		28	139

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)
	Minutes with flicker		







## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_11 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 87.5° Slope: 90.0° (42)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January			February			March			April			May			June		
1	07:44		15:38 (LZ15)	07:28	06:48				06:53		18:43 (LZ07)	06:03		05:31			
	16:42	28	16:06 (LZ15)	17:19	17:57				19:35	22	19:05 (LZ07)	20:11		20:44			
2	07:44		15:39 (LZ15)	07:27	06:46				06:51		18:43 (LZ07)	06:02		05:30			
	16:43	27	16:06 (LZ15)	17:20	17:58				19:36	21	19:04 (LZ07)	20:12		20:45			
3	07:44		15:39 (LZ15)	07:25	06:45				06:49		18:44 (LZ07)	06:00		05:30			
	16:44	28	16:07 (LZ15)	17:22	17:59				19:38	20	19:04 (LZ07)	20:14		20:46			
4	07:44		15:39 (LZ15)	07:24	06:43				06:48		18:44 (LZ07)	05:59		05:29			
	16:45	29	16:08 (LZ15)	17:23	18:01				19:39	18	19:02 (LZ07)	20:15		20:46			
5	07:44		15:39 (LZ15)	07:23	06:41				06:46		18:45 (LZ07)	05:57		05:29			
	16:46	29	16:08 (LZ15)	17:25	18:02				19:40	15	19:00 (LZ07)	20:16		20:47			
6	07:44		15:39 (LZ15)	07:22	06:40				06:44		18:46 (LZ07)	05:56		05:29			
	16:47	29	16:08 (LZ15)	17:26	18:03				19:41	12	18:58 (LZ07)	20:17		20:48			
7	07:44		15:40 (LZ15)	07:21	06:38				06:42		18:50 (LZ07)	05:55		05:28			
	16:48	29	16:09 (LZ15)	17:27	18:05				19:42	4	18:54 (LZ07)	20:18		20:49			
8	07:43		15:40 (LZ15)	07:19	06:36				06:40			05:54		05:28			
	16:49	30	16:10 (LZ15)	17:29	18:06				19:44			20:19		20:49			
9	07:43		15:40 (LZ15)	07:18	06:34				06:39			05:52		05:28			
	16:50	30	16:10 (LZ15)	17:30	18:07				19:45			20:21		20:50			
10	07:43		15:41 (LZ15)	07:17	06:33				06:37			05:51		05:27			
	16:51	30	16:11 (LZ15)	17:31	18:08				19:46			20:22		20:50			
11	07:43		15:42 (LZ15)	07:16	06:31				06:35			05:50		05:27			
	16:52	29	16:11 (LZ15)	17:33	18:10				19:47			20:23		20:51			
12	07:42		15:41 (LZ15)	07:14	06:29				06:34			05:49		05:27			
	16:53	30	16:11 (LZ15)	17:34	18:11				19:48			20:24		20:52			
13	07:42		15:42 (LZ15)	07:13	06:27				06:32			05:47		05:27			
	16:54	30	16:12 (LZ15)	17:36	18:12				19:50			20:25		20:52			
14	07:42		15:42 (LZ15)	07:11	06:25				06:30			05:46		05:27			
	16:56	30	16:12 (LZ15)	17:37	18:13				19:51			20:26		20:53			
15	07:41		15:43 (LZ15)	07:10	06:24				06:28			05:45		05:27			
	16:57	30	16:13 (LZ15)	17:38	18:15				19:52			20:27		20:53			
16	07:41		15:43 (LZ15)	07:08	06:22				06:27			05:44		05:27			
	16:58	29	16:12 (LZ15)	17:40	18:16				19:53			20:28		20:53			
17	07:40		15:45 (LZ15)	07:07	06:20				06:25			05:43		05:27			
	16:59	28	16:13 (LZ15)	17:41	18:17				19:54			20:29		20:54			
18	07:39		15:45 (LZ15)	07:06	06:18				06:23			05:42		05:27			
	17:00	28	16:13 (LZ15)	17:42	18:18				19:56			20:31		20:54			
19	07:39		15:45 (LZ15)	07:04	06:16				06:22			05:41		05:27			
	17:02	28	16:13 (LZ15)	17:44	18:19				19:57			20:32		20:55			
20	07:38		15:46 (LZ15)	07:03	06:15				06:20			05:40		05:27			
	17:03	26	16:12 (LZ15)	17:45	18:21				19:58			20:33		20:55			
21	07:38		15:47 (LZ15)	07:01	06:13				06:18			05:39		05:27			
	17:04	26	16:13 (LZ15)	17:46	18:22				19:59			20:34		20:55			
22	07:37		15:48 (LZ15)	06:59	06:11				06:17			05:38		05:27			
	17:06	24	16:12 (LZ15)	17:48	18:23				20:00			20:35		20:55			
23	07:36		15:49 (LZ15)	06:58	06:09				06:15			05:37		05:28			
	17:07	23	16:12 (LZ15)	17:49	18:24				20:02			20:36		20:55			
24	07:35		15:50 (LZ15)	06:56	06:07			17:54 (LZ07)	06:14			05:36		05:28			
	17:08	21	16:11 (LZ15)	17:50	18:26	5	17:59 (LZ07)	20:03				20:37		20:56			
25	07:34		15:51 (LZ15)	06:55	06:06		17:50 (LZ07)	06:12				05:36		05:28			
	17:10	19	16:10 (LZ15)	17:52	18:27	12	18:02 (LZ07)	20:04				20:38		20:56			
26	07:34		15:53 (LZ15)	06:53	06:04		17:48 (LZ07)	06:11				05:35		05:28			
	17:11	16	16:09 (LZ15)	17:53	18:28	16	18:04 (LZ07)	20:05				20:39		20:56			
27	07:33		15:55 (LZ15)	06:51	06:02		17:46 (LZ07)	06:09				05:34		05:29			
	17:12	12	16:07 (LZ15)	17:54	18:29	19	18:05 (LZ07)	20:06				20:40		20:56			
28	07:32		16:00 (LZ15)	06:50	06:00		17:45 (LZ07)	06:07				05:33		05:29			
	17:14	3	16:03 (LZ15)	17:56	18:30	20	18:05 (LZ07)	20:08				20:40		20:56			
29	07:31				06:58		18:45 (LZ07)	06:06				05:33		05:30			
	17:15				19:32	21	19:06 (LZ07)	20:09				20:41		20:56			
30	07:30				06:57		18:44 (LZ07)	06:05				05:32		05:30			
	17:16				19:33	22	19:06 (LZ07)	20:10				20:42		20:56			
31	07:29				06:55		18:43 (LZ07)					05:31					
	17:18				19:34	22	19:05 (LZ07)					20:43					
Potential sun hours	289			293	369			402				456		462			
Total, worst case		721			137			112									
Sun reduction		0.28			0.31			0.40									
Oper. time red.		1.00			1.00			1.00									
Wind dir. red.		0.61			0.61			0.61									
Total reduction		0.17			0.19			0.24									
Total, real		122			25			27									

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_11 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 87.5° Slope: 90.0° (42)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

		July	August	September		October	November		December	
	1	05:31	05:57	06:32		07:06	06:44		07:23	15:24 (LZ15)
		20:56	20:34	19:47		18:52	17:01		16:34	29 15:53 (LZ15)
	2	05:31	05:58	06:33		07:07	06:46		07:24	15:24 (LZ15)
		20:55	20:33	19:45		18:51	17:00		16:33	30 15:54 (LZ15)
	3	05:32	05:59	06:34		07:08	06:47		07:25	15:24 (LZ15)
		20:55	20:32	19:44		18:49	16:59		16:33	30 15:54 (LZ15)
	4	05:32	06:00	06:35		07:09	06:48		07:26	15:25 (LZ15)
		20:55	20:30	19:42		18:47	16:57		16:33	29 15:54 (LZ15)
	5	05:33	06:01	06:36	18:47 (LZ07)	07:11	06:50		07:27	15:25 (LZ15)
		20:55	20:29	19:40	3 18:50 (LZ07)	18:45	16:56		16:33	29 15:54 (LZ15)
	6	05:34	06:02	06:37	18:43 (LZ07)	07:12	06:51		07:28	15:25 (LZ15)
		20:54	20:28	19:38	11 18:54 (LZ07)	18:43	16:55		16:32	29 15:54 (LZ15)
	7	05:34	06:04	06:39	18:40 (LZ07)	07:13	06:52		07:29	15:26 (LZ15)
		20:54	20:26	19:36	15 18:55 (LZ07)	18:42	16:54		16:32	29 15:55 (LZ15)
	8	05:35	06:05	06:40	18:38 (LZ07)	07:14	06:54		07:30	15:26 (LZ15)
		20:54	20:25	19:35	18 18:56 (LZ07)	18:40	16:52		16:32	29 15:55 (LZ15)
	9	05:36	06:06	06:41	18:37 (LZ07)	07:15	06:55		07:31	15:27 (LZ15)
		20:53	20:24	19:33	20 18:57 (LZ07)	18:38	16:51		16:32	28 15:55 (LZ15)
	10	05:36	06:07	06:42	18:36 (LZ07)	07:17	06:56		07:32	15:28 (LZ15)
		20:53	20:22	19:31	21 18:57 (LZ07)	18:36	16:50		16:32	28 15:56 (LZ15)
	11	05:37	06:08	06:43	18:36 (LZ07)	07:18	06:57		07:33	15:28 (LZ15)
		20:52	20:21	19:29	22 18:58 (LZ07)	18:35	16:49		16:32	28 15:56 (LZ15)
	12	05:38	06:09	06:44	18:35 (LZ07)	07:19	06:59		07:34	15:29 (LZ15)
		20:52	20:19	19:27	23 18:58 (LZ07)	18:33	16:48		16:32	27 15:56 (LZ15)
	13	05:39	06:10	06:45	18:35 (LZ07)	07:20	07:00		07:34	15:30 (LZ15)
		20:51	20:18	19:25	22 18:57 (LZ07)	18:31	16:47		16:32	27 15:57 (LZ15)
	14	05:39	06:11	06:46	18:35 (LZ07)	07:21	07:01	15:31 (LZ15)	07:35	15:30 (LZ15)
		20:51	20:17	19:24	21 18:56 (LZ07)	18:29	16:46	5 15:36 (LZ15)	16:32	26 15:56 (LZ15)
	15	05:40	06:13	06:48	18:35 (LZ07)	07:23	07:03	15:28 (LZ15)	07:36	15:31 (LZ15)
		20:50	20:15	19:22	20 18:55 (LZ07)	18:28	16:45	12 15:40 (LZ15)	16:33	26 15:57 (LZ15)
	16	05:41	06:14	06:49	18:35 (LZ07)	07:24	07:04	15:26 (LZ15)	07:37	15:31 (LZ15)
		20:49	20:14	19:20	19 18:54 (LZ07)	18:26	16:44	16 15:42 (LZ15)	16:33	27 15:58 (LZ15)
	17	05:42	06:15	06:50	18:36 (LZ07)	07:25	07:05	15:25 (LZ15)	07:37	15:32 (LZ15)
		20:49	20:12	19:18	16 18:52 (LZ07)	18:24	16:43	19 15:44 (LZ15)	16:33	26 15:58 (LZ15)
	18	05:43	06:16	06:51	18:37 (LZ07)	07:26	07:07	15:24 (LZ15)	07:38	15:32 (LZ15)
		20:48	20:10	19:16	13 18:50 (LZ07)	18:23	16:42	21 15:45 (LZ15)	16:33	26 15:58 (LZ15)
	19	05:44	06:17	06:52	18:39 (LZ07)	07:28	07:08	15:23 (LZ15)	07:39	15:33 (LZ15)
		20:47	20:09	19:14	8 18:47 (LZ07)	18:21	16:41	23 15:46 (LZ15)	16:34	26 15:59 (LZ15)
	20	05:45	06:18	06:53		07:29	07:09	15:23 (LZ15)	07:39	15:33 (LZ15)
		20:46	20:07	19:13		18:19	16:40	24 15:47 (LZ15)	16:34	26 15:59 (LZ15)
	21	05:46	06:19	06:54		07:30	07:10	15:22 (LZ15)	07:40	15:34 (LZ15)
		20:45	20:06	19:11		18:18	16:40	26 15:48 (LZ15)	16:34	26 16:00 (LZ15)
	22	05:47	06:20	06:55		07:31	07:12	15:22 (LZ15)	07:40	15:34 (LZ15)
		20:45	20:04	19:09		18:16	16:39	26 15:48 (LZ15)	16:35	26 16:00 (LZ15)
	23	05:48	06:22	06:57		07:33	07:13	15:22 (LZ15)	07:41	15:35 (LZ15)
		20:44	20:02	19:07		18:15	16:38	28 15:50 (LZ15)	16:35	26 16:01 (LZ15)
	24	05:49	06:23	06:58		07:34	07:14	15:22 (LZ15)	07:41	15:35 (LZ15)
		20:43	20:01	19:05		18:13	16:37	28 15:50 (LZ15)	16:36	26 16:01 (LZ15)
	25	05:50	06:24	06:59		06:35	07:15	15:22 (LZ15)	07:42	15:36 (LZ15)
		20:42	19:59	19:03		17:12	16:37	28 15:50 (LZ15)	16:37	26 16:02 (LZ15)
	26	05:51	06:25	07:00		06:37	07:17	15:22 (LZ15)	07:42	15:36 (LZ15)
		20:41	19:57	19:01		17:10	16:36	29 15:51 (LZ15)	16:37	26 16:02 (LZ15)
	27	05:52	06:26	07:01		06:38	07:18	15:22 (LZ15)	07:43	15:36 (LZ15)
		20:40	19:56	19:00		17:09	16:36	30 15:52 (LZ15)	16:38	26 16:02 (LZ15)
	28	05:53	06:27	07:02		06:39	07:19	15:22 (LZ15)	07:43	15:36 (LZ15)
		20:39	19:54	18:58		17:07	16:35	30 15:52 (LZ15)	16:39	27 16:03 (LZ15)
	29	05:54	06:28	07:04		06:40	07:20	15:22 (LZ15)	07:43	15:38 (LZ15)
		20:38	19:52	18:56		17:06	16:35	30 15:52 (LZ15)	16:39	26 16:04 (LZ15)
	30	05:55	06:29	07:05		06:42	07:21	15:23 (LZ15)	07:43	15:38 (LZ15)
		20:36	19:51	18:54		17:04	16:34	30 15:53 (LZ15)	16:40	27 16:05 (LZ15)
	31	05:56	06:31			06:43			07:43	15:38 (LZ15)
		20:35	19:49			17:03			16:41	27 16:05 (LZ15)
Potential sun hours		468	434	376		342	291		278	
Total, worst case				252			405			844
Sun reduction				0.59			0.36			0.26
Oper. time red.				1.00			1.00			1.00
Wind dir. red.				0.61			0.61			0.61
Total reduction				0.36			0.22			0.16
Total, real				91			90			135

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_12 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 89.2° Slope: 90.0° (43)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January		February		March		April		May		June	
1	07:44 16:42		07:28 17:19	30	16:03 (LZ15) 16:33 (LZ15)	06:48 17:57	06:53 19:35		06:03 20:11	05:31 20:44	
2	07:44 16:43		07:27 17:20	30	16:03 (LZ15) 16:33 (LZ15)	06:46 17:58	06:51 19:36		06:02 20:12	05:30 20:45	
3	07:44 16:44		07:25 17:22	29	16:03 (LZ15) 16:32 (LZ15)	06:45 17:59	06:49 19:38	8	19:04 (LZ07) 19:12 (LZ07)	06:00 20:14	05:30 20:46
4	07:44 16:45		07:24 17:23	27	16:04 (LZ15) 16:31 (LZ15)	06:43 18:01	06:48 19:39	13	19:01 (LZ07) 19:14 (LZ07)	05:59 20:15	05:29 20:46
5	07:44 16:46		07:23 17:25	25	16:06 (LZ15) 16:31 (LZ15)	06:41 18:02	06:46 19:40	17	18:59 (LZ07) 19:16 (LZ07)	05:57 20:16	05:29 20:47
6	07:44 16:47		07:22 17:26	23	16:07 (LZ15) 16:30 (LZ15)	06:40 18:03	06:44 19:41	19	18:57 (LZ07) 19:16 (LZ07)	05:56 20:17	05:29 20:48
7	07:44 16:48		07:21 17:27	20	16:08 (LZ15) 16:28 (LZ15)	06:38 18:05	06:42 19:42	20	18:56 (LZ07) 19:16 (LZ07)	05:55 20:18	05:28 20:49
8	07:43 16:49		07:19 17:29	17	16:10 (LZ15) 16:27 (LZ15)	06:36 18:06	06:40 19:44	21	18:56 (LZ07) 19:17 (LZ07)	05:54 20:19	05:28 20:49
9	07:43 16:50		07:18 17:30	12	16:13 (LZ15) 16:25 (LZ15)	06:34 18:07	06:39 19:45	22	18:55 (LZ07) 19:17 (LZ07)	05:52 20:21	05:28 20:50
10	07:43 16:51		07:17 17:31			06:33 18:08	06:37 19:46	23	18:54 (LZ07) 19:17 (LZ07)	05:51 20:22	05:27 20:50
11	07:43 16:52	7	16:08 (LZ15) 16:15 (LZ15)	17:16 17:33		06:31 18:10	06:35 19:47	22	18:55 (LZ07) 19:17 (LZ07)	05:50 20:23	05:27 20:51
12	07:42 16:53	11	16:06 (LZ15) 16:17 (LZ15)	07:14 17:34		06:29 18:11	06:34 19:48	21	18:55 (LZ07) 19:16 (LZ07)	05:49 20:24	05:27 20:52
13	07:42 16:54	15	16:05 (LZ15) 16:20 (LZ15)	07:13 17:36		06:27 18:12	06:32 19:50	20	18:55 (LZ07) 19:15 (LZ07)	05:47 20:25	05:27 20:52
14	07:42 16:56	17	16:04 (LZ15) 16:21 (LZ15)	07:11 17:37		06:25 18:13	06:30 19:51	19	18:55 (LZ07) 19:14 (LZ07)	05:46 20:26	05:27 20:53
15	07:41 16:57	19	16:04 (LZ15) 16:23 (LZ15)	07:10 17:38		06:24 18:15	06:28 19:52	17	18:56 (LZ07) 19:13 (LZ07)	05:45 20:27	05:27 20:53
16	07:41 16:58	21	16:03 (LZ15) 16:24 (LZ15)	07:08 17:40		06:22 18:16	06:27 19:53	14	18:57 (LZ07) 19:11 (LZ07)	05:44 20:28	05:27 20:53
17	07:40 16:59	23	16:03 (LZ15) 16:26 (LZ15)	07:07 17:41		06:20 18:17	06:25 19:54	9	18:59 (LZ07) 19:08 (LZ07)	05:43 20:29	05:27 20:54
18	07:39 17:00	24	16:02 (LZ15) 16:26 (LZ15)	07:06 17:42		06:18 18:18	06:23 19:56		05:42 20:31	05:27 20:54	
19	07:39 17:02	26	16:01 (LZ15) 16:27 (LZ15)	07:04 17:44		06:16 18:19	06:22 19:57		05:41 20:32	05:27 20:55	
20	07:38 17:03	27	16:01 (LZ15) 16:28 (LZ15)	07:03 17:45		06:15 18:21	06:20 19:58		05:40 20:33	05:27 20:55	
21	07:38 17:04	28	16:01 (LZ15) 16:29 (LZ15)	07:01 17:46		06:13 18:22	06:18 19:59		05:39 20:34	05:27 20:55	
22	07:37 17:06	29	16:01 (LZ15) 16:30 (LZ15)	06:59 17:48		06:11 18:23	06:17 20:00		05:38 20:35	05:27 20:55	
23	07:36 17:07	29	16:01 (LZ15) 16:30 (LZ15)	06:58 17:49		06:09 18:24	06:15 20:02		05:37 20:36	05:28 20:55	
24	07:35 17:08	30	16:01 (LZ15) 16:31 (LZ15)	06:56 17:50		06:07 18:26	06:14 20:03		05:36 20:37	05:28 20:56	
25	07:34 17:10	31	16:00 (LZ15) 16:31 (LZ15)	06:55 17:52		06:06 18:27	06:12 20:04		05:36 20:38	05:28 20:56	
26	07:34 17:11	32	16:00 (LZ15) 16:32 (LZ15)	06:53 17:53		06:04 18:28	06:11 20:05		05:35 20:39	05:28 20:56	
27	07:33 17:12	31	16:01 (LZ15) 16:32 (LZ15)	06:51 17:54		06:02 18:29	06:09 20:06		05:34 20:40	05:29 20:56	
28	07:32 17:14	31	16:01 (LZ15) 16:32 (LZ15)	06:50 17:56		06:00 18:30	06:07 20:08		05:33 20:40	05:29 20:56	
29	07:31 17:15	32	16:01 (LZ15) 16:33 (LZ15)			06:58 19:32	06:06 20:09		05:33 20:41	05:30 20:56	
30	07:30 17:16	31	16:02 (LZ15) 16:33 (LZ15)			06:57 19:33	06:05 20:10		05:32 20:42	05:30 20:56	
31	07:29 17:18	31	16:02 (LZ15) 16:33 (LZ15)			06:55 19:34			05:31 20:43		
Potential sun hours		289		293		369	402		456	462	
Total, worst case		525		213			265				
Sun reduction		0.28		0.29			0.40				
Oper. time red.		1.00		1.00			1.00				
Wind dir. red.		0.61		0.61			0.61				
Total reduction		0.17		0.18			0.24				
Total, real		89		38			65				

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_12 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 89.2° Slope: 90.0° (43)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

July		August		September		October		November		December	
1	05:31 20:56	05:57 20:34		06:32 19:47	18:54 (LZ07) 19:16 (LZ07)	07:06 18:52	06:44 17:01		15:46 (LZ15) 15:50 (LZ15)	07:23 16:34	7 15:57 (LZ15)
2	05:31 20:55	05:58 20:33		06:33 19:45	18:53 (LZ07) 19:16 (LZ07)	07:07 18:51	06:46 17:00	4	15:42 (LZ15) 15:55 (LZ15)	07:24 16:33	
3	05:32 20:55	05:59 20:32		06:34 19:44	18:53 (LZ07) 19:15 (LZ07)	07:08 18:49	06:47 16:59	13	15:39 (LZ15) 15:57 (LZ15)	07:25 16:33	
4	05:32 20:55	06:00 20:30		06:35 19:42	18:53 (LZ07) 19:14 (LZ07)	07:09 18:47	06:48 16:57	18	15:37 (LZ15) 15:58 (LZ15)	07:26 16:33	
5	05:33 20:55	06:01 20:29		06:36 19:40	18:53 (LZ07) 19:14 (LZ07)	07:11 18:45	06:50 16:56	21	15:37 (LZ15) 16:00 (LZ15)	07:27 16:33	
6	05:34 20:54	06:02 20:28		06:37 19:38	18:53 (LZ07) 19:12 (LZ07)	07:12 18:43	06:51 16:55	23	15:35 (LZ15) 16:01 (LZ15)	07:28 16:32	
7	05:34 20:54	06:04 20:26		06:39 19:36	18:54 (LZ07) 19:11 (LZ07)	07:13 18:42	06:52 16:54	26	15:35 (LZ15) 16:02 (LZ15)	07:29 16:32	
8	05:35 20:54	06:05 20:25		06:40 19:35	18:55 (LZ07) 19:09 (LZ07)	07:14 18:40	06:54 16:52	27	15:34 (LZ15) 16:03 (LZ15)	07:30 16:32	
9	05:36 20:53	06:06 20:24		06:41 19:33	18:57 (LZ07) 19:06 (LZ07)	07:15 18:38	06:55 16:51	29	15:33 (LZ15) 16:03 (LZ15)	07:31 16:32	
10	05:36 20:53	06:07 20:22		06:42 19:31		07:17 18:36	06:56 16:50	30	15:34 (LZ15) 16:04 (LZ15)	07:32 16:32	
11	05:37 20:52	06:08 20:21		06:43 19:29		07:18 18:35	06:57 16:49	30	15:33 (LZ15) 16:04 (LZ15)	07:33 16:32	
12	05:38 20:52	06:09 20:19		06:44 19:27		07:19 18:33	06:59 16:48	31	15:33 (LZ15) 16:05 (LZ15)	07:34 16:32	
13	05:39 20:51	06:10 20:18		06:45 19:25		07:20 18:31	07:00 16:47	32	15:33 (LZ15) 16:05 (LZ15)	07:34 16:32	
14	05:39 20:51	06:11 20:17		06:46 19:24		07:21 18:29	07:01 16:46	32	15:33 (LZ15) 16:04 (LZ15)	07:35 16:32	
15	05:40 20:50	06:13 20:15		06:48 19:22		07:23 18:28	07:03 16:45	31	15:34 (LZ15) 16:05 (LZ15)	07:36 16:33	
16	05:41 20:49	06:14 20:14		06:49 19:20		07:24 18:26	07:04 16:44	31	15:33 (LZ15) 16:05 (LZ15)	07:37 16:33	
17	05:42 20:49	06:15 20:12		06:50 19:18		07:25 18:24	07:05 16:43	32	15:34 (LZ15) 16:05 (LZ15)	07:37 16:33	
18	05:43 20:48	06:16 20:10		06:51 19:16		07:26 18:23	07:07 16:42	31	15:35 (LZ15) 16:05 (LZ15)	07:38 16:33	
19	05:44 20:47	06:17 20:09		06:52 19:14		07:28 18:21	07:08 16:41	30	15:35 (LZ15) 16:04 (LZ15)	07:39 16:34	
20	05:45 20:46	06:18 20:07		06:53 19:13		07:29 18:19	07:09 16:40	29	15:36 (LZ15) 16:05 (LZ15)	07:39 16:34	
21	05:46 20:45	06:19 20:06		06:54 19:11		07:30 18:18	07:10 16:40	29	15:36 (LZ15) 16:04 (LZ15)	07:40 16:35	
22	05:47 20:45	06:20 20:04		06:55 19:09		07:31 18:16	07:12 16:39	28	15:37 (LZ15) 16:04 (LZ15)	07:40 16:35	
23	05:48 20:44	06:22 20:02		06:57 19:07		07:33 18:15	07:13 16:38	27	15:38 (LZ15) 16:04 (LZ15)	07:41 16:35	
24	05:49 20:43	06:23 20:01		06:58 19:05		07:34 18:13	07:14 16:37	26	15:39 (LZ15) 16:03 (LZ15)	07:41 16:36	
25	05:50 20:42	06:24 19:59		06:59 19:03		07:35 17:12	07:15 16:37	24	15:40 (LZ15) 16:03 (LZ15)	07:42 16:37	
26	05:51 20:41	06:25 19:57	9	07:00 19:01	19:02 (LZ07) 19:11 (LZ07)	06:36 17:10	07:17 16:36	23	15:42 (LZ15) 16:03 (LZ15)	07:42 16:37	
27	05:52 20:40	06:26 19:56	14	07:01 19:00	18:59 (LZ07) 19:13 (LZ07)	06:38 17:09	07:18 16:36	21	15:43 (LZ15) 16:02 (LZ15)	07:43 16:38	
28	05:53 20:39	06:27 19:54	17	07:02 18:58	18:57 (LZ07) 19:14 (LZ07)	06:39 17:07	07:19 16:35	19	15:44 (LZ15) 16:01 (LZ15)	07:43 16:39	
29	05:54 20:38	06:28 19:52	19	07:04 18:56	18:56 (LZ07) 19:15 (LZ07)	06:40 17:06	07:20 16:35	17	15:45 (LZ15) 16:00 (LZ15)	07:43 16:39	
30	05:55 20:36	06:29 19:51	21	07:05 18:54	18:55 (LZ07) 19:16 (LZ07)	06:42 17:04	07:21 16:34	15	15:48 (LZ15) 15:59 (LZ15)	07:43 16:40	
31	05:56 20:35	06:31 19:49	21	07:05 19:16 (LZ07)		06:42 17:03		11		07:43 16:41	
Potential sun hours	468	434		376		342	291			278	
Total, worst case		101		168			740			7	
Sun reduction		0.65		0.59			0.36			0.26	
Oper. time red.		1.00		1.00			1.00			1.00	
Wind dir. red.		0.61		0.61			0.61			0.61	
Total reduction		0.40		0.36			0.22			0.16	
Total, real		40		61			164			1	

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_13 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 56.5° Slope: 90.0° (64)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:44 16:42	07:28 17:19	16:41 (LZ15) 17:57	06:48 19:35	06:03 20:11	05:31 20:44	05:31 20:56	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	15:59 (LZ15) 16:27 (LZ15)	07:22 16:34
2	07:44 16:43	07:27 17:20	16:37 (LZ15) 17:58	06:51 19:36	06:02 20:12	05:30 20:45	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:51	06:46 17:00	16:00 (LZ15) 16:28 (LZ15)	07:24 16:33
3	07:44 16:44	07:25 17:22	16:35 (LZ15) 17:59	06:49 19:38	06:00 20:14	05:30 20:46	05:32 20:55	05:59 20:32	06:34 19:43	07:08 18:49	06:47 16:59	16:00 (LZ15) 16:27 (LZ15)	07:25 16:33
4	07:44 16:45	07:24 17:23	16:34 (LZ15) 18:01	06:48 19:39	05:59 20:15	05:29 20:46	05:32 20:55	06:00 20:30	06:35 19:42	07:09 18:47	06:48 16:57	16:01 (LZ15) 16:26 (LZ15)	07:26 16:33
5	07:44 16:46	07:23 17:25	16:33 (LZ15) 18:02	06:46 19:40	05:57 20:16	05:29 20:47	05:33 20:55	06:01 20:29	06:36 19:40	07:11 18:45	06:50 16:56	16:02 (LZ15) 16:26 (LZ15)	07:27 16:33
6	07:44 16:47	07:22 17:26	16:32 (LZ15) 18:03	06:44 19:41	05:56 20:17	05:29 20:48	05:34 20:54	06:02 20:28	06:37 19:38	07:12 18:43	06:51 16:55	16:03 (LZ15) 16:24 (LZ15)	07:28 16:32
7	07:44 16:48	07:21 17:27	16:31 (LZ15) 18:05	06:42 19:42	05:55 20:18	05:28 20:49	05:34 20:54	06:04 20:26	06:39 19:36	07:13 18:42	06:52 16:54	16:05 (LZ15) 16:24 (LZ15)	07:29 16:32
8	07:43 16:49	07:19 17:29	16:31 (LZ15) 18:06	06:40 19:44	05:54 20:19	05:28 20:49	05:35 20:54	06:05 20:25	06:40 19:35	07:14 18:40	06:54 16:52	16:06 (LZ15) 16:22 (LZ15)	07:30 16:32
9	07:43 16:50	07:18 17:30	16:31 (LZ15) 18:07	06:39 19:45	05:52 20:21	05:28 20:50	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	06:55 16:51	16:08 (LZ15) 16:19 (LZ15)	07:31 16:32
10	07:43 16:51	07:17 17:31	16:30 (LZ15) 18:08	06:37 19:46	05:51 20:22	05:27 20:50	05:36 20:53	06:07 20:22	06:42 19:31	07:17 18:36	06:56 16:50	16:12 (LZ15) 16:16 (LZ15)	07:32 16:32
11	07:43 16:52	07:15 17:33	16:30 (LZ15) 18:10	06:35 19:47	05:50 20:23	05:27 20:51	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:35	06:57 16:49	16:16 (LZ15) 16:22 (LZ15)	07:33 16:32
12	07:42 16:53	07:14 17:34	16:30 (LZ15) 18:11	06:34 19:48	05:49 20:24	05:27 20:52	05:38 20:52	06:09 20:19	06:44 19:27	07:19 18:33	06:59 16:48	16:22 (LZ15) 16:28 (LZ15)	07:34 16:32
13	07:42 16:54	07:13 17:35	16:30 (LZ15) 18:12	06:32 19:50	05:47 20:25	05:27 20:52	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	07:00 16:47	16:28 (LZ15) 16:34 (LZ15)	07:34 16:32
14	07:42 16:56	07:11 17:37	16:30 (LZ15) 18:13	06:30 19:51	05:46 20:26	05:27 20:53	05:39 20:51	06:11 20:17	06:46 19:24	07:21 18:29	07:01 16:46	16:34 (LZ15) 16:40 (LZ15)	07:35 16:32
15	07:41 16:57	07:10 17:38	16:30 (LZ15) 18:15	06:28 19:52	05:45 20:27	05:27 20:53	05:40 20:50	06:13 20:15	06:48 19:22	07:23 18:28	07:03 16:45	16:40 (LZ15) 16:46 (LZ15)	07:36 16:33
16	07:41 16:58	07:08 17:40	16:31 (LZ15) 18:16	06:27 19:53	05:44 20:28	05:27 20:53	05:41 20:49	06:14 20:13	06:49 19:20	07:24 18:26	07:04 16:44	16:46 (LZ15) 16:52 (LZ15)	07:37 16:33
17	07:40 16:59	07:07 17:41	16:32 (LZ15) 18:17	06:25 19:54	05:43 20:29	05:27 20:54	05:42 20:49	06:15 20:12	06:50 19:18	07:25 18:24	07:05 16:43	16:52 (LZ15) 16:58 (LZ15)	07:37 16:33
18	07:39 17:00	07:06 17:42	16:33 (LZ15) 18:18	06:23 19:56	05:42 20:31	05:27 20:54	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	07:07 16:42	17:00 (LZ15) 17:06 (LZ15)	07:38 16:33
19	07:39 17:02	07:04 17:44	16:34 (LZ15) 18:19	06:22 19:57	05:41 20:32	05:27 20:55	05:44 20:47	06:17 20:09	06:52 19:14	07:28 18:21	07:08 16:41	17:08 (LZ15) 17:14 (LZ15)	07:39 16:34
20	07:38 17:03	07:02 17:45	16:35 (LZ15) 18:21	06:20 19:58	05:40 20:33	05:27 20:55	05:45 20:46	06:18 20:07	06:53 19:13	07:29 18:19	07:09 16:40	17:12 (LZ15) 17:18 (LZ15)	07:39 16:34
21	07:38 17:04	07:01 17:46	16:38 (LZ15) 18:22	06:18 19:59	05:39 20:34	05:27 20:55	05:46 20:45	06:19 20:06	06:54 19:11	07:30 18:18	07:10 16:40	17:08 (LZ15) 17:22 (LZ15)	07:40 16:34
22	07:37 17:06	06:59 17:48	16:43 (LZ15) 18:23	06:17 20:00	05:38 20:35	05:27 20:55	05:47 20:45	06:20 20:04	06:55 19:09	07:31 18:16	07:12 16:39	17:05 (LZ15) 17:23 (LZ15)	07:40 16:35
23	07:36 17:07	06:58 17:49	16:44 (LZ15) 18:24	06:15 20:02	05:37 20:36	05:28 20:55	05:48 20:44	06:22 20:02	06:57 19:07	07:33 18:15	07:13 16:38	17:04 (LZ15) 17:25 (LZ15)	07:41 16:35
24	07:35 17:08	06:56 17:50	16:45 (LZ15) 18:26	06:14 20:03	05:36 20:37	05:28 20:56	05:49 20:43	06:23 20:01	06:58 19:05	07:34 18:13	07:14 16:37	17:02 (LZ15) 17:26 (LZ15)	07:41 16:36
25	07:34 17:10	06:55 17:52	16:46 (LZ15) 18:27	06:12 20:04	05:36 20:38	05:28 20:56	05:50 20:42	06:24 19:59	06:59 19:03	07:35 17:12	07:15 16:37	17:01 (LZ15) 17:26 (LZ15)	07:42 16:37
26	07:34 17:11	06:53 17:53	16:47 (LZ15) 18:28	06:11 20:05	05:35 20:39	05:28 20:56	05:51 20:41	06:25 19:57	07:00 19:01	06:36 17:10	07:17 16:36	17:00 (LZ15) 17:27 (LZ15)	07:42 16:37
27	07:33 17:12	06:51 17:54	16:48 (LZ15) 18:29	06:09 20:06	05:34 20:40	05:29 20:56	05:52 20:40	06:26 19:56	07:01 19:00	06:38 17:09	07:18 16:36	17:01 (LZ15) 17:28 (LZ15)	07:43 16:38
28	07:32 17:14	06:50 17:56	16:49 (LZ15) 18:30	06:07 20:08	05:33 20:40	05:29 20:56	05:53 20:39	06:27 19:54	07:02 18:58	06:39 17:07	07:19 16:35	17:02 (LZ15) 17:29 (LZ15)	07:43 16:39
29	07:31 17:15		16:50 (LZ15) 18:31	06:06 20:09	05:33 20:41	05:30 20:56	05:54 20:38	06:28 19:52	07:04 18:56	06:40 17:06	07:20 16:35	17:03 (LZ15) 17:30 (LZ15)	07:43 16:39
30	07:30 17:16		16:51 (LZ15) 18:32	06:05 20:10	05:32 20:42	05:30 20:56	05:55 20:36	06:29 19:51	07:05 18:54	06:42 17:04	07:21 16:34	17:04 (LZ15) 17:31 (LZ15)	07:43 16:40
31	07:29 17:18		16:52 (LZ15) 18:33	06:04 20:11	05:31 20:43	05:29 20:57	05:56 20:35	06:31 19:49	07:06 18:53	06:43 17:03	07:22 16:41	17:05 (LZ15) 17:32 (LZ15)	07:43 16:41
Potential sun hours	289	293	369	402	456	462	468	434	376	342	291	278	
Total, worst case		471								276	203		
Sun reduction		0.29								0.47	0.36		
Oper. time red.		1.00								1.00	1.00		
Wind dir. red.		0.60								0.60	0.60		
Total reduction		0.17								0.28	0.22		
Total, real		82								78	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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_14 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 39.8° Slope: 90.0° (65)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:44 16:42	07:28 17:19	06:48 17:57	06:53 19:35	06:03 20:11	05:31 20:44	05:31 20:56	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	16:09 (LZ15) 16:34
2	07:44 16:43	07:27 17:20	06:46 17:58	06:51 19:36	06:02 20:12	05:30 20:45	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:51	06:46 17:00	16:10 (LZ15) 16:33
3	07:44 16:44	07:25 17:22	06:45 17:59	06:49 19:38	06:00 20:14	05:30 20:46	05:32 20:55	05:59 20:32	06:34 19:43	07:08 18:49	06:47 16:59	16:10 (LZ15) 16:33
4	07:44 16:45	07:24 17:23	16:49 (LZ15) 17:52	06:43 18:01	06:48 19:39	05:59 20:15	05:29 20:46	05:32 20:55	06:00 19:42	06:35 18:47	06:48 16:57	16:11 (LZ15) 16:33
5	07:44 16:46	07:23 17:24	16:45 (LZ15) 17:53	06:41 18:02	06:46 19:40	05:57 20:16	05:29 20:47	05:33 20:55	06:01 20:29	06:36 18:41	06:50 16:56	16:13 (LZ15) 16:33
6	07:44 16:47	07:22 17:26	16:43 (LZ15) 17:59	06:40 18:03	06:44 19:41	05:56 20:17	05:29 20:48	05:33 20:54	06:02 20:28	06:37 19:38	06:51 16:55	16:15 (LZ15) 16:32
7	07:44 16:48	07:21 17:27	16:41 (LZ15) 17:56	06:38 18:05	06:42 19:42	05:55 20:18	05:28 20:49	05:34 20:54	06:04 20:26	06:39 19:36	06:52 16:54	16:16 (LZ15) 16:32
8	07:43 16:49	07:19 17:29	16:40 (LZ15) 17:57	06:36 18:06	06:40 19:44	05:53 20:19	05:28 20:49	05:35 20:54	06:05 20:25	06:40 19:35	06:54 16:52	16:17 (LZ15) 16:32
9	07:43 16:50	07:18 17:30	16:39 (LZ15) 18:00	06:34 18:07	06:39 19:45	05:52 20:21	05:28 20:50	05:36 20:53	06:06 20:24	06:41 19:33	06:55 16:51	16:18 (LZ15) 16:32
10	07:43 16:51	07:17 17:31	16:39 (LZ15) 18:01	06:33 18:08	06:37 19:46	05:51 20:22	05:27 20:50	05:36 20:53	06:07 20:22	06:42 19:31	06:56 16:50	16:19 (LZ15) 16:32
11	07:43 16:52	07:15 17:33	16:39 (LZ15) 18:02	06:31 18:10	06:35 19:47	05:50 20:23	05:27 20:51	05:37 20:52	06:08 20:21	06:43 19:29	06:57 16:49	16:20 (LZ15) 16:32
12	07:42 16:53	07:14 17:34	16:39 (LZ15) 18:03	06:29 18:11	06:33 19:48	05:49 20:24	05:27 20:52	05:38 20:52	06:09 20:19	06:44 19:27	06:59 16:48	16:21 (LZ15) 16:32
13	07:42 16:54	07:13 17:35	16:38 (LZ15) 18:04	06:27 18:12	06:32 19:50	05:47 20:25	05:27 20:52	05:39 20:51	06:10 20:18	06:45 19:25	07:00 16:47	16:22 (LZ15) 16:32
14	07:42 16:56	07:11 17:37	16:39 (LZ15) 18:05	06:25 18:13	06:30 19:51	05:46 20:26	05:27 20:53	05:39 20:51	06:11 20:17	06:46 19:24	07:01 16:46	16:23 (LZ15) 16:32
15	07:41 16:57	07:10 17:38	16:38 (LZ15) 18:06	06:24 18:15	06:28 19:52	05:45 20:27	05:27 20:50	05:40 20:50	06:12 20:15	06:48 19:22	07:03 16:45	16:24 (LZ15) 16:32
16	07:41 16:58	07:08 17:40	16:39 (LZ15) 18:07	06:22 18:16	06:27 19:53	05:44 20:28	05:27 20:53	05:41 20:49	06:14 20:13	06:49 19:20	07:04 16:44	16:25 (LZ15) 16:32
17	07:40 16:59	07:07 17:41	16:39 (LZ15) 18:08	06:20 18:17	06:25 19:54	05:43 20:29	05:27 20:54	05:42 20:49	06:15 20:12	06:50 19:18	07:05 16:43	16:26 (LZ15) 16:32
18	07:39 17:00	07:06 17:42	16:40 (LZ15) 18:09	06:18 18:18	06:23 19:56	05:42 20:31	05:27 20:54	05:43 20:48	06:16 20:10	06:51 19:16	07:06 16:42	16:27 (LZ15) 16:32
19	07:39 17:02	07:04 17:44	16:41 (LZ15) 18:10	06:16 18:19	06:22 19:57	05:41 20:32	05:27 20:55	05:44 20:47	06:17 20:09	06:52 19:14	07:08 16:41	16:28 (LZ15) 16:34
20	07:38 17:03	07:02 17:45	16:42 (LZ15) 18:11	06:15 18:21	06:20 19:58	05:40 20:33	05:27 20:55	05:45 20:46	06:18 20:07	06:53 19:13	07:09 16:40	16:29 (LZ15) 16:34
21	07:38 17:04	07:01 17:46	16:44 (LZ15) 18:12	06:13 18:22	06:18 19:59	05:39 20:34	05:27 20:55	05:46 20:45	06:19 20:06	06:54 19:11	07:10 16:40	16:30 (LZ15) 16:34
22	07:37 17:06	06:59 17:48	16:46 (LZ15) 18:13	06:11 18:23	06:17 20:00	05:38 20:35	05:27 20:55	05:47 20:45	06:20 20:04	06:55 19:09	07:12 16:39	16:31 (LZ15) 16:35
23	07:36 17:07	06:58 17:49	16:55 (LZ15) 18:14	06:10 18:24	06:17 20:02	05:37 20:36	05:28 20:55	05:48 20:44	06:22 20:02	06:57 19:07	07:13 16:38	16:32 (LZ15) 16:35
24	07:35 17:08	06:56 17:50	16:56 (LZ15) 18:15	06:14 18:26	06:19 20:03	05:36 20:37	05:28 20:56	05:49 20:43	06:23 20:01	06:58 19:05	07:14 16:37	16:33 (LZ15) 16:36
25	07:34 17:10	06:55 17:52	16:57 (LZ15) 18:16	06:12 18:27	06:19 20:04	05:36 20:38	05:28 20:56	05:50 20:42	06:24 19:59	06:59 19:03	07:15 16:37	16:34 (LZ15) 16:37
26	07:34 17:11	06:53 17:53	16:58 (LZ15) 18:17	06:11 18:28	06:19 20:05	05:35 20:39	05:28 20:56	05:51 20:41	06:25 19:57	07:00 19:01	07:17 16:36	16:35 (LZ15) 16:37
27	07:33 17:12	06:51 17:54	16:59 (LZ15) 18:18	06:10 18:29	06:19 20:06	05:34 20:40	05:29 20:56	05:52 20:43	06:26 19:56	07:01 19:00	07:18 16:36	16:36 (LZ15) 16:38
28	07:32 17:14	06:50 17:56	17:00 (LZ15) 18:19	06:09 18:30	06:19 20:08	05:33 20:40	05:29 20:56	05:53 20:39	06:27 19:54	07:02 18:58	07:19 16:35	16:37 (LZ15) 16:39
29	07:31 17:15		17:01 (LZ15) 18:20	06:08 18:31	06:19 20:09	05:33 20:41	05:30 20:56	05:54 20:38	06:28 19:52	07:04 18:56	07:20 16:35	16:38 (LZ15) 16:39
30	07:30 17:16		17:02 (LZ15) 18:21	06:07 18:32	06:19 20:10	05:32 20:42	05:30 20:56	05:55 20:36	06:29 19:50	07:05 18:54	07:21 16:34	16:39 (LZ15) 16:40
31	07:29 17:18		17:03 (LZ15) 18:22	06:06 18:33	06:19 20:11	05:31 20:43	05:30 20:57	06:31 20:35	06:43 19:49	07:06 19:03	07:22 16:41	16:40 (LZ15) 16:41
Potential sun hours	289	293	369	402	456	462	468	434	376	342	291	278
Total, worst case		374								260	110	
Sun reduction		0.29								0.47	0.36	
Oper. time red.		1.00								1.00	1.00	
Wind dir. red.		0.60								0.60	0.60	
Total reduction		0.17								0.28	0.22	
Total, real		65								73	24	

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)
	Minutes with flicker		







## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: KrU\_15 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -60.9° Slope: 90.0° (66)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January		February		March		April		May		June		July		August		September		October		November		December	
1	07:44	07:28			06:48	07:16 (LZ16)	06:53	06:03	05:31	05:31	05:57	06:32		07:06		07:53 (LZ16)	06:44	07:22					
	16:42	17:19			17:57	22 07:38 (LZ16)	19:35	20:11	20:44	20:56	20:34	19:47		18:52	21	08:14 (LZ16)	17:01	16:34					
2	07:44	07:27			06:46	07:15 (LZ16)	06:51	06:02	05:30	05:31	05:58	06:33		07:07		07:52 (LZ16)	06:46	07:24					
	16:43	17:20			17:58	24 07:39 (LZ16)	19:36	20:12	20:45	20:55	20:33	19:45		18:51	23	08:15 (LZ16)	17:00	16:33					
3	07:44	07:25			06:45	07:14 (LZ16)	06:49	06:00	05:30	05:32	05:59	06:34		07:08		07:50 (LZ16)	06:47	07:25					
	16:44	17:22			17:59	25 07:39 (LZ16)	19:38	20:14	20:46	20:55	20:32	19:43		18:49	25	08:15 (LZ16)	16:59	16:33					
4	07:44	07:24			06:43	07:14 (LZ16)	06:48	05:59	05:29	05:32	06:00	06:35		07:09		07:50 (LZ16)	06:48	07:26					
	16:45	17:23			18:01	26 07:40 (LZ16)	19:39	20:15	20:46	20:55	20:30	19:42		18:47	27	08:17 (LZ16)	16:57	16:33					
5	07:44	07:23			06:41	07:13 (LZ16)	06:46	05:57	05:29	05:33	06:01	06:36		07:11		07:49 (LZ16)	06:50	07:27					
	16:46	17:24			18:02	27 07:40 (LZ16)	19:40	20:16	20:47	20:55	20:29	19:40		18:45	27	08:16 (LZ16)	16:56	16:33					
6	07:44	07:22			06:40	07:12 (LZ16)	06:44	05:56	05:29	05:33	06:02	06:37		07:12		07:48 (LZ16)	06:51	07:28					
	16:47	17:26			18:03	28 07:40 (LZ16)	19:41	20:17	20:48	20:54	20:28	19:38		18:43	28	08:16 (LZ16)	16:55	16:32					
7	07:44	07:21			06:38	07:12 (LZ16)	06:42	05:55	05:28	05:34	06:04	06:39		07:13		07:48 (LZ16)	06:52	07:29					
	16:48	17:27			18:05	28 07:40 (LZ16)	19:42	20:18	20:49	20:54	20:26	19:36		18:42	28	08:16 (LZ16)	16:54	16:32					
8	07:43	07:19			06:36	07:12 (LZ16)	06:40	05:53	05:28	05:35	06:05	06:40		07:14		07:47 (LZ16)	06:53	07:30					
	16:49	17:29			18:06	28 07:40 (LZ16)	19:44	20:19	20:49	20:54	20:25	19:35		18:40	28	08:15 (LZ16)	16:52	16:32					
9	07:43	07:18			06:34	07:12 (LZ16)	06:39	05:52	05:28	05:36	06:06	06:41		07:15		07:48 (LZ16)	06:55	07:31					
	16:50	17:30			18:07	27 07:39 (LZ16)	19:45	20:20	20:50	20:53	20:24	19:33		18:38	27	08:15 (LZ16)	16:51	16:32					
10	07:43	07:17			06:33	07:12 (LZ16)	06:37	05:51	05:27	05:36	06:07	06:42		07:17		07:48 (LZ16)	06:56	07:32					
	16:51	17:31			18:08	26 07:38 (LZ16)	19:46	20:22	20:50	20:53	20:22	19:31		18:36	27	08:15 (LZ16)	16:50	16:32					
11	07:43	07:15			06:31	07:13 (LZ16)	06:35	05:50	05:27	05:37	06:08	06:43		07:18		07:48 (LZ16)	06:57	07:33					
	16:52	17:33			18:10	24 07:37 (LZ16)	19:47	20:23	20:51	20:52	20:21	19:29		18:35	25	08:13 (LZ16)	16:49	16:32					
12	07:42	07:14			06:29	07:13 (LZ16)	06:33	05:49	05:27	05:38	06:09	06:44		07:19		07:49 (LZ16)	06:59	07:33					
	16:53	17:34			18:11	22 07:35 (LZ16)	19:48	20:24	20:52	20:52	20:19	19:27		18:33	23	08:12 (LZ16)	16:48	16:32					
13	07:42	07:13			06:27	07:15 (LZ16)	06:32	05:47	05:27	05:39	06:10	06:45		07:20		07:50 (LZ16)	07:00	07:34					
	16:54	17:35			18:12	19 07:34 (LZ16)	19:50	20:25	20:52	20:51	20:18	19:25		18:31	21	08:11 (LZ16)	16:47	16:32					
14	07:42	07:11			06:25	07:17 (LZ16)	06:30	05:46	05:27	05:39	06:11	06:46		07:21		07:51 (LZ16)	07:01	07:35					
	16:56	17:37			18:13	15 07:32 (LZ16)	19:51	20:26	20:53	20:51	20:17	19:24		18:29	18	08:09 (LZ16)	16:46	16:32					
15	07:41	07:10			06:24	07:19 (LZ16)	06:28	05:45	05:27	05:40	06:12	06:48		07:23		07:53 (LZ16)	07:03	07:36					
	16:57	17:38			18:15	9 07:28 (LZ16)	19:52	20:27	20:53	20:50	20:15	19:22		18:28	14	08:07 (LZ16)	16:45	16:32					
16	07:41	07:08			06:22		06:27	05:44	05:27	05:41	06:14	06:49		07:24		07:57 (LZ16)	07:04	07:37					
	16:58	17:40			18:16		19:53	20:28	20:53	20:49	20:13	19:20		18:26	5	08:02 (LZ16)	16:44	16:33					
17	07:40	07:07			06:20		06:25	05:43	05:27	05:42	06:15	06:50		07:25			07:05	07:37					
	16:59	17:41			18:17		19:54	20:29	20:54	20:49	20:12	19:18		18:24			16:43	16:33					
18	07:39	07:06			06:18		06:23	05:42	05:27	05:43	06:16	06:51		07:26			07:07	07:38					
	17:00	17:42			18:18		19:56	20:31	20:54	20:48	20:10	19:16		18:23			16:42	16:33					
19	07:39	07:04			06:16		06:22	05:41	05:27	05:44	06:17	06:52		07:28			07:08	07:39					
	17:02	17:44			18:19		19:57	20:32	20:54	20:47	20:09	19:14		18:21			16:41	16:34					
20	07:38	07:02			06:15		06:20	05:40	05:27	05:45	06:18	06:53		07:29			07:09	07:39					
	17:03	17:45			18:21		19:58	20:33	20:55	20:46	20:07	19:13		18:19			16:40	16:34					
21	07:37	07:01			06:13		06:18	05:39	05:27	05:46	06:19	06:54		07:30			07:10	07:40					
	17:04	17:46			18:22		19:59	20:34	20:55	20:45	20:06	19:11		18:18			16:40	16:34					
22	07:37	06:59			06:11		06:17	05:38	05:27	05:47	06:20	06:55		07:31			07:12	07:40					
	17:06	17:48			18:23		20:00	20:35	20:55	20:45	20:04	19:09		18:16			16:39	16:35					
23	07:36	06:58			06:09		06:15	05:37	05:28	05:48	06:22	06:57		07:33			07:13	07:41					
	17:07	17:49			18:24		20:02	20:36	20:55	20:44	20:02	19:07		18:15			16:38	16:35					
24	07:35	06:56			06:07		06:14	05:36	05:28	05:49	06:23	06:58		07:34			07:14	07:41					
	17:08	17:50			18:26		20:03	20:37	20:56	20:43	20:01	19:05		18:13			16:37	16:36					
25	07:34	06:55			06:06		06:12	05:36	05:28	05:50	06:24	06:59		07:35			07:15	07:42					
	17:10	17:52			18:27		20:04	20:38	20:56	20:42	19:59	19:03		17:12			16:37	16:37					
26	07:34	06:53		07:23 (LZ16)	06:04		06:11	05:35	05:28	05:51	06:25	07:00		07:36			07:17	07:42					
	17:11	17:53	10	07:33 (LZ16)	18:28		20:05	20:39	20:56	20:41	19:57	19:01		17:10			16:36	16:37					
27	07:33	06:51		07:20 (LZ16)	06:02		06:09	05:34	05:29	05:52	06:26	07:01		07:38			07:18	07:43					
	17:12	17:54	15	07:35 (LZ16)	18:29		20:06	20:40	20:56	20:40	19:56	19:00		17:09			16:36	16:38					
28	07:32	06:50		07:18 (LZ16)	06:00		06:07	05:33	05:29	05:53	06:27	07:02		07:39		08:02 (LZ16)	06:39	07:19	07:43				
	17:14	17:56	20	07:38 (LZ16)	18:30		20:08	20:40	20:56	20:39	19:54	18:58	4	08:06 (LZ16)		08:06 (LZ16)	17:07	16:35	16:39				
29	07:31				06:58		06:06	05:33	05:30	05:54	06:28	07:04		07:39		08:11 (LZ16)	06:40	07:20	07:43				
	17:15				19:32		20:09	20:41	20:56	20:38	19:52	18:56	13	08:11 (LZ16)		07:55 (LZ16)	17:06	16:35	16:39				
30	07:30				06:57		06:05	05:32	05:30	05:55	06:29	07:05		07:39			06:42	07:21	07:43				
	17:16				19:33		20:10	20:42	20:56	20:36	19:50	18:54	18	08:13 (LZ16)			17:04	16:34	16:40				
31	07:29				06:55			05:31		05:56	06:31			07:40			17:03	07:43					



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -111.8° Slope: 90.0° (54)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January			February			March			April			May			June		
1	07:44		08:49 (LZ66)	07:28		06:48		07:17 (LZ64)	06:53		06:03	05:31					
	16:42	4	08:53 (LZ66)	17:19		17:57	21	07:38 (LZ64)	19:35		20:11	20:44					
2	07:44			07:27		06:46		07:17 (LZ64)	06:51		06:02	05:31					
	16:43			17:21		17:58	21	07:38 (LZ64)	19:37		20:12	20:45					
3	07:44			07:25		06:45		07:17 (LZ64)	06:49		06:00	05:30					
	16:44			17:22		18:00	20	07:37 (LZ64)	19:38		20:14	20:46					
4	07:44			07:24		06:43		07:19 (LZ64)	06:48		05:59	05:30					
	16:45			17:23		18:01	17	07:36 (LZ64)	19:39		20:15	20:46					
5	07:44			07:23		06:41		07:20 (LZ64)	06:46		05:58	05:29					
	16:46			17:25		18:02	14	07:34 (LZ64)	19:40		20:16	20:47					
6	07:44			07:22		06:40		07:21 (LZ64)	06:44		05:56	05:29					
	16:47			17:26		18:03	21	07:42 (LZ65)	19:41		20:17	20:48					
7	07:44			07:21		06:38		07:24 (LZ65)	06:42		05:55	05:28					
	16:48			17:27		18:05	21	07:45 (LZ65)	19:43		20:18	20:48					
8	07:43			07:19		06:36		07:22 (LZ65)	06:41		05:54	05:28					
	16:49			17:29		18:06	25	07:47 (LZ65)	19:44		20:19	20:49					
9	07:43			07:18		06:34		07:20 (LZ65)	06:39		05:52	05:28					
	16:50			17:30		18:07	29	07:49 (LZ65)	19:45		20:21	20:50					
10	07:43			07:17		06:33		07:18 (LZ65)	06:37		05:51	05:28					
	16:51			17:32		18:08	32	07:50 (LZ65)	19:46		20:22	20:50					
11	07:43			07:16		06:31		07:16 (LZ65)	06:35		05:50	05:27					
	16:52			17:33		18:10	34	07:50 (LZ65)	19:47		20:23	20:51					
12	07:42			07:14		06:29		07:15 (LZ65)	06:34		05:49	05:27					
	16:53			17:34		18:11	37	07:52 (LZ65)	19:48		20:24	20:52					
13	07:42			07:13		06:27		07:14 (LZ65)	06:32		05:48	05:27					
	16:55			17:36		18:12	38	07:52 (LZ65)	19:50		20:25	20:52					
14	07:41			07:11		06:26		07:13 (LZ65)	06:30		05:46	05:27					
	16:56			17:37		18:13	39	07:52 (LZ65)	19:51		20:26	20:53					
15	07:41			07:10		06:24		07:12 (LZ65)	06:29		05:45	05:27					
	16:57			17:38		18:15	40	07:52 (LZ65)	19:52		20:27	20:53					
16	07:41			07:09		06:22		07:11 (LZ65)	06:27		05:44	05:27					
	16:58			17:40		18:16	41	07:52 (LZ65)	19:53		20:28	20:53					
17	07:40			07:07		06:20		07:12 (LZ65)	06:25		05:43	05:27					
	16:59			17:41		18:17	41	07:53 (LZ65)	19:54		20:29	20:54					
18	07:39			07:06		06:18		07:11 (LZ65)	06:24		05:42	05:27					
	17:01			17:42		18:18	41	07:52 (LZ65)	19:56		20:30	20:54					
19	07:39			07:04		06:17		07:11 (LZ65)	06:22		05:41	05:27					
	17:02			17:44		18:20	41	07:52 (LZ65)	19:57		20:32	20:54					
20	07:38			07:03		06:15		07:10 (LZ65)	06:20		05:40	05:27					
	17:03			17:45		18:21	41	07:51 (LZ65)	19:58		20:33	20:55					
21	07:37			07:01		06:13		07:10 (LZ65)	06:19		05:39	05:27					
	17:05			17:46		18:22	40	07:50 (LZ65)	19:59		20:34	20:55					
22	07:37			06:59		07:24 (LZ64)	06:11	07:10 (LZ65)	06:17		05:38	05:28					
	17:06			17:48	9	07:33 (LZ64)	18:23	07:49 (LZ65)	20:00		20:35	20:55					
23	07:36			06:58		07:22 (LZ64)	06:09	07:11 (LZ65)	06:15		05:37	05:28					
	17:07			17:49	14	07:36 (LZ64)	18:24	07:49 (LZ65)	20:02		20:36	20:55					
24	07:35			06:56		07:20 (LZ64)	06:08	07:11 (LZ65)	06:14		05:37	05:28					
	17:08			17:50	17	07:37 (LZ64)	18:26	07:48 (LZ65)	20:03		20:37	20:56					
25	07:34			06:55		07:20 (LZ64)	06:06	07:11 (LZ65)	06:12		05:36	05:28					
	17:10			17:52	18	07:38 (LZ64)	18:27	07:46 (LZ65)	20:04		20:38	20:56					
26	07:34			06:53		07:18 (LZ64)	06:04	07:12 (LZ65)	06:11		05:35	05:29					
	17:11			17:53	20	07:38 (LZ64)	18:28	07:45 (LZ65)	20:05		20:39	20:56					
27	07:33			06:51		07:18 (LZ64)	06:02	07:12 (LZ65)	06:09		05:34	05:29					
	17:12			17:54	20	07:38 (LZ64)	18:29	07:43 (LZ65)	20:06		20:40	20:56					
28	07:32			06:50		07:18 (LZ64)	06:00	07:14 (LZ65)	06:08		05:34	05:29					
	17:14			17:56	21	07:39 (LZ64)	18:30	07:42 (LZ65)	20:08		20:40	20:56					
29	07:31					06:58		08:16 (LZ65)	06:06		05:33	05:30					
	17:15					19:32	23	08:39 (LZ65)	20:09		20:41	20:56					
30	07:30					06:57		08:18 (LZ65)	06:05		05:32	05:30					
	17:16					19:33	18	08:36 (LZ65)	20:10		20:42	20:56					
31	07:29					06:55		08:21 (LZ65)			05:32						
	17:18					19:34	11	08:32 (LZ65)			20:43						
Potential sun hours	289			293		369		402			456		462				
Total, worst case	4			119		947											
Sun reduction	0.28			0.29		0.31											
Oper. time red.	1.00			1.00		1.00											
Wind dir. red.	0.66			0.62		0.61											
Total reduction	0.19			0.18		0.19											
Total, real	1			21		178											

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -111.8° Slope: 90.0° (54)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	July	August	September	October	November	December
1	05:31 20:55	05:57 20:34	06:32 19:47	07:06 18:52	07:54 (LZ65) 08:31 (LZ65)	06:44 17:02
2	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:51	07:54 (LZ65) 08:29 (LZ65)	06:46 17:00
3	05:32 20:55	05:59 20:32	06:34 19:44	07:08 18:49	07:55 (LZ65) 08:28 (LZ65)	06:47 16:59
4	05:33 20:55	06:00 20:30	06:35 19:42	07:09 18:47	07:57 (LZ65) 08:27 (LZ65)	06:48 16:58
5	05:33 20:55	06:02 20:29	06:36 19:40	07:11 18:45	07:58 (LZ65) 08:25 (LZ65)	06:50 16:56
6	05:34 20:54	06:03 20:28	06:38 19:38	07:12 18:43	07:59 (LZ65) 08:22 (LZ65)	06:51 16:55
7	05:34 20:54	06:04 20:26	06:39 19:36	07:13 18:42	07:58 (LZ64) 08:19 (LZ65)	06:52 16:54
8	05:35 20:54	06:05 20:25	06:40 19:35	07:14 18:40	07:55 (LZ64) 08:14 (LZ65)	06:54 16:53
9	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	07:54 (LZ64) 08:10 (LZ64)	06:55 16:51
10	05:37 20:53	06:07 20:22	06:42 19:31	07:17 18:36	07:53 (LZ64) 08:11 (LZ64)	06:56 16:50
11	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:35	07:51 (LZ64) 08:11 (LZ64)	06:57 16:49
12	05:38 20:52	06:09 20:19	06:44 19:27	07:19 18:33	07:50 (LZ64) 08:11 (LZ64)	06:59 16:48
13	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	07:51 (LZ64) 08:12 (LZ64)	07:00 16:47
14	05:40 20:51	06:12 20:17	06:47 19:24	07:21 18:30	07:50 (LZ64) 08:11 (LZ64)	07:01 16:46
15	05:41 20:50	06:13 20:15	06:48 19:22	07:23 18:28	07:50 (LZ64) 08:10 (LZ64)	07:03 16:45
16	05:41 20:49	06:14 20:14	06:49 19:20	07:24 18:26	07:51 (LZ64) 08:11 (LZ64)	07:04 16:44
17	05:42 20:49	06:15 20:12	06:50 19:18	07:25 18:25	07:51 (LZ64) 08:09 (LZ64)	07:05 16:43
18	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	07:52 (LZ64) 08:08 (LZ64)	07:07 16:42
19	05:44 20:47	06:17 20:09	06:52 19:14	07:28 18:21	07:53 (LZ64) 08:06 (LZ64)	07:08 16:41
20	05:45 20:46	06:18 20:07	06:53 19:13	07:29 18:20	07:56 (LZ64) 08:03 (LZ64)	07:09 16:41
21	05:46 20:45	06:19 20:06	06:54 19:11	07:30 18:18	07:10 16:40	07:40 16:35
22	05:47 20:44	06:21 20:04	06:56 19:09	07:31 18:16	07:12 16:39	07:40 16:35
23	05:48 20:44	06:22 20:02	06:57 19:07	07:33 18:15	07:13 16:38	07:41 16:36
24	05:49 20:43	06:23 20:01	06:58 19:05	07:34 18:13	07:14 16:38	07:41 16:36
25	05:50 20:42	06:24 19:59	06:59 19:03	07:35 18:12	07:15 16:37	07:42 16:37
26	05:51 20:41	06:25 19:57	07:00 19:02	07:37 18:10	07:17 16:36	07:42 16:38
27	05:52 20:40	06:26 19:56	07:01 19:00	07:38 18:09	07:18 16:36	07:42 16:38
28	05:53 20:39	06:27 19:54	07:02 18:58	07:39 18:07	07:19 16:35	07:43 16:39
29	05:54 20:37	06:29 19:52	07:04 18:56	07:40 18:06	07:20 16:35	07:43 16:40
30	05:55 20:36	06:30 19:51	07:05 18:54	07:42 18:04	07:21 16:34	07:43 16:40
31	05:56 20:35	06:31 19:49		07:43 17:03		07:43 16:41
Potential sun hours	468	433	376	342	291	279
Total, worst case			651	436		232
Sun reduction			0.59	0.47		0.26
Oper. time red.			1.00	1.00		1.00
Wind dir. red.			0.61	0.62		0.66
Total reduction			0.36	0.29		0.17
Total, real			237	127		40

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -98.1° Slope: 90.0° (55)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January			February			March			April			May			June		
1	07:44		08:20 (LZ66)	07:28	06:48				06:53			06:03		07:04 (LZ65)	05:31		
	16:42	22	08:42 (LZ66)	17:19	17:57				19:35			20:11	46	07:50 (LZ65)	20:44		
2	07:44		08:20 (LZ66)	07:27	06:46				06:51			06:02		07:04 (LZ65)	05:31		
	16:43	23	08:43 (LZ66)	17:21	17:58				19:36			20:12	46	07:50 (LZ65)	20:45		
3	07:44		08:20 (LZ66)	07:25	06:45				06:49			06:00		07:05 (LZ65)	05:30		
	16:44	24	08:44 (LZ66)	17:22	18:00				19:38			20:14	45	07:50 (LZ65)	20:46		
4	07:44		08:19 (LZ66)	07:24	06:43				06:48			05:59		07:04 (LZ65)	05:30		
	16:45	24	08:43 (LZ66)	17:23	18:01				19:39			20:15	45	07:49 (LZ65)	20:46		
5	07:44		08:20 (LZ66)	07:23	06:41				06:46			05:58		07:05 (LZ65)	05:29		
	16:46	24	08:44 (LZ66)	17:25	18:02				19:40			20:16	44	07:49 (LZ65)	20:47		
6	07:44		08:20 (LZ66)	07:22	06:40				06:44			05:56		07:05 (LZ65)	05:29		
	16:47	25	08:45 (LZ66)	17:26	18:03				19:41			20:17	43	07:48 (LZ65)	20:48		
7	07:44		08:20 (LZ66)	07:21	06:38				06:42			05:55		07:06 (LZ65)	05:28		
	16:48	26	08:46 (LZ66)	17:27	18:05				19:42			20:18	42	07:48 (LZ65)	20:48		
8	07:43		08:21 (LZ66)	07:19	06:36				06:41			05:54		07:06 (LZ65)	05:28		
	16:49	26	08:47 (LZ66)	17:29	18:06				19:44			20:19	40	07:46 (LZ65)	20:49		
9	07:43		08:20 (LZ66)	07:18	06:34				06:39			05:52		07:07 (LZ65)	05:28		
	16:50	27	08:47 (LZ66)	17:30	18:07				19:45			20:20	39	07:46 (LZ65)	20:50		
10	07:43		08:21 (LZ66)	07:17	06:33				06:37			05:51		07:07 (LZ65)	05:28		
	16:51	27	08:48 (LZ66)	17:32	18:08				19:46			20:22	38	07:45 (LZ65)	20:50		
11	07:43		08:22 (LZ66)	07:16	06:31			06:56 (LZ64)	06:35			05:50		07:08 (LZ65)	05:27		
	16:52	27	08:49 (LZ66)	17:33	18:10	8		07:04 (LZ64)	19:47			20:23	36	07:44 (LZ65)	20:51		
12	07:42		08:21 (LZ66)	07:14	06:29			06:54 (LZ64)	06:34			07:29 (LZ65)	05:49	07:09 (LZ65)	05:27		
	16:53	28	08:49 (LZ66)	17:34	18:11	14		07:08 (LZ64)	19:48	7		07:36 (LZ65)	20:24	07:43 (LZ65)	20:51		
13	07:42		08:22 (LZ66)	07:13	06:27			06:52 (LZ64)	06:32			07:23 (LZ65)	05:48	07:10 (LZ65)	05:27		
	16:55	27	08:49 (LZ66)	17:36	18:12	17		07:09 (LZ64)	19:50	18		07:41 (LZ65)	20:25	07:42 (LZ65)	20:52		
14	07:41		08:22 (LZ66)	07:11	06:26			06:50 (LZ64)	06:30			07:20 (LZ65)	05:46	07:11 (LZ65)	05:27		
	16:56	27	08:49 (LZ66)	17:37	18:13	20		07:10 (LZ64)	19:51	24		07:44 (LZ65)	20:26	07:41 (LZ65)	20:52		
15	07:41		08:23 (LZ66)	07:10	06:24			06:49 (LZ64)	06:29			07:17 (LZ65)	05:45	07:13 (LZ65)	05:27		
	16:57	27	08:50 (LZ66)	17:38	18:15	21		07:10 (LZ64)	19:52	28		07:45 (LZ65)	20:27	07:40 (LZ65)	20:53		
16	07:41		08:23 (LZ66)	07:08	06:22			06:48 (LZ64)	06:27			07:15 (LZ65)	05:44	07:14 (LZ65)	05:27		
	16:58	27	08:50 (LZ66)	17:40	18:16	22		07:10 (LZ64)	19:53	32		07:47 (LZ65)	20:28	07:39 (LZ65)	20:53		
17	07:40		08:23 (LZ66)	07:07	06:20			06:48 (LZ64)	06:25			07:14 (LZ65)	05:43	07:15 (LZ65)	05:27		
	16:59	27	08:50 (LZ66)	17:41	18:17	23		07:11 (LZ64)	19:54	34		07:48 (LZ65)	20:29	07:37 (LZ65)	20:54		
18	07:39		08:24 (LZ66)	07:06	06:18			06:48 (LZ64)	06:24			07:12 (LZ65)	05:42	07:17 (LZ65)	05:27		
	17:01	27	08:51 (LZ66)	17:42	18:18	22		07:10 (LZ64)	19:56	37		07:49 (LZ65)	20:30	07:35 (LZ65)	20:54		
19	07:39		08:24 (LZ66)	07:04	06:17			06:47 (LZ64)	06:22			07:10 (LZ65)	05:41	07:20 (LZ65)	05:27		
	17:02	27	08:51 (LZ66)	17:44	18:20	22		07:09 (LZ64)	19:57	39		07:49 (LZ65)	20:32	07:32 (LZ65)	20:54		
20	07:38		08:24 (LZ66)	07:03	06:15			06:47 (LZ64)	06:20			07:10 (LZ65)	05:40	07:25 (LZ65)	05:27		
	17:03	27	08:51 (LZ66)	17:45	18:21	22		07:09 (LZ64)	19:58	41		07:51 (LZ65)	20:33	07:27 (LZ65)	20:55		
21	07:37		08:26 (LZ66)	07:01	06:13			06:48 (LZ64)	06:19			07:08 (LZ65)	05:39		05:27		
	17:05	25	08:51 (LZ66)	17:46	18:22	19		07:07 (LZ64)	19:59	43		07:51 (LZ65)	20:34		20:55		
22	07:37		08:26 (LZ66)	06:59	06:11			06:48 (LZ64)	06:17			07:08 (LZ65)	05:38		05:28		
	17:06	25	08:51 (LZ66)	17:48	18:23	18		07:06 (LZ64)	20:00	44		07:52 (LZ65)	20:35		20:55		
23	07:36		08:27 (LZ66)	06:58	06:09			06:50 (LZ64)	06:15			07:07 (LZ65)	05:37		05:28		
	17:07	23	08:50 (LZ66)	17:49	18:24	15		07:05 (LZ64)	20:02	44		07:51 (LZ65)	20:36		20:55		
24	07:35		08:28 (LZ66)	06:56	06:08			06:52 (LZ64)	06:14			07:07 (LZ65)	05:37		05:28		
	17:08	22	08:50 (LZ66)	17:50	18:26	10		07:02 (LZ64)	20:03	45		07:52 (LZ65)	20:37		20:55		
25	07:34		08:29 (LZ66)	06:55	06:06				06:12			07:06 (LZ65)	05:36		05:28		
	17:10	20	08:49 (LZ66)	17:52	18:27				20:04	46		07:52 (LZ65)	20:38		20:56		
26	07:34		08:30 (LZ66)	06:53	06:04				06:11			07:06 (LZ65)	05:35		05:29		
	17:11	18	08:48 (LZ66)	17:53	18:28				20:05	46		07:52 (LZ65)	20:39		20:56		
27	07:33		08:32 (LZ66)	06:51	06:02				06:09			07:05 (LZ65)	05:34		05:29		
	17:12	15	08:47 (LZ66)	17:54	18:29				20:06	46		07:51 (LZ65)	20:39		20:56		
28	07:32		08:34 (LZ66)	06:50	06:00				06:08			07:05 (LZ65)	05:34		05:30		
	17:14	11	08:45 (LZ66)	17:56	18:30				20:08	47		07:52 (LZ65)	20:40		20:56		
29	07:31		08:38 (LZ66)		06:58				06:06			07:04 (LZ65)	05:33		05:30		
	17:15	3	08:41 (LZ66)		19:32				20:09	47		07:51 (LZ65)	20:41		20:56		
30	07:30				06:57				06:05			07:05 (LZ65)	05:32		05:30		
	17:16				19:33				20:10	46		07:51 (LZ65)	20:42		20:56		
31	07:29				06:55							05:32					
	17:18				19:34							20:43					
Potential sun hours	289			293	369			402				456			462		
Total, worst case		681			253			714				666					
Sun reduction		0.28			0.31			0.40				0.47					
Oper. time red.		1.00			1.00			1.00				1.00					
Wind dir. red.		0.67			0.62			0.59				0.59					
Total reduction		0.19			0.19			0.24				0.28					
Total, real		127			48			168				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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -98.1° Slope: 90.0° (55)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

July		August		September		October		November		December	
1	05:31	05:57	07:19 (LZ65)	06:32	07:06	07:32 (LZ64)	06:44	07:22	08:04 (LZ66)		
	20:55	20:34	35 07:54 (LZ65)	19:47	18:52	15 07:47 (LZ64)	17:02	16:34	27 08:31 (LZ66)		
2	05:31	05:58	07:19 (LZ65)	06:33	07:07	07:34 (LZ64)	06:46	07:24	08:04 (LZ66)		
	20:55	20:33	36 07:55 (LZ65)	19:45	18:51	10 07:44 (LZ64)	17:00	16:34	27 08:31 (LZ66)		
3	05:32	05:59	07:18 (LZ65)	06:34	07:08		06:47	07:25	08:04 (LZ66)		
	20:55	20:32	38 07:56 (LZ65)	19:44	18:49		16:59	16:33	27 08:31 (LZ66)		
4	05:33	06:00	07:17 (LZ65)	06:35	07:09		06:48	07:26	08:05 (LZ66)		
	20:55	20:30	40 07:57 (LZ65)	19:42	18:47		16:58	16:33	26 08:31 (LZ66)		
5	05:33	06:02	07:16 (LZ65)	06:36	07:11		06:50	07:27	08:05 (LZ66)		
	20:55	20:29	41 07:57 (LZ65)	19:40	18:45		16:56	16:33	26 08:31 (LZ66)		
6	05:34	06:03	07:16 (LZ65)	06:38	07:12		06:51	07:28	08:06 (LZ66)		
	20:54	20:28	42 07:58 (LZ65)	19:38	18:43		16:55	16:33	25 08:31 (LZ66)		
7	05:34	06:04	07:15 (LZ65)	06:39	07:13		06:52	07:29	08:07 (LZ66)		
	20:54	20:26	43 07:58 (LZ65)	19:36	18:42		16:54	16:32	24 08:31 (LZ66)		
8	05:35	06:05	07:14 (LZ65)	06:40	07:14		06:54	07:30	08:07 (LZ66)		
	20:54	20:25	44 07:58 (LZ65)	19:35	18:40		16:53	16:32	24 08:31 (LZ66)		
9	05:36	06:06	07:14 (LZ65)	06:41	07:15		06:55	07:31	08:08 (LZ66)		
	20:53	20:24	45 07:59 (LZ65)	19:33	18:38		16:51	16:32	24 08:32 (LZ66)		
10	05:37	06:07	07:13 (LZ65)	06:42	07:17		06:56	07:32	08:09 (LZ66)		
	20:53	20:22	46 07:59 (LZ65)	19:31	18:36		16:50	16:32	23 08:32 (LZ66)		
11	05:37	06:08	07:13 (LZ65)	06:43	07:18		06:57	07:33	08:10 (LZ66)		
	20:52	20:21	46 07:59 (LZ65)	19:29	18:35		16:49	16:32	22 08:32 (LZ66)		
12	05:38	06:09	07:13 (LZ65)	06:44	07:19		06:59	07:33	08:10 (LZ66)		
	20:52	20:19	46 07:59 (LZ65)	19:27	18:33		16:48	16:32	22 08:32 (LZ66)		
13	05:39	06:10	07:12 (LZ65)	06:45	07:20		07:00	07:34	08:11 (LZ66)		
	20:51	20:18	47 07:59 (LZ65)	19:25	18:31		16:47	4 08:14 (LZ66)	16:32	22 08:33 (LZ66)	
14	05:40	06:12	07:12 (LZ65)	06:47	07:21		07:01	08:06 (LZ66)	07:35	08:11 (LZ66)	
	20:51	20:17	47 07:59 (LZ65)	19:24	18:30		16:46	11 08:17 (LZ66)	16:33	21 08:32 (LZ66)	
15	05:41	06:13	07:12 (LZ65)	06:48	07:23		07:03	08:05 (LZ66)	07:36	08:12 (LZ66)	
	20:50	20:15	46 07:58 (LZ65)	19:22	18:28		16:45	15 08:20 (LZ66)	16:33	21 08:33 (LZ66)	
16	05:41	06:14	07:13 (LZ65)	06:49	07:24		07:04	08:03 (LZ66)	07:37	08:13 (LZ66)	
	20:49	20:13	46 07:59 (LZ65)	19:20	18:26		16:44	18 08:21 (LZ66)	16:33	20 08:33 (LZ66)	
17	05:42	06:15	07:13 (LZ65)	06:50	07:25		07:05	08:03 (LZ66)	07:37	08:13 (LZ66)	
	20:49	20:12	46 07:59 (LZ65)	19:18	18:25		16:43	20 08:23 (LZ66)	16:33	20 08:33 (LZ66)	
18	05:43	06:16	07:13 (LZ65)	06:51	07:26		07:07	08:02 (LZ66)	07:38	08:14 (LZ66)	
	20:48	20:10	45 07:58 (LZ65)	19:16	18:23		16:42	22 08:24 (LZ66)	16:34	20 08:34 (LZ66)	
19	05:44	06:17	07:13 (LZ65)	06:52	07:28	07:39 (LZ64)	07:08	08:01 (LZ66)	07:39	08:15 (LZ66)	
	20:47	20:09	45 07:58 (LZ65)	19:14	9 07:48 (LZ64)	18:21	16:41	23 08:24 (LZ66)	16:34	19 08:34 (LZ66)	
20	05:45	06:18	07:13 (LZ65)	06:53	07:29	07:37 (LZ64)	07:09	08:01 (LZ66)	07:39	08:15 (LZ66)	
	20:46	20:07	44 07:57 (LZ65)	19:13	14 07:51 (LZ64)	18:20	16:41	25 08:26 (LZ66)	16:34	19 08:34 (LZ66)	
21	05:46	06:19	07:13 (LZ65)	06:54	07:30	07:35 (LZ64)	07:10	08:01 (LZ66)	07:40	08:16 (LZ66)	
	20:45	20:06	43 07:56 (LZ65)	19:11	17 07:52 (LZ64)	18:18	16:40	25 08:26 (LZ66)	16:35	19 08:35 (LZ66)	
22	05:47	06:21	07:13 (LZ65)	06:56	07:31	07:33 (LZ64)	07:12	08:00 (LZ66)	07:40	08:16 (LZ66)	
	20:44	20:04	42 07:55 (LZ65)	19:09	19 07:52 (LZ64)	18:16	16:39	27 08:27 (LZ66)	16:35	19 08:35 (LZ66)	
23	05:48	06:22	07:14 (LZ65)	06:57	07:32	07:32 (LZ64)	07:13	08:01 (LZ66)	07:41	08:17 (LZ66)	
	20:44	20:02	40 07:54 (LZ65)	19:07	21 07:53 (LZ64)	18:15	16:38	27 08:28 (LZ66)	16:36	19 08:36 (LZ66)	
24	05:49	07:32 (LZ65)	06:23	06:58	07:31	07:31 (LZ64)	07:34	08:01 (LZ66)	07:41	08:17 (LZ66)	
	20:43	9 07:41 (LZ65)	20:01	39 07:53 (LZ65)	19:05	22 07:53 (LZ64)	18:13	16:38	27 08:28 (LZ66)	16:36	19 08:36 (LZ66)
25	05:50	07:29 (LZ65)	06:24	06:59	07:30	07:30 (LZ64)	06:35	07:15	08:01 (LZ66)	07:42	08:17 (LZ66)
	20:42	15 07:44 (LZ65)	19:59	37 07:52 (LZ65)	19:03	23 07:53 (LZ64)	17:12	16:37	27 08:28 (LZ66)	16:37	20 08:37 (LZ66)
26	05:51	07:27 (LZ65)	06:25	07:00	07:30	07:30 (LZ64)	06:37	07:17	08:02 (LZ66)	07:42	08:18 (LZ66)
	20:41	19 07:46 (LZ65)	19:57	34 07:50 (LZ65)	19:02	22 07:52 (LZ64)	17:10	16:36	27 08:29 (LZ66)	16:38	20 08:38 (LZ66)
27	05:52	07:25 (LZ65)	06:26	07:01	07:29	07:29 (LZ64)	06:38	07:18	08:02 (LZ66)	07:42	08:18 (LZ66)
	20:40	23 07:48 (LZ65)	19:56	31 07:48 (LZ65)	19:00	22 07:51 (LZ64)	17:09	16:36	27 08:29 (LZ66)	16:38	20 08:38 (LZ66)
28	05:53	07:24 (LZ65)	06:27	07:02	07:30	07:30 (LZ64)	06:39	07:19	08:02 (LZ66)	07:43	08:18 (LZ66)
	20:39	26 07:50 (LZ65)	19:54	28 07:46 (LZ65)	18:58	22 07:52 (LZ64)	17:07	16:35	27 08:29 (LZ66)	16:39	21 08:39 (LZ66)
29	05:54	07:23 (LZ65)	06:29	07:04	07:31	07:31 (LZ64)	06:40	07:20	08:02 (LZ66)	07:43	08:18 (LZ66)
	20:37	28 07:51 (LZ65)	19:52	24 07:45 (LZ65)	18:56	19 07:50 (LZ64)	17:06	16:35	28 08:30 (LZ66)	16:40	21 08:39 (LZ66)
30	05:55	07:21 (LZ65)	06:30	07:05	07:31	07:31 (LZ64)	06:42	07:21	08:02 (LZ66)	07:43	08:19 (LZ66)
	20:36	31 07:52 (LZ65)	19:51	17 07:41 (LZ65)	18:54	18 07:49 (LZ64)	17:04	16:34	28 08:30 (LZ66)	16:40	22 08:41 (LZ66)
31	05:56	07:20 (LZ65)	06:31	07:06	07:31	07:31 (LZ64)	06:43			07:43	08:19 (LZ66)
	20:35	33 07:53 (LZ65)	19:49	6 07:35 (LZ65)			17:03			16:41	22 08:41 (LZ66)
Potential sun hours	468		433		376		342		291		279
Total, worst case	184		1209		228		25		408		681
Sun reduction	0.59		0.65		0.59		0.47		0.36		0.26
Oper. time red.	1.00		1.00		1.00		1.00		1.00		1.00
Wind dir. red.	0.59		0.59		0.62		0.62		0.67		0.67
Total reduction	0.35		0.38		0.36		0.29		0.24		0.18
Total, real	64		464		83		7		99		120

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)



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -99.0° Slope: 90.0° (56)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January		February		March		April		May		June			
1	07:44 16:42		07:28 17:19	33	08:08 (LZ66) 08:41 (LZ66)	06:48 17:57	7	07:33 (LZ67) 07:40 (LZ67)	06:53 19:35	21	07:18 (LZ64) 07:39 (LZ64)	06:03 20:11	05:31 20:44
2	07:44 16:43		07:27 17:21	32	08:09 (LZ66) 08:41 (LZ66)	06:46 17:58			06:51 19:36	23	07:17 (LZ64) 07:40 (LZ64)	06:02 20:12	05:31 20:45
3	07:44 16:44		07:25 17:22	33	08:08 (LZ66) 08:41 (LZ66)	06:45 18:00			06:49 19:38	24	07:17 (LZ64) 07:41 (LZ64)	06:00 20:13	05:30 20:46
4	07:44 16:45		07:24 17:23	33	08:08 (LZ66) 08:41 (LZ66)	06:43 18:01			06:48 19:39	24	07:16 (LZ64) 07:40 (LZ64)	05:59 20:15	05:30 20:46
5	07:44 16:46		07:23 17:25	33	08:08 (LZ66) 08:41 (LZ66)	06:41 18:02			06:46 19:40	25	07:15 (LZ64) 07:40 (LZ64)	05:58 20:16	05:29 20:47
6	07:44 16:47		07:22 17:26	32	08:09 (LZ66) 08:41 (LZ66)	06:40 18:03			06:44 19:41	24	07:15 (LZ64) 07:39 (LZ64)	05:56 20:17	05:29 20:48
7	07:43 16:48		07:21 17:27	31	08:09 (LZ66) 08:40 (LZ66)	06:38 18:05			06:42 19:42	24	07:15 (LZ64) 07:39 (LZ64)	05:55 20:18	05:28 20:48
8	07:43 16:49		07:19 17:29	31	08:09 (LZ66) 08:40 (LZ66)	06:36 18:06			06:41 19:44	23	07:15 (LZ64) 07:38 (LZ64)	05:54 20:19	05:28 20:49
9	07:43 16:50		07:18 17:30	30	08:10 (LZ66) 08:40 (LZ66)	06:34 18:07			06:39 19:45	22	07:15 (LZ64) 07:37 (LZ64)	05:52 20:20	05:28 20:50
10	07:43 16:51		07:17 17:32	29	08:10 (LZ66) 08:39 (LZ66)	06:33 18:08			06:37 19:46	20	07:16 (LZ64) 07:36 (LZ64)	05:51 20:22	05:28 20:50
11	07:43 16:52		07:15 17:33	27	08:12 (LZ66) 08:39 (LZ66)	06:31 18:10			06:35 19:47	17	07:18 (LZ64) 07:35 (LZ64)	05:50 20:23	05:27 20:51
12	07:42 16:53		07:14 17:34	25	08:13 (LZ66) 08:38 (LZ66)	06:29 18:11			06:34 19:48	13	07:19 (LZ64) 07:32 (LZ64)	05:49 20:24	05:27 20:51
13	07:42 16:55		07:13 17:36	22	08:14 (LZ66) 08:36 (LZ66)	06:27 18:12			06:32 19:50	7	07:21 (LZ64) 07:28 (LZ64)	05:48 20:25	05:27 20:52
14	07:41 16:56		07:11 17:37	19	08:16 (LZ66) 08:35 (LZ66)	06:26 18:13			06:30 19:51			05:46 20:26	05:27 20:52
15	07:41 16:57		07:10 17:38	24	07:33 (LZ67) 08:32 (LZ66)	06:24 18:15			06:29 19:52			05:45 20:27	05:27 20:53
16	07:41 16:58		07:08 17:40	17	07:31 (LZ67) 08:27 (LZ66)	06:22 18:16			06:27 19:53			05:44 20:28	05:27 20:53
17	07:40 16:59		07:07 17:41	17	07:29 (LZ67) 07:46 (LZ67)	06:20 18:17			06:25 19:54			05:43 20:29	05:27 20:54
18	07:39 17:01		07:06 17:42	19	07:29 (LZ67) 07:48 (LZ67)	06:18 18:18			06:24 19:56			05:42 20:30	05:27 20:54
19	07:39 17:02		07:04 17:44	21	07:27 (LZ67) 07:48 (LZ67)	06:17 18:20			06:22 19:57			05:41 20:32	05:27 20:54
20	07:38 17:03	7	07:03 08:25 (LZ66)	22	07:27 (LZ67) 07:49 (LZ67)	06:15 18:21			06:20 19:58			05:40 20:33	05:27 20:55
21	07:37 17:05	13	07:01 08:29 (LZ66)	22	07:27 (LZ67) 07:49 (LZ67)	06:13 18:22			06:19 19:59			05:39 20:34	05:27 20:55
22	07:37 17:06	17	06:59 08:14 (LZ66)	22	07:26 (LZ67) 07:48 (LZ67)	06:11 18:23			06:17 20:00			05:38 20:35	05:28 20:55
23	07:36 17:07	19	06:58 08:13 (LZ66)	22	07:27 (LZ67) 07:49 (LZ67)	06:09 18:24			06:15 20:02			05:37 20:36	05:28 20:55
24	07:35 17:08	22	06:56 08:12 (LZ66)	21	07:27 (LZ67) 07:48 (LZ67)	06:08 18:26			06:14 20:03			05:37 20:37	05:28 20:55
25	07:34 17:10	24	06:55 08:11 (LZ66)	20	07:28 (LZ67) 07:48 (LZ67)	06:06 18:27			06:12 20:04			05:36 20:38	05:28 20:56
26	07:33 17:11	26	06:53 08:10 (LZ66)	19	07:28 (LZ67) 07:47 (LZ67)	06:04 18:28			06:11 20:05			05:35 20:39	05:29 20:56
27	07:33 17:12	28	06:51 08:09 (LZ66)	16	07:29 (LZ67) 07:45 (LZ67)	06:02 18:29			06:09 20:06			05:34 20:39	05:29 20:56
28	07:32 17:14	29	06:50 08:09 (LZ66)	13	07:31 (LZ67) 07:44 (LZ67)	06:00 18:30			06:08 20:08			05:34 20:40	05:30 20:56
29	07:31 17:15	30	06:58 08:09 (LZ66)			06:58 19:32	12	07:24 (LZ64) 07:36 (LZ64)	06:06 20:09			05:33 20:41	05:30 20:56
30	07:30 17:16	30	06:57 08:09 (LZ66)			06:57 19:33	16	07:22 (LZ64) 07:38 (LZ64)	06:05 20:10			05:32 20:42	05:30 20:56
31	07:29 17:18	32	06:55 08:08 (LZ66)			06:55 19:34	19	07:20 (LZ64) 07:39 (LZ64)	05:52 20:43			05:32 20:43	
Potential sun hours		289		293		369		402		456		462	
Total, worst case		277		685		54		267					
Sun reduction		0.28		0.29		0.31		0.40					
Oper. time red.		1.00		1.00		1.00		1.00					
Wind dir. red.		0.66		0.65		0.61		0.61					
Total reduction		0.19		0.19		0.19		0.24					
Total, real		51		129		10		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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -99.0° Slope: 90.0° (56)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	July	August	September	October	November	December
1	05:31 20:55	05:57 20:34	06:32 19:47	07:17 (LZ64) 18:52	06:44 17:02	07:40 (LZ66) 16:34
2	05:31 20:55	05:58 20:33	06:33 19:45	07:15 (LZ64) 18:51	06:46 17:00	07:40 (LZ66) 16:34
3	05:32 20:55	05:59 20:32	06:34 19:44	07:13 (LZ64) 18:49	06:47 16:59	07:39 (LZ66) 16:33
4	05:33 20:55	06:00 20:30	06:35 19:42	07:12 (LZ64) 18:47	06:48 16:58	07:38 (LZ66) 16:33
5	05:33 20:55	06:02 20:29	06:36 19:40	07:11 (LZ64) 18:45	06:50 16:56	07:39 (LZ66) 16:33
6	05:34 20:54	06:03 20:28	06:38 19:38	07:11 (LZ64) 18:43	06:51 16:55	07:38 (LZ66) 16:33
7	05:34 20:54	06:04 20:26	06:39 19:36	07:10 (LZ64) 18:42	06:52 16:54	07:39 (LZ66) 16:32
8	05:35 20:54	06:05 20:25	06:40 19:35	07:10 (LZ64) 18:40	06:53 16:53	07:39 (LZ66) 16:32
9	05:36 20:53	06:06 20:24	06:41 19:33	07:10 (LZ64) 18:38	06:55 16:51	07:38 (LZ66) 16:32
10	05:37 20:53	06:07 20:22	06:42 19:31	07:11 (LZ64) 18:36	06:56 16:50	07:39 (LZ66) 16:32
11	05:37 20:52	06:08 20:21	06:43 19:29	07:11 (LZ64) 18:35	06:57 16:49	07:39 (LZ66) 16:32
12	05:38 20:52	06:09 20:19	06:44 19:27	07:12 (LZ64) 18:33	06:59 16:48	07:40 (LZ66) 16:32
13	05:39 20:51	06:10 20:18	06:45 19:25	07:13 (LZ64) 18:31	07:00 16:47	07:41 (LZ66) 16:32
14	05:40 20:51	06:12 20:17	06:47 19:24	07:14 (LZ64) 18:30	07:01 16:46	07:41 (LZ66) 16:33
15	05:41 20:50	06:13 20:15	06:48 19:22	07:18 (LZ64) 18:28	07:03 16:45	07:42 (LZ66) 16:33
16	05:41 20:49	06:14 20:13	06:49 19:20	07:22 (LZ64) 18:26	18 08:18 (LZ67) 16:44	08:10 (LZ66) 16:33
17	05:42 20:49	06:15 20:12	06:50 19:18	07:25 18:25	07:05 16:43	07:45 (LZ66) 16:33
18	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	07:07 16:42	07:46 (LZ66) 16:34
19	05:44 20:47	06:17 20:09	06:52 19:14	07:28 18:21	07:08 16:41	07:47 (LZ66) 16:34
20	05:45 20:46	06:18 20:07	06:53 19:13	07:29 18:20	07:09 16:41	07:49 (LZ66) 16:34
21	05:46 20:45	06:19 20:06	06:54 19:11	07:30 18:18	07:10 16:40	07:51 (LZ66) 16:35
22	05:47 20:44	06:21 20:04	06:56 19:09	07:31 18:16	07:12 16:39	07:54 (LZ66) 16:35
23	05:48 20:44	06:22 20:02	06:57 19:07	07:33 18:15	07:13 16:38	08:01 (LZ66) 16:36
24	05:49 20:43	06:23 20:01	06:58 19:05	07:34 18:13	07:14 16:38	16:36
25	05:50 20:42	06:24 19:59	06:59 19:03	07:35 17:12	07:15 16:37	07:42
26	05:51 20:41	06:25 19:57	07:00 19:02	06:37 17:10	07:17 16:36	07:42
27	05:52 20:40	06:26 19:56	07:01 19:00	06:38 17:09	07:18 16:36	07:42
28	05:53 20:39	06:27 19:54	07:02 18:58	06:39 17:07	07:19 16:35	07:43
29	05:54 20:37	06:29 19:52	07:04 18:56	06:40 17:06	07:20 16:35	07:43
30	05:55 20:36	06:30 19:51	07:05 18:54	06:42 17:04	07:21 16:34	07:43
31	05:56 20:35	06:31 19:49	07:19 (LZ64) 07:32 (LZ64)	06:43 17:03	07:41 (LZ66) 08:08 (LZ66)	16:40 16:41
Potential sun hours	468	433	376	342	291	279
Total, worst case		21	302	387	596	
Sun reduction		0.65	0.59	0.47	0.36	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.61	0.61	0.64	0.66	
Total reduction		0.39	0.36	0.30	0.24	
Total, real		8	108	117	144	

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -100.3° Slope: 90.0° (57)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January			February			March			April			May			June		
1	07:44		07:28	08:09 (LZ73)	06:48		07:34 (LZ66)	06:53		06:03		06:38 (LZ64)	05:31				
	16:42		17:19	08:26 (LZ73)	17:57	37	08:11 (LZ66)	19:35		20:11	25	07:03 (LZ64)	20:44				
2	07:44		07:27	08:11 (LZ73)	06:46		07:33 (LZ66)	06:51		06:02		06:39 (LZ64)	05:31				
	16:43		17:21	08:25 (LZ73)	17:58	37	08:10 (LZ66)	19:36		20:12	24	07:03 (LZ64)	20:45				
3	07:44		07:25	08:12 (LZ73)	06:45		07:32 (LZ66)	06:49		06:00		06:40 (LZ64)	05:30				
	16:44		17:22	08:22 (LZ73)	18:00	38	08:10 (LZ66)	19:38		20:13	23	07:03 (LZ64)	20:45				
4	07:44		07:24		06:43		07:33 (LZ66)	06:48		05:59		06:40 (LZ64)	05:30				
	16:45		17:23		18:01	37	08:10 (LZ66)	19:39		20:15	21	07:01 (LZ64)	20:46				
5	07:44		07:23		06:41		07:07 (LZ67)	06:46		05:58		06:41 (LZ64)	05:29				
	16:46		17:25		18:02	46	08:09 (LZ66)	19:40		20:16	20	07:01 (LZ64)	20:47				
6	07:44		07:22		06:40		07:04 (LZ67)	06:44		05:56		06:42 (LZ64)	05:29				
	16:47		17:26		18:03	50	08:08 (LZ66)	19:41		20:17	18	07:00 (LZ64)	20:48				
7	07:43		07:21		06:38		07:02 (LZ67)	06:42		05:55		06:43 (LZ64)	05:28				
	16:48		17:27		18:05	52	08:07 (LZ66)	19:42		20:18	16	06:59 (LZ64)	20:48				
8	07:43		07:19		06:36		07:01 (LZ67)	06:41		05:54		06:44 (LZ64)	05:28				
	16:49		17:29		18:06	53	08:07 (LZ66)	19:44		20:19	12	06:56 (LZ64)	20:49				
9	07:43		07:18		06:34		07:00 (LZ67)	06:39		05:52		06:47 (LZ64)	05:28				
	16:50		17:30		18:07	54	08:06 (LZ66)	19:45		20:20	6	06:53 (LZ64)	20:50				
10	07:43		07:17		06:33		06:59 (LZ67)	06:37		05:51			05:28				
	16:51		17:32		18:08	52	08:04 (LZ66)	19:46		20:22			05:50				
11	07:43		07:15		06:31		06:58 (LZ67)	06:35		05:50			05:27				
	16:52		17:33		18:10	50	08:02 (LZ66)	19:47		20:23			05:27				
12	07:42		07:14		06:29		06:58 (LZ67)	06:34		05:49			05:27				
	16:53	2	08:13 (LZ73)	17:34		18:11	47	08:01 (LZ66)	19:48		20:24		05:27				
13	07:42		07:13		06:27		06:58 (LZ67)	06:32		05:48			05:27				
	16:55	9	08:17 (LZ73)	17:36		18:12	42	07:58 (LZ66)	19:50		20:25		05:27				
14	07:41		07:11		06:26		06:58 (LZ67)	06:30		05:46			05:27				
	16:56	11	08:18 (LZ73)	17:37		18:13	35	07:54 (LZ66)	19:51		20:26		05:27				
15	07:41		07:10		06:24		06:58 (LZ67)	06:29		05:45			05:27				
	16:57	14	08:20 (LZ73)	17:38		18:15	22	07:20 (LZ67)	19:52		20:27		05:27				
16	07:41		07:08		06:22		06:58 (LZ67)	06:27		05:44			05:27				
	16:58	16	08:21 (LZ73)	17:40		18:16	20	07:18 (LZ67)	19:53		20:28		05:27				
17	07:40		07:07		06:20		07:00 (LZ67)	06:25		05:43			05:27				
	16:59	17	08:22 (LZ73)	17:41		18:17	18	07:18 (LZ67)	19:54		20:29		05:27				
18	07:39		07:06		06:18		07:01 (LZ67)	06:24		05:42			05:27				
	17:01	18	08:23 (LZ73)	17:42		18:18	15	07:16 (LZ67)	19:56		20:30		05:27				
19	07:39		07:04		06:17		07:04 (LZ67)	06:22		05:41			05:27				
	17:02	20	08:24 (LZ73)	17:44	12	07:59 (LZ66)	8	07:12 (LZ67)	19:57		20:32		05:27				
20	07:38		07:03		06:15			06:20		05:40			05:27				
	17:03	21	08:25 (LZ73)	17:45	19	08:03 (LZ66)		19:58	11	06:59 (LZ64)		20:33	05:27				
21	07:37		07:01		06:13			06:19		06:45 (LZ64)		05:39	05:27				
	17:05	21	08:26 (LZ73)	17:46	24	08:05 (LZ66)		19:59	16	07:01 (LZ64)		20:34	05:27				
22	07:37		06:59		06:11			06:17		06:44 (LZ64)		05:38	05:28				
	17:06	22	08:26 (LZ73)	17:48	27	08:06 (LZ66)		20:00	19	07:03 (LZ64)		20:35	05:28				
23	07:36		06:58		06:09			06:15		06:42 (LZ64)		05:37	05:28				
	17:07	23	08:27 (LZ73)	17:49	30	08:08 (LZ66)		20:02	21	07:03 (LZ64)		20:36	05:28				
24	07:35		06:56		06:08			06:14		06:42 (LZ64)		05:37	05:28				
	17:08	23	08:27 (LZ73)	17:50	31	08:08 (LZ66)		20:03	22	07:04 (LZ64)		20:37	05:28				
25	07:34		06:55		06:06			06:12		06:40 (LZ64)		05:36	05:28				
	17:10	23	08:27 (LZ73)	17:52	34	08:10 (LZ66)		20:04	24	07:04 (LZ64)		20:38	05:29				
26	07:33		06:53		06:04			06:11		06:40 (LZ64)		05:35	05:29				
	17:11	22	08:27 (LZ73)	17:53	35	08:10 (LZ66)		20:05	25	07:05 (LZ64)		20:39	05:30				
27	07:33		06:51		06:02			06:09		06:39 (LZ64)		05:34	05:29				
	17:12	22	08:27 (LZ73)	17:54	36	08:10 (LZ66)		20:06	26	07:05 (LZ64)		20:39	05:30				
28	07:32		06:50		06:00			06:08		06:39 (LZ64)		05:34	05:30				
	17:14	21	08:27 (LZ73)	17:56	37	08:11 (LZ66)		20:08	26	07:05 (LZ64)		20:40	05:30				
29	07:31				06:58			06:06		06:39 (LZ64)		05:33	05:30				
	17:15	21	08:27 (LZ73)		19:32			20:09	25	07:04 (LZ64)		20:41	05:30				
30	07:30				06:57			06:05		06:39 (LZ64)		05:32	05:30				
	17:16	20	08:27 (LZ73)		19:33			20:10	25	07:04 (LZ64)		20:42	05:30				
31	07:29		06:55		06:55					05:32			05:32				
	17:18	19	08:27 (LZ73)		19:34					20:43			05:32				
Potential sun hours	289		293		369			402		456			462				
Total, worst case	365		326		713			240		165							
Sun reduction	0.28		0.29		0.31			0.40		0.47							
Oper. time red.	1.00		1.00		1.00			1.00		1.00							
Wind dir. red.	0.66		0.64		0.63			0.57		0.57							
Total reduction	0.19		0.18		0.19			0.23		0.27							
Total, real	68		60		137			54		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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -100.3° Slope: 90.0° (57)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July	August	September	October	November	December
1	05:31 20:55	05:57 20:34	06:32 19:47	07:06 18:52	07:37 (LZ67) 08:39 (LZ66)	06:44 17:02
2	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:51	07:37 (LZ67) 08:40 (LZ66)	06:46 17:00
3	05:32 20:55	05:59 20:32	06:34 19:44	07:08 18:49	07:36 (LZ67) 08:41 (LZ66)	06:47 16:59
4	05:33 20:55	06:00 20:30	06:35 19:42	07:09 18:47	07:37 (LZ67) 08:43 (LZ66)	06:48 16:58
5	05:33 20:55	06:02 20:29	06:36 19:40	07:11 18:45	07:37 (LZ67) 08:43 (LZ66)	06:50 16:56
6	05:34 20:54	06:03 20:28	06:38 19:38	07:12 18:43	07:38 (LZ67) 08:44 (LZ66)	06:51 16:55
7	05:34 20:54	06:04 20:26	06:39 19:36	07:13 18:42	07:39 (LZ67) 08:44 (LZ66)	06:52 16:54
8	05:35 20:54	06:05 20:25	06:40 19:35	07:14 18:40	07:40 (LZ67) 08:44 (LZ66)	06:53 16:53
9	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	07:44 (LZ67) 08:45 (LZ66)	06:55 16:51
10	05:37 20:53	06:07 20:22	06:42 19:31	07:17 18:36	08:07 (LZ66) 08:44 (LZ66)	06:56 16:50
11	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:35	08:07 (LZ66) 08:44 (LZ66)	06:57 16:49
12	05:38 20:52	06:09 20:19	06:44 19:27	07:19 18:33	08:06 (LZ66) 08:43 (LZ66)	06:59 16:48
13	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	08:07 (LZ66) 08:44 (LZ66)	07:00 16:47
14	05:40 20:51	06:12 20:16	06:47 19:24	07:21 18:30	08:07 (LZ66) 08:43 (LZ66)	07:01 16:46
15	05:41 20:50	06:13 20:15	06:48 19:22	07:23 18:28	08:07 (LZ66) 08:42 (LZ66)	07:03 16:45
16	05:41 20:49	06:14 20:13	06:49 19:20	07:24 18:26	08:07 (LZ66) 08:41 (LZ66)	07:04 16:44
17	05:42 20:49	06:15 20:12	06:50 19:18	07:25 18:25	08:08 (LZ66) 08:41 (LZ66)	07:05 16:43
18	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	08:09 (LZ66) 08:39 (LZ66)	07:07 16:42
19	05:44 20:47	06:17 20:09	06:52 19:14	07:28 18:21	08:09 (LZ66) 08:38 (LZ66)	07:08 16:41
20	05:45 20:46	06:18 20:07	06:53 19:13	07:29 18:20	08:11 (LZ66) 08:37 (LZ66)	07:09 16:41
21	05:46 20:45	06:19 20:06	06:54 19:11	07:30 18:18	08:13 (LZ66) 08:35 (LZ66)	07:10 16:40
22	05:47 20:44	06:21 20:04	06:56 19:09	07:31 18:16	08:14 (LZ66) 08:32 (LZ66)	07:12 16:39
23	05:48 20:44	06:22 20:02	06:57 19:07	07:33 18:15	08:19 (LZ66) 08:29 (LZ66)	07:13 16:38
24	05:49 20:43	06:23 20:01	06:58 19:05	07:34 18:13	07:42 (LZ73) 16:38	07:14 16:38
25	05:50 20:42	06:24 19:59	06:59 19:03	07:35 18:12	16:38 16:37	19:08:01 (LZ73) 16:36
26	05:51 20:41	06:25 19:57	07:00 19:02	07:36 18:10	16:37 16:36	17:07:44 (LZ73) 16:38
27	05:52 20:40	06:26 19:56	07:01 19:00	07:37 18:09	16:36 16:36	17:07:45 (LZ73) 16:38
28	05:53 20:39	06:27 19:54	07:02 18:58	07:38 18:07	16:36 16:35	17:07:47 (LZ73) 16:39
29	05:54 20:37	06:29 19:52	07:04 18:56	07:39 18:33	16:35 16:35	17:07:48 (LZ73) 16:40
30	05:55 20:36	06:30 19:51	07:05 18:54	07:38 18:37	16:35 16:34	17:07:51 (LZ73) 16:40
31	05:56 20:35	06:31 19:49	06:43 17:03	17:04 17:03	3 07:54 (LZ73) 291	16:40 279
Potential sun hours	468	433	376	342	291	279
Total, worst case		412	145	871	410	
Sun reduction		0.65	0.59	0.47	0.36	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.57	0.62	0.63	0.66	
Total reduction		0.37	0.37	0.30	0.24	
Total, real		152	53	259	99	

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)



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_05 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -94.1° Slope: 90.0° (58)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January			February			March			April			May			June		
1	07:44		08:29 (LZ74)	07:28		06:48			06:53		07:19 (LZ67)	06:03			05:31		06:01 (LZ64)
	16:42	31	09:00 (LZ74)	17:19		17:57			19:35	25	07:51 (LZ66)	20:11			20:44	20	06:21 (LZ64)
2	07:44		08:29 (LZ74)	07:27		06:46			06:51		07:17 (LZ67)	06:02			05:31		06:00 (LZ64)
	16:43	32	09:01 (LZ74)	17:21		17:58			19:36	37	07:55 (LZ66)	20:12			20:45	21	06:21 (LZ64)
3	07:44		08:30 (LZ74)	07:25		06:45			06:49		07:16 (LZ67)	06:00			05:30		06:00 (LZ64)
	16:44	31	09:01 (LZ74)	17:22		18:00			19:38	42	07:58 (LZ66)	20:13			20:45	22	06:22 (LZ64)
4	07:44		08:29 (LZ74)	07:24		06:43			06:48		07:15 (LZ67)	05:59			05:30		06:01 (LZ64)
	16:45	32	09:01 (LZ74)	17:23		18:01			19:39	45	08:00 (LZ66)	20:15			20:46	22	06:23 (LZ64)
5	07:44		08:30 (LZ74)	07:23		06:41			06:46		07:14 (LZ67)	05:58			05:29		06:00 (LZ64)
	16:46	32	09:02 (LZ74)	17:25		18:02			19:40	47	08:01 (LZ66)	20:16			20:47	22	06:22 (LZ64)
6	07:44		08:30 (LZ74)	07:22		06:40			06:44		07:13 (LZ67)	05:56			05:29		06:00 (LZ64)
	16:47	32	09:02 (LZ74)	17:26		18:03			19:41	49	08:02 (LZ66)	20:17			20:48	23	06:23 (LZ64)
7	07:43		08:31 (LZ74)	07:21		06:38			06:42		07:13 (LZ67)	05:55			05:28		06:00 (LZ64)
	16:48	32	09:03 (LZ74)	17:27		18:05			19:42	50	08:03 (LZ66)	20:18			20:48	24	06:24 (LZ64)
8	07:43		08:32 (LZ74)	07:19		06:36			06:41		07:12 (LZ67)	05:54			05:28		06:00 (LZ64)
	16:49	32	09:04 (LZ74)	17:29		18:06			19:44	52	08:04 (LZ66)	20:19			20:49	23	06:23 (LZ64)
9	07:43		08:31 (LZ74)	07:18		06:34			06:39		07:12 (LZ67)	05:52			05:28		06:00 (LZ64)
	16:50	32	09:03 (LZ74)	17:30		18:07			19:45	52	08:04 (LZ66)	20:20			20:50	24	06:24 (LZ64)
10	07:43		08:32 (LZ74)	07:17		06:33			06:37		07:12 (LZ67)	05:51			05:28		06:00 (LZ64)
	16:51	32	09:04 (LZ74)	17:32		18:08			19:46	52	08:04 (LZ66)	20:22			20:50	24	06:24 (LZ64)
11	07:43		08:33 (LZ74)	07:15	07:43 (LZ73)	06:31			06:35		07:13 (LZ67)	05:50			05:27		06:00 (LZ64)
	16:52	32	09:05 (LZ74)	17:33	10	18:10			19:47	51	08:04 (LZ66)	20:23			20:51	25	06:25 (LZ64)
12	07:42		08:33 (LZ74)	07:14	07:41 (LZ73)	06:29			06:34		07:13 (LZ67)	05:49			05:27		06:00 (LZ64)
	16:54	32	09:05 (LZ74)	17:34	15	18:11			19:48	51	08:04 (LZ66)	20:24			20:51	25	06:25 (LZ64)
13	07:42		08:34 (LZ74)	07:13	07:39 (LZ73)	06:27			06:32		07:14 (LZ67)	05:48			05:27		06:01 (LZ64)
	16:55	31	09:05 (LZ74)	17:36	18	18:12			19:50	50	08:04 (LZ66)	20:25			20:52	25	06:26 (LZ64)
14	07:41		08:34 (LZ74)	07:11	07:38 (LZ73)	06:26			06:30		07:16 (LZ67)	05:46			05:27		06:01 (LZ64)
	16:56	31	09:05 (LZ74)	17:37	20	18:13			19:51	48	08:04 (LZ66)	20:26			20:52	25	06:26 (LZ64)
15	07:41		08:35 (LZ74)	07:10	07:37 (LZ73)	06:24			06:29		07:18 (LZ67)	05:45			05:27		06:01 (LZ64)
	16:57	31	09:06 (LZ74)	17:38	22	18:15			19:52	46	08:04 (LZ66)	20:27			20:53	25	06:26 (LZ64)
16	07:40		08:35 (LZ74)	07:08	07:36 (LZ73)	06:22			06:27		07:21 (LZ66)	05:44			05:27		06:01 (LZ64)
	16:58	30	09:05 (LZ74)	17:40	24	18:16			19:53	42	08:03 (LZ66)	20:28			20:53	25	06:26 (LZ64)
17	07:40		08:36 (LZ74)	07:07	07:35 (LZ73)	06:20			06:25		07:21 (LZ66)	05:43			05:27		06:01 (LZ64)
	16:59	29	09:05 (LZ74)	17:41	25	18:17			19:54	42	08:03 (LZ66)	20:29			20:54	26	06:27 (LZ64)
18	07:39		08:37 (LZ74)	07:06	07:36 (LZ73)	06:18			06:24		07:21 (LZ66)	05:42			05:27		06:01 (LZ64)
	17:01	29	09:06 (LZ74)	17:42	25	18:18			19:56	41	08:02 (LZ66)	20:30			20:54	26	06:27 (LZ64)
19	07:39		08:37 (LZ74)	07:04	07:35 (LZ73)	06:17			06:22		07:21 (LZ66)	05:41			05:27		06:01 (LZ64)
	17:02	28	09:05 (LZ74)	17:44	25	18:20			19:57	40	08:01 (LZ66)	20:31			20:54	26	06:27 (LZ64)
20	07:38		08:38 (LZ74)	07:02	07:35 (LZ73)	06:15			06:20		07:22 (LZ66)	05:40			05:27		06:01 (LZ64)
	17:03	27	09:05 (LZ74)	17:45	26	18:21			19:58	39	08:01 (LZ66)	20:33			20:55	26	06:27 (LZ64)
21	07:37		08:39 (LZ74)	07:01	07:35 (LZ73)	06:13			06:19		07:21 (LZ66)	05:39			05:27		06:01 (LZ64)
	17:05	25	09:04 (LZ74)	17:46	25	18:22			19:59	38	07:59 (LZ66)	20:34			20:55	26	06:27 (LZ64)
22	07:37		08:41 (LZ74)	06:59	07:35 (LZ73)	06:11			06:17		07:22 (LZ66)	05:38			05:28		06:02 (LZ64)
	17:06	23	09:04 (LZ74)	17:48	24	18:23			20:00	37	07:59 (LZ66)	20:35			20:55	26	06:28 (LZ64)
23	07:36		08:42 (LZ74)	06:58	07:36 (LZ73)	06:09			06:15		07:23 (LZ66)	05:38			05:28		06:02 (LZ64)
	17:07	21	09:03 (LZ74)	17:49	23	18:24			20:02	34	07:57 (LZ66)	20:36			20:55	26	06:28 (LZ64)
24	07:35		08:43 (LZ74)	06:56	07:36 (LZ73)	06:08			06:14		07:24 (LZ66)	05:37			05:28		06:02 (LZ64)
	17:08	19	09:02 (LZ74)	17:50	21	18:26			20:03	33	07:57 (LZ66)	20:37			20:55	26	06:28 (LZ64)
25	07:34		08:45 (LZ74)	06:55	07:38 (LZ73)	06:06			06:12		07:24 (LZ66)	05:36			05:28		06:02 (LZ64)
	17:10	16	09:01 (LZ74)	17:52	19	18:27			20:04	31	07:55 (LZ66)	20:38			20:56	26	06:28 (LZ64)
26	07:33		08:47 (LZ74)	06:53	07:39 (LZ73)	06:04			06:11		07:26 (LZ66)	05:35		06:07 (LZ64)	05:29		06:03 (LZ64)
	17:11	12	08:59 (LZ74)	17:53	16	18:28			20:05	28	07:54 (LZ66)	20:39	6	06:13 (LZ64)	20:56	26	06:29 (LZ64)
27	07:33			06:51	07:41 (LZ73)	06:02			06:09		07:27 (LZ66)	05:34		06:05 (LZ64)	05:29		06:03 (LZ64)
	17:12			17:54	11	18:29			20:06	24	07:51 (LZ66)	20:39	11	06:16 (LZ64)	20:56	25	06:28 (LZ64)
28	07:32			06:50					06:08		07:29 (LZ66)	05:34		06:04 (LZ64)	05:30		06:04 (LZ64)
	17:14			17:56		18:30			20:08	21	07:50 (LZ66)	20:40	13	06:17 (LZ64)	20:56	25	06:29 (LZ64)
29	07:31					06:58			06:06		07:31 (LZ66)	05:33		06:02 (LZ64)	05:30		06:04 (LZ64)
	17:15					19:32			20:09	15	07:46 (LZ66)	20:41	15	06:17 (LZ64)	20:56	25	06:29 (LZ64)
30	07:30					06:57	07:27 (LZ67)		06:05		07:35 (LZ66)	05:32		06:02 (LZ64)	05:30		06:04 (LZ64)
	17:16					19:33	2	07:29 (LZ67)	20:10	7	07:42 (LZ66)	20:42	17	06:19 (LZ64)	20:56	24	06:28 (LZ64)
31	07:29					06:55	07:21 (LZ67)					05:32		06:01 (LZ64)			
	17:18					19:34	13	07:34 (LZ67)				20:43	18	06:19 (LZ64)			
Potential sun hours	289		293			369			402			456			462		
Total, worst case	734		349			15			1169			80			734		
Sun reduction	0.28		0.29			0.31			0.40			0.47			0.49		
Oper. time red.	1.00		1.00			1.00			1.00			1.00			1.00		
Wind dir. red.	0.66		0.64			0.60			0.61			0.60			0.60		
Total reduction	0.19		0.19			0.18			0.24			0.28			0.30		
Total, real	136		65			3			281			22			218		

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)



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_05 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -94.1° Slope: 90.0° (58)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July			August			September			October			November			December		
1	05:31		06:04 (LZ64)	05:57			06:32		07:12 (LZ67)	07:06		06:44			07:22		08:15 (LZ74)	
2	20:55	25	06:29 (LZ64)	20:34			19:47	51	08:03 (LZ66)	18:52		17:02			16:34	32	08:47 (LZ74)	
	05:31		06:05 (LZ64)	05:58			06:33		07:11 (LZ67)	07:07		06:46			07:24		08:15 (LZ74)	
3	20:55	25	06:30 (LZ64)	20:33			19:45	52	08:03 (LZ66)	18:51		17:00			16:34	32	08:47 (LZ74)	
	05:32		06:05 (LZ64)	05:59			06:34		07:10 (LZ67)	07:08		06:47			07:25		08:15 (LZ74)	
4	20:55	24	06:29 (LZ64)	20:32			19:44	52	08:02 (LZ66)	18:49		16:59			16:33	32	08:47 (LZ74)	
	05:33		06:06 (LZ64)	06:00			06:35		07:09 (LZ67)	07:09		06:48			07:26		08:16 (LZ74)	
5	20:55	24	06:30 (LZ64)	20:30			19:42	52	08:01 (LZ66)	18:47		16:58			16:33	32	08:48 (LZ74)	
	05:33		06:05 (LZ64)	06:02			06:36		07:09 (LZ67)	07:11		06:50			07:27		08:16 (LZ74)	
6	20:55	24	06:29 (LZ64)	20:29			19:40	50	07:59 (LZ66)	18:45		16:56			16:33	32	08:48 (LZ74)	
	05:34		06:06 (LZ64)	06:03			06:38		07:09 (LZ67)	07:12		06:51			07:28		08:16 (LZ74)	
7	20:54	23	06:29 (LZ64)	20:28			19:38	49	07:58 (LZ66)	18:43		16:55			16:33	32	08:48 (LZ74)	
	05:34		06:07 (LZ64)	06:04			06:39		07:09 (LZ67)	07:13		06:52			07:29		08:17 (LZ74)	
8	20:54	23	06:30 (LZ64)	20:26			19:36	47	07:56 (LZ66)	18:42		16:54			16:32	32	08:49 (LZ74)	
	05:35		06:07 (LZ64)	06:05			06:40		07:09 (LZ67)	07:14		06:53			07:30		08:17 (LZ74)	
9	20:54	22	06:29 (LZ64)	20:25			19:35	45	07:54 (LZ66)	18:40		16:53			16:32	32	08:49 (LZ74)	
	05:36		06:08 (LZ64)	06:06			06:41		07:09 (LZ67)	07:15		06:55			07:31		08:18 (LZ74)	
10	20:53	21	06:29 (LZ64)	20:24			19:33	43	07:52 (LZ66)	18:38		16:51			16:32	32	08:50 (LZ74)	
	05:37		06:08 (LZ64)	06:07			06:42		07:11 (LZ67)	07:17		06:56			07:32		08:19 (LZ74)	
11	20:53	21	06:29 (LZ64)	20:22			19:31	38	07:50 (LZ66)	18:36		16:50			16:32	31	08:50 (LZ74)	
	05:37		06:08 (LZ64)	06:08			06:43		07:11 (LZ67)	07:18		06:57			07:33		08:19 (LZ74)	
12	20:52	20	06:28 (LZ64)	20:21			19:29	28	07:45 (LZ66)	18:35		16:49			16:32	31	08:50 (LZ74)	
	05:38		06:09 (LZ64)	06:09			06:44		07:13 (LZ67)	07:19		06:59			07:33		08:20 (LZ74)	
13	20:52	19	06:28 (LZ64)	20:19			19:27	13	07:26 (LZ67)	18:33		16:48			16:32	31	08:51 (LZ74)	
	05:39		06:10 (LZ64)	06:10			06:45		07:16 (LZ67)	07:20		07:00			07:34		08:20 (LZ74)	
14	20:51	18	06:28 (LZ64)	20:18	11	07:41 (LZ66)	19:25	6	07:22 (LZ67)	18:31		16:47			16:32	31	08:51 (LZ74)	
	05:40		06:11 (LZ64)	06:12			07:38 (LZ66)	06:47		07:21		07:01	08:17 (LZ73)		07:35		08:20 (LZ74)	
15	20:51	16	06:27 (LZ64)	20:16	17	07:55 (LZ66)	19:24			18:30	5	08:22 (LZ73)			16:33	31	08:51 (LZ74)	
	05:41		06:12 (LZ64)	06:13			07:35 (LZ66)	06:48		07:23		07:03		08:25 (LZ74)	07:36		08:21 (LZ74)	
16	20:50	15	06:27 (LZ64)	20:15	22	07:57 (LZ66)	19:22			18:28	13	08:25 (LZ73)	16:45	2	08:27 (LZ74)	16:33	31	08:52 (LZ74)
	05:41		06:13 (LZ64)	06:14			07:34 (LZ66)	06:49		07:24		08:10 (LZ73)	07:04		08:20 (LZ74)	07:37		08:22 (LZ74)
17	20:49	12	06:25 (LZ64)	20:13	26	08:00 (LZ66)	19:20			18:26	17	08:27 (LZ73)	16:44	12	08:32 (LZ74)	16:33	30	08:52 (LZ74)
	05:42		06:15 (LZ64)	06:15			07:32 (LZ66)	06:50		07:25		08:09 (LZ73)	07:05		08:19 (LZ74)	07:37		08:22 (LZ74)
18	20:48	8	06:23 (LZ64)	20:12	29	08:01 (LZ66)	19:18			18:25	20	08:29 (LZ73)	16:43	16	08:35 (LZ74)	16:33	30	08:52 (LZ74)
	05:43		06:16	06:16			07:31 (LZ66)	06:51		07:26		08:08 (LZ73)	07:07		08:17 (LZ74)	07:38		08:23 (LZ74)
19	20:48		06:10	31	08:02 (LZ66)	19:16				18:23	21	08:29 (LZ73)	16:42	19	08:36 (LZ74)	16:34	30	08:53 (LZ74)
	05:44		06:17	07:29 (LZ66)	06:52					07:28		08:06 (LZ73)	07:08		08:16 (LZ74)	07:39		08:23 (LZ74)
20	20:47		20:09	34	08:03 (LZ66)	19:14				18:21	24	08:30 (LZ73)	16:41	21	08:37 (LZ74)	16:34	31	08:54 (LZ74)
	05:45		06:18	07:28 (LZ66)	06:53					07:29		08:06 (LZ73)	07:09		08:16 (LZ74)	07:39		08:23 (LZ74)
21	20:46		20:07	35	08:03 (LZ66)	19:13				18:20	25	08:31 (LZ73)	16:41	23	08:39 (LZ74)	16:34	31	08:54 (LZ74)
	05:46		06:19	07:27 (LZ66)	06:54					07:30		08:06 (LZ73)	07:10		08:15 (LZ74)	07:40		08:24 (LZ74)
22	20:45		20:06	37	08:04 (LZ66)	19:11				18:18	25	08:31 (LZ73)	16:40	25	08:40 (LZ74)	16:35	30	08:54 (LZ74)
	05:47		06:21	07:26 (LZ66)	06:56					07:31		08:05 (LZ73)	07:12		08:14 (LZ74)	07:40		08:24 (LZ74)
23	20:44		20:04	38	08:04 (LZ66)	19:09				18:16	25	08:30 (LZ73)	16:39	27	08:41 (LZ74)	16:35	30	08:54 (LZ74)
	05:48		06:22	07:25 (LZ66)	06:57					07:33		08:06 (LZ73)	07:13		08:14 (LZ74)	07:41		08:25 (LZ74)
24	20:44		20:02	40	08:05 (LZ66)	19:07				18:15	25	08:31 (LZ73)	16:38	28	08:42 (LZ74)	16:36	31	08:56 (LZ74)
	05:49		06:23	07:25 (LZ66)	06:58					07:34		08:05 (LZ73)	07:14		08:14 (LZ74)	07:41		08:25 (LZ74)
25	20:43		20:01	40	08:05 (LZ66)	19:05				18:13	25	08:30 (LZ73)	16:38	29	08:43 (LZ74)	16:36	31	08:56 (LZ74)
	05:50		06:24	07:24 (LZ66)	06:59					06:35		07:05 (LZ73)	07:15		08:14 (LZ74)	07:42		08:25 (LZ74)
26	20:42		19:59	41	08:05 (LZ66)	19:03				17:12	24	07:29 (LZ73)	16:37	29	08:43 (LZ74)	16:37	31	08:56 (LZ74)
	05:51		06:25	07:23 (LZ66)	07:00					06:36		07:06 (LZ73)	07:17		08:14 (LZ74)	07:42		08:27 (LZ74)
27	20:41		19:57	42	08:05 (LZ66)	19:02				17:10	23	07:29 (LZ73)	16:36	30	08:44 (LZ74)	16:38	30	08:57 (LZ74)
	05:52		06:26	07:23 (LZ66)	07:01					06:38		07:06 (LZ73)	07:18		08:14 (LZ74)	07:42		08:27 (LZ74)
28	20:40		19:56	42	08:05 (LZ66)	19:00				17:09	22	07:28 (LZ73)	16:36	31	08:45 (LZ74)	16:38	30	08:57 (LZ74)
	05:53		06:27	07:19 (LZ67)	07:02					06:39		07:08 (LZ73)	07:19		08:14 (LZ74)	07:43		08:27 (LZ74)
29	20:39		19:54	46	08:05 (LZ66)	18:58				17:07	20	07:28 (LZ73)	16:35	31	08:45 (LZ74)	16:39	31	08:58 (LZ74)
	05:54		06:29	07:17 (LZ67)	07:04					06:40		07:09 (LZ73)	07:20		08:14 (LZ74)	07:43		08:27 (LZ74)
30	20:37		19:52	48	08:05 (LZ66)	18:56				17:06	17	07:26 (LZ73)	16:35	31	08:45 (LZ74)	16:40	31	08:58 (LZ74)
	05:55		06:30	07:15 (LZ67)	07:05					06:42		07:10 (LZ73)	07:21		08:14 (LZ74)	07:43		08:27 (LZ74)
31	20:36		19:51	50	08:05 (LZ66)	18:54				17:04	14	07:24 (LZ73)	16:34	32	08:46 (LZ74)	16:40	31	08:58 (LZ74)
	05:56		06:31	07:13 (LZ67)						06:43		07:14 (LZ73)			07:43			08:29 (LZ74)
Potential sun hours	20:35		19:49	51	08:04 (LZ66)					17:03	8	07:22 (LZ73)			16:41	31		09:00 (LZ74)
Total, worst case	468						376					342		291		279		
Sun reduction	340			680			526					353		386				963
Oper. time red.	0.59			0.65			0.59					0.47		0.36				0.26
Wind dir. red.	1.00			1.00			1.00					1.00		1.00				1.00
Total reduction	0.60			0.61			0.60					0.64		0.66				0.66
Total, real	0.35			0.39			0.36					0.30		0.24				0.18
	120			266			188					107		93				169



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_06 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -90.4° Slope: 90.0° (59)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January		February		March		April		May		June	
1	07:44	07:28	08:12 (LZ74)	06:48	07:18 (LZ73)	06:53	06:03	06:43 (LZ67)	05:31	06:36 (LZ66)	
16:42		17:19	08:45 (LZ74)	17:57	10	07:28 (LZ73)	19:35	20:11	07:05 (LZ67)	20:44	42
2	07:44	07:27	08:12 (LZ74)	06:46	07:15 (LZ73)	06:51	06:02	06:44 (LZ67)	05:31	06:36 (LZ66)	
16:43		17:21	08:45 (LZ74)	17:58	15	07:30 (LZ73)	19:36	20:12	07:05 (LZ67)	20:45	41
3	07:44	07:25	08:11 (LZ74)	06:45	07:12 (LZ73)	06:49	06:00	06:45 (LZ67)	05:30	06:37 (LZ66)	
16:44		17:22	08:45 (LZ74)	18:00	19	07:31 (LZ73)	19:38	20:13	07:04 (LZ67)	20:45	41
4	07:44	07:24	08:11 (LZ74)	06:43	07:12 (LZ73)	06:48	05:59	06:45 (LZ67)	05:30	06:37 (LZ66)	
16:45		17:23	08:46 (LZ74)	18:01	21	07:33 (LZ73)	19:39	20:15	07:02 (LZ67)	20:46	41
5	07:44	07:23	08:11 (LZ74)	06:41	07:10 (LZ73)	06:46	05:58	06:47 (LZ67)	05:29	06:37 (LZ66)	
16:46		17:25	08:46 (LZ74)	18:02	24	07:34 (LZ73)	19:40	20:16	07:06 (LZ66)	20:47	40
6	07:44	07:22	08:12 (LZ74)	06:40	07:09 (LZ73)	06:44	05:56	06:45 (LZ66)	05:29	06:38 (LZ66)	
16:47		17:26	08:47 (LZ74)	18:03	25	07:34 (LZ73)	19:41	20:17	07:08 (LZ66)	20:48	40
7	07:43	07:21	08:11 (LZ74)	06:38	07:08 (LZ73)	06:42	05:55	06:44 (LZ66)	05:29	06:38 (LZ66)	
16:48		17:27	08:46 (LZ74)	18:05	26	07:34 (LZ73)	19:42	20:18	07:10 (LZ66)	20:48	40
8	07:43	07:19	08:12 (LZ74)	06:36	07:08 (LZ73)	06:41	05:54	06:41 (LZ66)	05:28	06:38 (LZ66)	
16:49		17:29	08:46 (LZ74)	18:06	26	07:34 (LZ73)	19:44	20:19	07:10 (LZ66)	20:49	39
9	07:43	07:18	08:12 (LZ74)	06:34	07:08 (LZ73)	06:39	05:52	06:40 (LZ66)	05:28	06:39 (LZ66)	
16:50		17:30	08:46 (LZ74)	18:07	26	07:34 (LZ73)	19:45	20:20	07:12 (LZ66)	20:50	38
10	07:43	07:17	08:12 (LZ74)	06:33	07:07 (LZ73)	06:37	05:51	06:39 (LZ66)	05:28	06:39 (LZ66)	
16:51		17:32	08:45 (LZ74)	18:08	26	07:33 (LZ73)	19:46	20:22	07:13 (LZ66)	20:50	39
11	07:43	07:15	08:13 (LZ74)	06:31	07:07 (LZ73)	06:35	05:50	06:39 (LZ66)	05:27	06:40 (LZ66)	
16:52		17:33	08:45 (LZ74)	18:10	26	07:33 (LZ73)	19:47	20:23	07:14 (LZ66)	20:51	38
12	07:42	07:14	08:14 (LZ74)	06:29	07:08 (LZ73)	06:34	05:49	06:38 (LZ66)	05:27	06:40 (LZ66)	
16:54		17:34	08:45 (LZ74)	18:11	25	07:33 (LZ73)	19:48	20:24	07:14 (LZ66)	20:51	38
13	07:42	07:13	08:14 (LZ74)	06:27	07:09 (LZ73)	06:32	05:48	06:37 (LZ66)	05:27	06:40 (LZ66)	
16:55		17:36	08:44 (LZ74)	18:12	22	07:31 (LZ73)	19:50	20:25	07:15 (LZ66)	20:52	38
14	07:41	07:11	08:15 (LZ74)	06:26	07:09 (LZ73)	06:30	05:46	06:37 (LZ66)	05:27	06:41 (LZ66)	
16:56		17:37	08:43 (LZ74)	18:13	21	07:30 (LZ73)	19:51	20:26	07:16 (LZ66)	20:52	37
15	07:41	07:10	08:16 (LZ74)	06:24	07:10 (LZ73)	06:29	05:45	06:36 (LZ66)	05:27	06:41 (LZ66)	
16:57		17:38	08:41 (LZ74)	18:15	18	07:28 (LZ73)	19:52	20:27	07:16 (LZ66)	20:53	37
16	07:40	07:08	08:18 (LZ74)	06:22	07:12 (LZ73)	06:27	05:44	06:36 (LZ66)	05:27	06:41 (LZ66)	
16:58		17:40	08:40 (LZ74)	18:16	13	07:25 (LZ73)	19:53	20:28	07:17 (LZ66)	20:53	37
17	07:40	07:07	08:19 (LZ74)	06:20	07:16 (LZ73)	06:25	05:43	06:36 (LZ66)	05:27	06:42 (LZ66)	
16:59		17:41	08:38 (LZ74)	18:17	6	07:22 (LZ73)	19:54	20:29	07:17 (LZ66)	20:54	36
18	07:39	07:06	08:23 (LZ74)	06:18		06:24	05:42	06:35 (LZ66)	05:27	06:42 (LZ66)	
17:01		17:42	08:35 (LZ74)	18:18		19:56	10	07:02 (LZ67)	20:30	20:54	36
19	07:39	07:04		06:17		06:22		06:49 (LZ67)	05:41	06:35 (LZ66)	05:27
17:02		17:44		18:20		19:57	15	07:04 (LZ67)	20:31	06:35 (LZ66)	05:27
20	07:38	07:02		06:15		06:20		06:48 (LZ67)	05:40	06:35 (LZ66)	05:27
17:03		17:45		18:21		19:58	18	07:06 (LZ67)	20:33	06:35 (LZ66)	05:27
21	07:37	07:01		06:13		06:19		06:46 (LZ67)	05:39	06:35 (LZ66)	05:27
17:05		17:46		18:22		19:59	21	07:07 (LZ67)	20:34	06:35 (LZ66)	05:27
22	07:37		08:24 (LZ74)	06:59		06:17		06:45 (LZ67)	05:38	06:34 (LZ66)	05:28
17:06	5	08:29 (LZ74)	17:48	18:23		20:00	23	07:08 (LZ67)	20:35	06:34 (LZ66)	05:28
23	07:36		08:20 (LZ74)	06:58		06:15		06:44 (LZ67)	05:38	06:34 (LZ66)	05:28
17:07	13	08:33 (LZ74)	17:49	18:24		20:02	24	07:08 (LZ67)	20:36	06:34 (LZ66)	05:28
24	07:35		08:18 (LZ74)	06:56		06:14		06:44 (LZ67)	05:37	06:35 (LZ66)	05:28
17:08	17	08:35 (LZ74)	17:50	18:26		20:03	24	07:08 (LZ67)	20:37	06:35 (LZ66)	05:28
25	07:34		08:17 (LZ74)	06:55		06:12		06:43 (LZ67)	05:36	06:35 (LZ66)	05:28
17:10	20	08:37 (LZ74)	17:52	18:27		20:04	25	07:08 (LZ67)	20:38	06:35 (LZ66)	05:28
26	07:33		08:15 (LZ74)	06:53		06:11		06:43 (LZ67)	05:35	06:35 (LZ66)	05:29
17:11	23	08:38 (LZ74)	17:53	18:28		20:05	25	07:08 (LZ67)	20:39	06:35 (LZ66)	05:29
27	07:33		08:15 (LZ74)	06:51		06:09		06:42 (LZ67)	05:34	06:35 (LZ66)	05:29
17:12	25	08:40 (LZ74)	17:54	18:29		20:06	26	07:08 (LZ67)	20:39	06:35 (LZ66)	05:29
28	07:32		08:14 (LZ74)	06:50		06:08		06:43 (LZ67)	05:34	06:35 (LZ66)	05:30
17:14	27	08:41 (LZ74)	17:56	18:30		20:08	25	07:08 (LZ67)	20:40	06:35 (LZ66)	05:30
29	07:31		08:13 (LZ74)	06:58		06:06		06:42 (LZ67)	05:33	06:35 (LZ66)	05:30
17:15	29	08:42 (LZ74)		19:32		20:09	25	07:07 (LZ67)	20:41	06:35 (LZ66)	05:30
30	07:30		08:13 (LZ74)	06:57		06:05		06:43 (LZ67)	05:32	06:36 (LZ66)	05:30
17:17	30	08:43 (LZ74)		19:33		20:10	24	07:07 (LZ67)	20:42	06:36 (LZ66)	05:30
31	07:29		08:12 (LZ74)	06:55					05:32	06:35 (LZ66)	
17:18	32	08:44 (LZ74)		19:34					20:43	06:35 (LZ66)	
Potential sun hours	289		293		369		402		456		462
Total, worst case	221		540		349		285		1106		1136
Sun reduction	0.28		0.29		0.31		0.40		0.47		0.49
Oper. time red.	1.00		1.00		1.00		1.00		1.00		1.00
Wind dir. red.	0.66		0.66		0.61		0.58		0.57		0.57
Total reduction	0.19		0.19		0.19		0.23		0.27		0.28
Total, real	41		104		65		65		297		322

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)





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: LoZ\_06 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -90.4° Slope: 90.0° (59)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July	August	September	October	November	December
1	05:31 20:55	06:44 (LZ66) 07:22 (LZ66)	05:57 20:34	06:49 (LZ66) 07:25 (LZ66)	06:32 19:47	
2	05:31 20:55	06:44 (LZ66) 07:23 (LZ66)	05:58 20:33	06:50 (LZ66) 07:24 (LZ66)	06:33 19:45	
3	05:32 20:55	06:44 (LZ66) 07:22 (LZ66)	05:59 20:32	06:50 (LZ66) 07:23 (LZ66)	06:34 19:44	
4	05:33 20:55	06:44 (LZ66) 07:23 (LZ66)	06:00 20:30	06:51 (LZ66) 07:22 (LZ66)	06:35 19:42	
5	05:33 20:55	06:44 (LZ66) 07:23 (LZ66)	06:02 20:29	06:52 (LZ66) 07:20 (LZ66)	06:36 19:40	
6	05:34 20:54	06:44 (LZ66) 07:24 (LZ66)	06:03 20:28	06:54 (LZ66) 07:19 (LZ66)	06:38 19:38	
7	05:34 20:54	06:44 (LZ66) 07:24 (LZ66)	06:04 20:26	06:55 (LZ66) 07:17 (LZ66)	06:39 19:36	
8	05:35 20:54	06:44 (LZ66) 07:24 (LZ66)	06:05 20:25	06:56 (LZ66) 07:14 (LZ66)	06:40 19:35	
9	05:36 20:53	06:44 (LZ66) 07:25 (LZ66)	06:06 20:24	06:55 (LZ67) 07:12 (LZ67)	06:41 19:33	
10	05:37 20:53	06:44 (LZ66) 07:25 (LZ66)	06:07 20:22	06:53 (LZ67) 07:13 (LZ67)	06:42 19:31	
11	05:37 20:52	06:44 (LZ66) 07:25 (LZ66)	06:08 20:21	06:52 (LZ67) 07:14 (LZ67)	06:43 19:29	
12	05:38 20:52	06:44 (LZ66) 07:26 (LZ66)	06:09 20:19	06:51 (LZ67) 07:14 (LZ67)	06:44 19:27	
13	05:39 20:51	06:44 (LZ66) 07:26 (LZ66)	06:10 20:18	06:51 (LZ67) 07:14 (LZ67)	06:45 19:25	
14	05:40 20:50	06:44 (LZ66) 07:27 (LZ66)	06:12 20:16	06:50 (LZ67) 07:15 (LZ67)	06:47 19:24	
15	05:41 20:50	06:45 (LZ66) 07:27 (LZ66)	06:13 20:15	06:49 (LZ67) 07:15 (LZ67)	06:48 19:22	
16	05:41 20:49	06:44 (LZ66) 07:26 (LZ66)	06:14 20:13	06:50 (LZ67) 07:15 (LZ67)	06:49 19:20	
17	05:42 20:48	06:44 (LZ66) 07:27 (LZ66)	06:15 20:12	06:50 (LZ67) 07:15 (LZ67)	06:50 19:18	
18	05:43 20:48	06:44 (LZ66) 07:27 (LZ66)	06:16 20:10	06:50 (LZ67) 07:15 (LZ67)	06:51 19:16	
19	05:44 20:47	06:44 (LZ66) 07:27 (LZ66)	06:17 20:09	06:50 (LZ67) 07:14 (LZ67)	06:52 19:14	
20	05:45 20:46	06:45 (LZ66) 07:27 (LZ66)	06:18 20:07	06:50 (LZ67) 07:13 (LZ67)	06:53 19:13	
21	05:46 20:45	06:45 (LZ66) 07:28 (LZ66)	06:19 20:06	06:50 (LZ67) 07:12 (LZ67)	06:54 19:11	
22	05:47 20:44	06:45 (LZ66) 07:28 (LZ66)	06:21 20:04	06:51 (LZ67) 07:11 (LZ67)	06:56 19:09	
23	05:48 20:44	06:45 (LZ66) 07:28 (LZ66)	06:22 20:02	06:52 (LZ67) 07:10 (LZ67)	06:57 19:07	
24	05:49 20:43	06:45 (LZ66) 07:28 (LZ66)	06:23 20:01	06:53 (LZ67) 07:08 (LZ67)	06:58 19:05	
25	05:50 20:42	06:46 (LZ66) 07:28 (LZ66)	06:24 19:59	06:55 (LZ67) 07:05 (LZ67)	06:59 19:03	
26	05:51 20:41	06:46 (LZ66) 07:27 (LZ66)	06:25 19:57	07:00 19:02	07:00 19:02	
27	05:52 20:40	06:46 (LZ66) 07:27 (LZ66)	06:26 19:56	07:01 19:00	07:01 19:00	
28	05:53 20:39	06:47 (LZ66) 07:27 (LZ66)	06:27 19:54	07:02 18:58	07:02 18:58	
29	05:54 20:37	06:47 (LZ66) 07:27 (LZ66)	06:29 19:52	07:04 18:56	07:04 18:56	
30	05:55 20:36	06:48 (LZ66) 07:26 (LZ66)	06:30 19:51	07:05 18:54	07:05 18:54	
31	05:56 20:35	06:48 (LZ66) 07:25 (LZ66)	06:31 19:49	07:06 19:03	07:06 19:03	
Potential sun hours	468	433	376	342	291	279
Total, worst case	1269	590	71	493	562	
Sun reduction	0.59	0.65	0.59	0.47	0.36	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.57	0.58	0.61	0.63	0.66	
Total reduction	0.34	0.37	0.36	0.30	0.24	
Total, real	427	219	26	148	136	

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)



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SeV\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -92.7° Slope: 90.0° (44)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June
1	07:44 16:42	07:28 17:19	06:48 17:57	07:20 (LZ26) 19:35	06:53 19:35	07:18 (LZ25) 20:11
2	07:44 16:43	07:27 17:21	06:47 17:58	07:19 (LZ26) 19:37	06:51 19:37	07:18 (LZ25) 20:13
3	07:44 16:44	07:26 17:22	06:45 18:00	07:19 (LZ26) 19:38	06:50 19:38	07:17 (LZ25) 20:14
4	07:44 16:45	07:24 17:23	06:43 18:01	07:18 (LZ26) 19:39	06:48 19:39	07:16 (LZ25) 20:15
5	07:44 16:46	07:23 17:25	06:41 18:02	07:17 (LZ26) 19:40	06:46 19:40	07:16 (LZ25) 20:16
6	07:44 16:47	07:22 17:26	06:40 18:03	07:17 (LZ26) 19:41	06:44 19:41	07:15 (LZ25) 20:17
7	07:44 16:48	07:21 17:28	06:38 18:05	07:17 (LZ26) 19:43	06:42 19:43	07:16 (LZ25) 20:18
8	07:44 16:49	07:20 17:29	06:36 18:06	07:17 (LZ26) 19:44	06:41 19:44	07:16 (LZ25) 20:20
9	07:43 16:50	07:18 17:30	06:35 18:07	07:17 (LZ26) 19:45	06:39 19:45	07:16 (LZ25) 20:21
10	07:43 16:51	07:17 17:32	06:33 18:09	07:17 (LZ26) 19:46	06:37 19:46	07:16 (LZ25) 20:22
11	07:43 16:52	07:16 17:33	06:31 18:10	07:18 (LZ26) 19:47	06:35 19:47	07:18 (LZ25) 20:23
12	07:42 16:53	07:14 17:34	06:29 18:11	07:18 (LZ26) 19:49	06:34 19:49	07:19 (LZ25) 20:24
13	07:42 16:55	07:13 17:36	06:27 18:12	07:19 (LZ26) 19:50	06:32 19:50	07:21 (LZ25) 20:25
14	07:42 16:56	07:12 17:37	06:26 18:14	07:20 (LZ26) 19:51	06:30 19:51	07:30 (LZ25) 20:26
15	07:41 16:57	07:10 17:38	06:24 18:15	07:22 (LZ26) 19:52	06:29 19:52	05:45 20:27
16	07:41 16:58	07:09 17:40	06:22 18:16	07:24 (LZ26) 19:53	06:27 19:53	05:44 20:29
17	07:40 16:59	07:07 17:41	06:20 18:17	07:35 (LZ26) 19:55	06:25 19:55	05:43 20:30
18	07:40 17:01	07:06 17:43	06:19 18:18	06:24 19:56	05:42 20:31	05:42 20:31
19	07:39 17:02	07:04 17:44	06:17 18:20	06:22 19:57	05:41 20:32	05:41 20:32
20	07:38 17:03	07:03 17:45	06:15 18:21	06:20 19:58	05:40 20:33	05:40 20:33
21	07:38 17:05	07:01 17:47	06:13 18:22	06:19 19:59	05:39 20:34	05:39 20:34
22	07:37 17:06	07:00 17:48	06:11 18:23	06:17 20:01	05:38 20:35	05:38 20:35
23	07:36 17:07	06:58 17:49	06:09 18:25	06:15 20:02	05:37 20:36	05:37 20:36
24	07:35 17:08	06:56 17:51	06:08 18:26	06:14 20:03	05:37 20:37	05:37 20:37
25	07:35 17:10	06:55 17:52	06:06 18:27	06:12 20:04	05:36 20:38	05:36 20:38
26	07:34 17:11	06:53 17:53	06:04 18:28	06:11 20:05	05:35 20:39	05:35 20:39
27	07:33 17:12	06:52 17:54	06:02 18:29	06:09 20:07	05:34 20:40	06:01 (LZ13) 20:56
28	07:32 17:14	06:50 17:56	06:00 18:31	06:28 (LZ25) 20:08	05:34 20:41	05:59 (LZ13) 20:56
29	07:31 17:15	06:49 17:57	05:59 18:32	06:24 (LZ25) 20:09	05:33 20:42	06:09 (LZ13) 20:56
30	07:30 17:17	06:48 17:58	05:57 18:33	06:22 (LZ25) 20:10	05:32 20:43	05:57 (LZ13) 20:56
31	07:29 17:18	06:47 17:59	05:55 18:34	06:20 (LZ25) 20:11	05:32 20:43	06:12 (LZ13) 20:56
Potential sun hours	289	293	369	402	456	462
Total, worst case		85	496	284	60	698
Sun reduction		0.29	0.31	0.40	0.47	0.49
Oper. time red.		1.00	1.00	1.00	1.00	1.00
Wind dir. red.		0.62	0.62	0.61	0.60	0.60
Total reduction		0.18	0.19	0.24	0.28	0.30
Total, real		15	93	68	17	208

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SeV\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -92.7° Slope: 90.0° (44)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

July			August			September			October			November			December		
1	05:31		05:59 (LZ13)	05:57		06:32		07:17 (LZ25)	07:06		07:57 (LZ26)	06:44		07:23			
	20:56	23	06:22 (LZ13)	20:34		19:47	18	07:35 (LZ25)	18:53		08:23 (LZ26)	17:02		16:34			
2	05:31		05:58 (LZ13)	05:58		06:33		07:15 (LZ25)	07:07		07:56 (LZ26)	06:46		07:24			
	20:56	24	06:22 (LZ13)	20:33		19:45	21	07:36 (LZ25)	18:51	28	08:24 (LZ26)	17:00		16:34			
3	05:32		05:59 (LZ13)	05:59		06:34		07:14 (LZ25)	07:08		07:56 (LZ26)	06:47		07:25			
	20:55	23	06:22 (LZ13)	20:32		19:44	23	07:37 (LZ25)	18:49	29	08:25 (LZ26)	16:59		16:33			
4	05:33		06:00 (LZ13)	06:00		06:35		07:13 (LZ25)	07:10		07:55 (LZ26)	06:48		07:26			
	20:55	23	06:23 (LZ13)	20:31		19:42	24	07:37 (LZ25)	18:47	30	08:25 (LZ26)	16:58		16:33			
5	05:33		06:00 (LZ13)	06:02		06:36		07:12 (LZ25)	07:11		07:54 (LZ26)	06:50		07:27			
	20:55	22	06:22 (LZ13)	20:29		19:40	25	07:37 (LZ25)	18:45	31	08:25 (LZ26)	16:56		16:33			
6	05:34		06:00 (LZ13)	06:03		06:38		07:11 (LZ25)	07:12		07:53 (LZ26)	06:51		07:28			
	20:55	23	06:23 (LZ13)	20:28		19:38	26	07:37 (LZ25)	18:44	32	08:25 (LZ26)	16:55		16:33			
7	05:34		06:01 (LZ13)	06:04		06:39		07:11 (LZ25)	07:13		07:52 (LZ26)	06:52		07:29			
	20:54	22	06:23 (LZ13)	20:27		19:37	25	07:36 (LZ25)	18:42	33	08:25 (LZ26)	16:54		16:32			
8	05:35		06:01 (LZ13)	06:05		06:40		07:10 (LZ25)	07:14		07:53 (LZ26)	06:54		07:30			
	20:54	21	06:22 (LZ13)	20:25		19:35	26	07:36 (LZ25)	18:40	32	08:25 (LZ26)	16:53		16:32			
9	05:36		06:02 (LZ13)	06:06		06:41		07:11 (LZ25)	07:16		07:53 (LZ26)	06:55		07:31			
	20:53	20	06:22 (LZ13)	20:24		19:33	25	07:36 (LZ25)	18:38	31	08:24 (LZ26)	16:52		16:32			
10	05:37		06:03 (LZ13)	06:07		06:42		07:11 (LZ25)	07:17		07:53 (LZ26)	06:56		07:32			
	20:53	19	06:22 (LZ13)	20:23		19:31	24	07:35 (LZ25)	18:37	30	08:23 (LZ26)	16:50		16:32			
11	05:37		06:03 (LZ13)	06:08		06:43		07:11 (LZ25)	07:18		07:53 (LZ26)	06:58		07:33			
	20:52	18	06:21 (LZ13)	20:21		19:29	23	07:34 (LZ25)	18:35	29	08:22 (LZ26)	16:49		16:32			
12	05:38		06:04 (LZ13)	06:09		06:44		07:12 (LZ25)	07:19		07:54 (LZ26)	06:59		07:34			
	20:52	17	06:21 (LZ13)	20:20		19:27	21	07:33 (LZ25)	18:33	28	08:22 (LZ26)	16:48		16:32			
13	05:39		06:05 (LZ13)	06:10		06:46		07:13 (LZ25)	07:20		07:54 (LZ26)	07:00		07:35			
	20:51	15	06:20 (LZ13)	20:18		19:26	18	07:31 (LZ25)	18:31	27	08:21 (LZ26)	16:47		16:32			
14	05:40		06:06 (LZ13)	06:12		06:47		07:14 (LZ25)	07:22		07:55 (LZ26)	07:02		07:35			
	20:51	14	06:20 (LZ13)	20:17		19:24	15	07:29 (LZ25)	18:30	24	08:19 (LZ26)	16:46		16:33			
15	05:41		06:07 (LZ13)	06:13		06:48		07:17 (LZ25)	07:23		07:56 (LZ26)	07:03		07:36			
	20:50	12	06:19 (LZ13)	20:15		19:22	8	07:25 (LZ25)	18:28	21	08:17 (LZ26)	16:45		16:33			
16	05:41		06:08 (LZ13)	06:14		06:49			07:24		07:58 (LZ26)	07:04		07:37			
	20:49	9	06:17 (LZ13)	20:14		19:20			18:26	18	08:16 (LZ26)	16:44		16:33			
17	05:42		06:12 (LZ13)	06:15		06:50			07:25		08:01 (LZ26)	07:06		07:38			
	20:49	2	06:14 (LZ13)	20:12		19:18			18:25	11	08:12 (LZ26)	16:43		16:33			
18	05:43			06:16		06:51			07:27			07:07		07:38			
	20:48			20:11		19:16			18:23			16:42		16:34			
19	05:44			06:17		06:52			07:28			07:08		07:39			
	20:47			20:09		19:15			18:21			16:41		16:34			
20	05:45			06:18		06:53			07:29			07:09		07:39			
	20:46			20:07		19:13			18:20			16:41		16:34			
21	05:46			06:20		06:55			07:30			07:11		07:40			
	20:46			20:06		19:11			18:18			16:40		16:35			
22	05:47			06:21		06:56			07:32			07:12		07:41			
	20:45			20:04		19:09			18:16			16:39		16:35			
23	05:48			06:22		06:57			07:33			07:13		07:41			
	20:44			20:03		19:07			18:15			16:38		16:36			
24	05:49			06:23		06:58			07:34			07:14		07:42			
	20:43			20:01		19:05			18:13			16:38		16:36			
25	05:50			06:24		06:59			06:35			07:16		07:42			
	20:42			19:59		19:04			17:12			16:37		16:37			
26	05:51			06:25		07:00			06:37			07:17		07:42			
	20:41			19:58		19:02			17:10			16:36		16:38			
27	05:52			06:26		07:01		08:09 (LZ26)	06:38			07:18		07:43			
	20:40			19:56		19:00	7	08:16 (LZ26)	17:09			16:36		16:38			
28	05:53			06:27		07:03		08:04 (LZ26)	06:39			07:19		07:43			
	20:39			19:54		18:58	15	08:19 (LZ26)	17:07			16:35		16:39			
29	05:54			06:29		07:04		08:01 (LZ26)	06:41			07:20		07:43			
	20:38			19:52		18:56	20	08:21 (LZ26)	17:06			16:35		16:40			
30	05:55			06:30		07:22 (LZ25)		07:59 (LZ26)	06:42			07:22		07:43			
	20:37			19:51	9	07:31 (LZ25)	18:54	24	08:23 (LZ26)			16:34		16:40			
31	05:56			06:31		07:19 (LZ25)			06:43					07:44			
	20:35			19:49	15	07:34 (LZ25)			17:03					16:41			
Potential sun hours	468			433		376			342			291		279			
Total, worst case		307			24		388		460								
Sun reduction		0.59			0.65		0.59		0.47								
Oper. time red.		1.00			1.00		1.00		1.00								
Wind dir. red.		0.60			0.61		0.61		0.62								
Total reduction		0.35			0.39		0.36		0.29								
Total, real		108			9		140		134								

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SeV\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -92.0° Slope: 90.0° (45)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:44 16:42	07:28 17:19	06:48 17:57	06:53 19:35	06:03 20:11	05:31 20:44	05:31 20:56	05:57 20:34	06:32 19:47	07:04 (LZ25) 07:30 (LZ25)	07:06 18:53	07:46 (LZ26) 17:02	07:23 16:34
2	07:44 16:43	07:27 17:21	06:47 17:58	06:51 19:37	06:02 20:13	05:31 20:45	05:31 20:56	05:58 20:33	06:33 19:45	07:04 (LZ25) 07:29 (LZ25)	07:07 18:51	07:46 (LZ26) 17:00	07:24 16:34
3	07:44 16:44	07:26 17:22	06:45 18:00	06:50 19:38	06:00 20:14	05:30 20:46	05:33 20:55	05:59 20:32	06:34 19:44	07:04 (LZ25) 07:28 (LZ25)	07:08 18:49	07:47 (LZ26) 16:59	07:25 16:33
4	07:44 16:45	07:24 17:23	06:43 18:01	06:48 19:39	06:00 20:15	05:30 20:47	05:33 20:55	06:00 20:31	06:35 19:42	07:05 (LZ25) 07:27 (LZ25)	07:10 18:47	07:47 (LZ26) 16:58	07:26 16:33
5	07:44 16:46	07:23 17:25	06:41 18:02	06:46 19:40	06:06 20:16	05:29 20:47	05:33 20:55	06:02 20:29	06:36 19:40	07:05 (LZ25) 07:25 (LZ25)	07:11 18:45	07:48 (LZ26) 16:56	07:27 16:33
6	07:44 16:47	07:22 17:26	06:40 18:03	06:40 19:41	06:14 (LZ26) 20:17	05:25 20:48	05:34 20:55	06:03 20:28	06:38 19:38	07:07 (LZ25) 07:23 (LZ25)	07:12 18:44	07:48 (LZ26) 16:55	07:28 16:33
7	07:44 16:48	07:21 17:28	06:38 18:05	06:42 19:42	07:13 (LZ26) 20:18	05:55 20:49	05:34 20:54	06:04 20:27	06:39 19:37	07:09 (LZ25) 07:20 (LZ25)	07:13 18:42	07:49 (LZ26) 16:54	07:29 16:32
8	07:44 16:49	07:20 17:29	06:36 18:06	06:40 19:43	07:11 (LZ26) 20:19	05:54 20:49	05:34 20:54	06:05 20:25	06:40 19:35	07:20 (LZ25) 07:28 (LZ26)	18:40 18:44	07:51 (LZ26) 16:53	07:30 16:32
9	07:43 16:50	07:18 17:30	06:35 18:07	06:39 19:45	07:10 (LZ26) 20:21	05:52 20:50	05:36 20:53	06:06 20:24	06:41 19:33	07:16 18:38	07:53 (LZ26) 18:11	07:55 (LZ26) 16:52	07:31 16:32
10	07:43 16:51	07:17 17:32	06:33 18:09	06:37 19:46	07:09 (LZ26) 20:22	05:51 20:51	05:37 20:53	06:07 20:23	06:42 19:31	07:17 18:37	07:56 (LZ26) 08:07 (LZ26)	07:56 (LZ26) 16:50	07:32 16:32
11	07:43 16:52	07:16 17:33	06:31 18:10	06:35 19:47	07:09 (LZ26) 20:23	05:50 20:51	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:35		06:58 16:49	07:33 16:32
12	07:42 16:53	07:14 17:34	06:29 18:11	06:34 19:49	07:08 (LZ26) 20:24	05:49 20:52	05:38 20:52	06:09 20:20	06:44 19:27	07:19 18:33		06:59 16:48	07:34 16:32
13	07:42 16:55	07:13 17:36	06:27 18:12	06:32 19:50	07:07 (LZ26) 20:25	05:48 20:52	05:39 20:51	06:10 20:18	06:46 19:26	06:40 18:31		07:00 16:47	07:35 16:32
14	07:42 16:56	07:12 17:37	06:26 18:14	06:30 19:51	07:07 (LZ26) 20:26	05:47 20:53	05:40 20:51	06:12 20:17	06:47 19:24	07:22 18:30		07:02 16:46	07:35 16:33
15	07:41 16:57	07:10 17:38	06:24 18:15	06:29 19:52	07:06 (LZ26) 20:27	05:45 20:53	05:41 20:50	06:13 20:15	06:48 19:22	07:23 18:28		07:03 16:45	07:36 16:33
16	07:41 16:58	07:09 17:40	06:22 18:16	06:27 19:53	07:06 (LZ26) 20:29	05:44 20:54	05:41 20:49	06:14 20:14	06:49 19:20	07:24 18:26		07:04 16:44	07:37 16:33
17	07:40 16:59	07:07 17:41	06:20 18:17	06:25 19:55	07:07 (LZ26) 20:30	05:43 20:54	05:42 20:49	06:15 20:12	06:50 19:18	07:25 18:25		07:05 16:43	07:38 16:33
18	07:40 17:01	07:06 17:43	06:18 18:18	06:24 19:56	07:07 (LZ26) 20:31	05:42 20:54	05:41 20:48	06:16 20:11	06:51 19:16	07:27 18:23	08:05 (LZ26)	07:07 16:42	07:38 16:34
19	07:39 17:02	07:04 17:44	06:17 18:20	06:22 19:57	07:07 (LZ26) 20:32	05:41 20:55	05:44 20:47	06:17 20:09	06:52 19:15	07:28 (LZ26)	08:01 (LZ26)	07:08 16:41	07:39 16:34
20	07:38 17:03	07:03 17:45	06:15 18:21	06:20 19:58	07:06 (LZ26) 20:33	05:40 20:55	05:45 20:46	06:18 20:07	06:53 19:13	07:28 (LZ26)	07:58 (LZ26)	07:09 16:41	07:39 16:34
21	07:38 17:05	07:01 17:47	06:13 18:22	06:19 19:59	07:08 (LZ26) 20:34	05:39 20:55	05:46 20:46	06:20 20:06	06:55 19:11	07:25 (LZ25)	07:55 (LZ26)	07:11 16:40	07:40 16:35
22	07:37 17:06	07:00 17:48	06:11 18:23	06:17 19:57	07:09 (LZ26) 20:35	05:38 20:55	05:47 20:45	06:21 20:04	06:56 19:09	07:26 (LZ25)	07:53 (LZ26)	07:12 16:39	07:41 16:35
23	07:36 17:07	06:58 17:49	06:09 18:25	06:15 19:58	07:11 (LZ26) 20:36	05:37 20:56	05:48 20:44	06:22 20:03	06:57 19:07	07:29 (LZ25)	07:52 (LZ26)	07:13 16:38	07:41 16:36
24	07:35 17:08	06:56 17:51	06:08 18:26	06:14 19:59	07:13 (LZ26) 20:37	05:42 20:56	05:49 20:43	06:23 20:01	06:58 19:05	07:28 (LZ26)	07:50 (LZ26)	07:14 16:38	07:42 16:36
25	07:35 17:10	06:55 17:52	06:06 18:27	06:12 20:04	07:16 (LZ26) 20:38	05:40 20:56	05:50 20:42	06:24 19:59	06:59 19:04	07:26 (LZ25)	08:22 (LZ26)	07:16 16:37	07:42 16:37
26	07:34 17:11	06:53 17:53	06:04 18:28	06:11 20:05	07:25 (LZ26) 20:39	05:40 20:56	05:51 20:41	06:25 19:58	07:00 19:02	07:25 (LZ25)	07:48 (LZ26)	07:17 16:36	07:42 16:38
27	07:33 17:12	06:52 17:54	06:02 18:29	06:09 20:07	07:26 (LZ26) 20:40	05:40 20:56	05:52 20:40	06:26 19:56	07:01 19:00	07:26 (LZ25)	07:48 (LZ26)	07:18 16:36	07:43 16:38
28	07:32 17:14	06:50 17:56	06:01 18:31	06:08 20:08	07:27 (LZ26) 20:41	05:39 20:56	05:53 20:39	06:27 19:54	06:59 19:04	07:27 (LZ25)	07:48 (LZ26)	07:19 16:35	07:43 16:39
29	07:31 17:15	06:49 17:59	06:00 19:32	06:06 20:09	07:28 (LZ26) 20:42	05:38 20:56	05:54 20:38	06:29 19:52	07:04 (LZ25)	07:28 (LZ25)	07:47 (LZ26)	07:20 16:35	07:43 16:40
30	07:30 17:17	06:47 18:00	06:57 19:33	06:05 20:10	07:29 (LZ26) 20:43	05:37 20:56	05:55 20:37	06:30 19:51	07:05 (LZ25)	07:29 (LZ25)	07:47 (LZ26)	07:22 16:34	07:43 16:40
31	07:29 17:18	06:46 19:34	06:55 19:34		07:30 (LZ26) 20:43	05:36 20:56	05:56 19:49	06:31 20:27	07:04 (LZ25)	07:29 (LZ25)	07:48 (LZ26)	07:23 16:41	07:44 16:41
Potential sun hours	289	293	369	402	456	462	468	433	376		342	291	279
Total, worst case			616									269	
Sun reduction			0.31		403				264		503	0.47	
Oper. time red.			1.00		0.40				0.65		0.59	1.00	
Wind dir. red.			0.61		1.00				1.00		1.00	0.33	
Total reduction			0.19		0.60				0.60		0.61	0.61	
Total, real			0.116		0.24				0.39		0.36	0.29	
				95					102		181	78	



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SeV\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -92.6° Slope: 90.0° (46)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

January		February		March		April		May		June	
1	07:44	07:28	08:03 (LZ35)	06:48	06:53	07:53 (LZ26)	06:03	06:49 (LZ25)	05:31		
	16:42	17:19	08:24 (LZ35)	17:57	19:35	08:26 (LZ26)	20:11	07:15 (LZ25)	20:44		
2	07:44	07:27	08:04 (LZ35)	06:47	06:51	07:55 (LZ26)	06:02	06:49 (LZ25)	05:31		
	16:43	17:21	08:24 (LZ35)	17:58	19:37	08:25 (LZ26)	20:13	07:13 (LZ25)	20:45		
3	07:44	07:26	08:05 (LZ35)	06:45	06:50	07:55 (LZ26)	06:00	06:50 (LZ25)	05:30		
	16:44	17:22	08:24 (LZ35)	18:00	19:38	08:23 (LZ26)	20:14	07:12 (LZ25)	20:46		
4	07:44	07:24	08:05 (LZ35)	06:43	06:48	07:57 (LZ26)	05:59	06:51 (LZ25)	05:30		
	16:45	17:23	08:22 (LZ35)	18:01	19:39	08:21 (LZ26)	20:15	07:10 (LZ25)	20:47		
5	07:44	07:23	08:06 (LZ35)	06:41	06:46	07:58 (LZ26)	05:58	06:53 (LZ25)	05:29		
	16:46	17:25	08:21 (LZ35)	18:02	19:40	08:18 (LZ26)	20:16	07:09 (LZ25)	20:47		
6	07:44	07:22	08:09 (LZ35)	06:40	06:44	08:01 (LZ26)	05:56	06:55 (LZ25)	05:29		
	16:47	17:26	08:20 (LZ35)	18:03	19:41	08:14 (LZ26)	20:17	07:07 (LZ25)	20:48		
7	07:44	07:21	08:12 (LZ35)	06:38	06:42		05:55	07:00 (LZ25)	05:28		
	16:48	17:27	08:17 (LZ35)	18:05	19:43		20:18	07:02 (LZ25)	20:49		
8	07:44	07:20		06:36	06:41		05:54		05:28		
	16:49	17:29		18:06	19:44		20:20		20:49		
9	07:43	07:18		06:35	06:39		05:52		05:28		
	16:50	17:30		18:07	19:45		20:21		20:50		
10	07:43	07:17		06:33	06:37		05:51		05:28		
	16:51	17:32		18:09	19:46		20:22		20:51		
11	07:43	07:16		06:31	06:35		05:50		05:27		
	16:52	17:33		18:10	19:47		20:23		20:51		
12	07:42	07:14		06:29	06:34		05:49		05:27		
	16:53	17:34		18:11	19:49		20:24		20:52		
13	07:42	07:13		06:27	07:10 (LZ26)	06:32	05:48		05:27		
	16:55	17:36		18:12	07:23 (LZ26)	19:50	20:25		20:52		
14	07:42	07:12		06:26	07:06 (LZ26)	06:30	05:46		05:27		
	16:56	17:37		18:14	07:26 (LZ26)	19:51	20:26		20:53		
15	07:41	07:10		06:24	07:03 (LZ26)	06:29	07:00 (LZ25)	05:45	05:27		
	16:57	17:38		18:15	07:28 (LZ26)	19:52	07:09 (LZ25)	20:27	20:53		
16	07:41	07:09		06:22	07:01 (LZ26)	06:27	06:56 (LZ25)	05:44	05:27		
	16:58	17:40		18:16	07:29 (LZ26)	19:53	07:12 (LZ25)	20:29	20:54		
17	07:40	07:07		06:20	07:00 (LZ26)	06:25	06:55 (LZ25)	05:43	05:27		
	16:59	17:41		18:17	07:31 (LZ26)	19:55	07:14 (LZ25)	20:30	20:54		
18	07:40	07:06		06:18	06:58 (LZ26)	06:24	06:53 (LZ25)	05:42	05:27		
	17:01	17:43		18:18	07:31 (LZ26)	19:56	07:15 (LZ25)	20:31	20:54		
19	07:39	08:06 (LZ35)	07:04	06:17	06:57 (LZ26)	06:22	06:51 (LZ25)	05:41	05:27		
	17:02	08:14 (LZ35)	17:44	18:20	07:32 (LZ26)	19:57	07:16 (LZ25)	20:32	20:55		
20	07:38	08:05 (LZ35)	07:03	06:15	06:55 (LZ26)	06:20	06:51 (LZ25)	05:40	05:27		
	17:03	08:17 (LZ35)	17:45	18:21	07:32 (LZ26)	19:58	07:17 (LZ25)	20:33	20:55		
21	07:38	08:04 (LZ35)	07:01	06:13	06:54 (LZ26)	06:19	06:49 (LZ25)	05:39	05:27		
	17:05	08:18 (LZ35)	17:47	18:22	07:32 (LZ26)	19:59	07:17 (LZ25)	20:34	20:55		
22	07:37	08:03 (LZ35)	07:00	06:11	06:54 (LZ26)	06:17	06:49 (LZ25)	05:38	05:28		
	17:06	08:19 (LZ35)	17:48	18:23	07:33 (LZ26)	20:01	07:18 (LZ25)	20:35	20:55		
23	07:36	08:02 (LZ35)	06:58	06:09	06:54 (LZ26)	06:15	06:48 (LZ25)	05:37	05:28		
	17:07	08:20 (LZ35)	17:49	18:25	07:33 (LZ26)	20:02	07:17 (LZ25)	20:36	20:56		
24	07:35	08:02 (LZ35)	06:56	06:08	06:53 (LZ26)	06:14	06:48 (LZ25)	05:37	05:28		
	17:08	08:21 (LZ35)	17:51	18:26	07:33 (LZ26)	20:03	07:18 (LZ25)	20:37	20:56		
25	07:35	08:02 (LZ35)	06:55	06:06	06:52 (LZ26)	06:12	06:47 (LZ25)	05:36	05:28		
	17:10	08:22 (LZ35)	17:52	18:27	07:32 (LZ26)	20:04	07:17 (LZ25)	20:38	20:56		
26	07:34	08:01 (LZ35)	06:53	06:04	06:52 (LZ26)	06:11	06:48 (LZ25)	05:35	05:29		
	17:11	08:22 (LZ35)	17:53	18:28	07:31 (LZ26)	20:05	07:17 (LZ25)	20:39	20:56		
27	07:33	08:01 (LZ35)	06:52	06:02	06:52 (LZ26)	06:09	06:47 (LZ25)	05:34	05:29		
	17:12	08:23 (LZ35)	17:54	18:29	07:31 (LZ26)	20:07	07:16 (LZ25)	20:40	20:56		
28	07:32	08:01 (LZ35)	06:50	06:00	06:52 (LZ26)	06:08	06:48 (LZ25)	05:34	05:29		
	17:14	08:23 (LZ35)	17:56	18:31	07:31 (LZ26)	20:08	07:16 (LZ25)	20:41	20:56		
29	07:31	08:02 (LZ35)		06:59	07:52 (LZ26)	06:06	06:47 (LZ25)	05:33	05:30		
	17:15	08:24 (LZ35)		19:32	08:30 (LZ26)	20:09	07:15 (LZ25)	20:42	20:56		
30	07:30	08:02 (LZ35)		06:57	07:52 (LZ26)	06:05	06:48 (LZ25)	05:32	05:30		
	17:17	08:24 (LZ35)		19:33	08:29 (LZ26)	20:10	07:15 (LZ25)	20:42	20:56		
31	07:29	08:02 (LZ35)		06:55	07:53 (LZ26)		05:32				
	17:18	08:24 (LZ35)		19:34	08:27 (LZ26)		20:43				
Potential sun hours	289	293		369	402		456		462		
Total, worst case	238	108		644	552		121				
Sun reduction	0.28	0.29		0.31	0.40		0.47				
Oper. time red.	1.00	1.00		1.00	1.00		1.00				
Wind dir. red.	0.66	0.66		0.62	0.59		0.58				
Total reduction	0.19	0.19		0.19	0.23		0.27				
Total, real	44	21		121	129		33				

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SeV\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -92.6° Slope: 90.0° (46)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	July	August	September	October	November	December
1	05:31 20:56	05:57 20:34	06:32 19:47	07:06 18:53	07:52 (LZ26) 07:58 (LZ26)	06:44 17:02
2	05:31 20:56	05:58 20:33	06:33 19:45	07:07 18:51		06:46 17:00
3	05:32 20:55	05:59 20:32	06:34 19:44	07:08 18:49		06:47 16:59
4	05:33 20:55	06:00 20:31	06:35 19:42	07:10 18:47		06:48 16:58
5	05:33 20:55	06:02 20:29	06:36 19:40	07:11 18:45		06:50 16:56
6	05:34 20:55	06:03 20:28	07:07 (LZ25) 07:14 (LZ25)	07:57 (LZ26) 08:10 (LZ26)	12 15	07:50 (LZ35) 07:36 (LZ35)
7	05:34 20:54	06:04 20:27	06:39 19:37	07:13 18:42		06:51 16:54
8	05:35 20:54	06:05 20:25	07:02 (LZ25) 07:19 (LZ25)	06:40 19:35		07:34 (LZ35) 07:53 (LZ35)
9	05:36 20:53	06:06 20:24	07:00 (LZ25) 07:20 (LZ25)	06:41 19:33		07:34 (LZ35) 07:55 (LZ35)
10	05:37 20:53	06:07 20:23	06:59 (LZ25) 07:21 (LZ25)	06:42 19:31		07:34 (LZ35) 07:55 (LZ35)
11	05:37 20:52	06:08 20:21	06:58 (LZ25) 07:22 (LZ25)	06:43 19:29		07:33 (LZ35) 07:55 (LZ35)
12	05:38 20:52	06:09 20:20	06:57 (LZ25) 07:22 (LZ25)	06:44 19:27		07:34 (LZ35) 07:56 (LZ35)
13	05:39 20:51	06:10 20:18	06:56 (LZ25) 07:23 (LZ25)	06:45 19:26		07:33 (LZ35) 07:56 (LZ35)
14	05:40 20:51	06:12 20:17	06:55 (LZ25) 07:23 (LZ25)	06:47 19:24		07:33 (LZ35) 07:56 (LZ35)
15	05:41 20:50	06:13 20:15	06:55 (LZ25) 07:24 (LZ25)	06:48 19:22		07:34 (LZ35) 07:56 (LZ35)
16	05:41 20:49	06:14 20:14	06:55 (LZ25) 07:24 (LZ25)	06:49 19:20		07:34 (LZ35) 07:55 (LZ35)
17	05:42 20:49	06:15 20:12	06:55 (LZ25) 07:24 (LZ25)	06:50 19:18		07:36 (LZ35) 07:56 (LZ35)
18	05:43 20:48	06:16 20:11	06:54 (LZ25) 07:24 (LZ25)	06:51 19:16		07:36 (LZ35) 07:55 (LZ35)
19	05:44 20:47	06:17 20:09	06:54 (LZ25) 07:24 (LZ25)	06:52 19:15		07:37 (LZ35) 07:55 (LZ35)
20	05:45 20:46	06:18 20:07	06:54 (LZ25) 07:23 (LZ25)	06:53 19:13		07:38 (LZ35) 07:54 (LZ35)
21	05:46 20:46	06:20 20:06	06:54 (LZ25) 07:22 (LZ25)	06:55 19:11		07:39 (LZ35) 07:53 (LZ35)
22	05:47 20:45	06:21 20:04	06:54 (LZ25) 07:22 (LZ25)	06:56 19:09		07:41 (LZ35) 07:53 (LZ35)
23	05:48 20:44	06:22 20:03	06:55 (LZ25) 07:21 (LZ25)	06:57 19:07		07:43 (LZ35) 07:51 (LZ35)
24	05:49 20:43	06:23 20:01	06:55 (LZ25) 07:19 (LZ25)	06:58 19:05		07:40 (LZ26) 08:16 (LZ26)
25	05:50 20:42	06:24 19:59	06:56 (LZ25) 07:18 (LZ25)	06:59 19:04		07:40 (LZ26) 08:14 (LZ26)
26	05:51 20:41	06:25 19:58	06:57 (LZ25) 07:16 (LZ25)	07:00 19:02		06:37 07:10
27	05:52 20:40	06:26 19:56	06:59 (LZ25) 07:14 (LZ25)	07:01 19:00		06:38 07:09
28	05:53 20:39	06:27 19:54	07:02 (LZ25) 07:11 (LZ25)	07:03 18:58		06:39 07:07
29	05:54 20:38	06:29 19:52	07:04 18:56	07:05 18:54		06:41 07:06
30	05:55 20:37	06:30 19:51	07:05 18:54	07:06 18:54		06:42 07:04
31	05:56 20:35	06:31 19:49		06:43 17:03		06:44 16:41
Potential sun hours	468	433	376	342	291	279
Total, worst case		530	797	6	350	
Sun reduction		0.65	0.59	0.47	0.36	
Oper. time red.		1.00	1.00	1.00	1.00	
Wind dir. red.		0.58	0.62	0.62	0.66	
Total reduction		0.38	0.36	0.29	0.24	
Total, real		199	291	2	84	

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)







## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SeV\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -91.0° Slope: 90.0° (47)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June
1	07:44 16:42	07:28 17:19	07:56 (LZ35) 08:16 (LZ35)	06:53 19:35	07:35 (LZ26) 08:12 (LZ26)	06:03 20:11
2	07:44 16:43	07:27 17:21	07:55 (LZ35) 08:17 (LZ35)	06:51 19:37	07:35 (LZ26) 08:13 (LZ26)	06:02 20:13
3	07:44 16:44	07:26 17:22	07:55 (LZ35) 08:17 (LZ35)	06:50 19:38	07:34 (LZ26) 08:13 (LZ26)	06:00 20:14
4	07:44 16:45	07:24 17:23	07:54 (LZ35) 08:17 (LZ35)	06:48 19:39	07:33 (LZ26) 08:13 (LZ26)	05:59 20:15
5	07:44 16:46	07:23 17:25	07:55 (LZ35) 08:17 (LZ35)	06:46 19:40	07:32 (LZ26) 08:13 (LZ26)	05:58 20:16
6	07:44 16:47	07:22 17:26	07:55 (LZ35) 08:18 (LZ35)	06:44 19:41	07:31 (LZ26) 08:12 (LZ26)	05:56 20:17
7	07:44 16:48	07:21 17:27	07:56 (LZ35) 08:18 (LZ35)	06:42 19:43	07:32 (LZ26) 08:13 (LZ26)	05:55 20:18
8	07:44 16:49	07:20 17:29	07:55 (LZ35) 08:17 (LZ35)	06:41 19:44	07:31 (LZ26) 08:12 (LZ26)	05:54 20:20
9	07:43 16:50	07:18 17:30	07:56 (LZ35) 08:17 (LZ35)	06:39 19:45	07:31 (LZ26) 08:11 (LZ26)	05:52 20:21
10	07:43 16:51	07:17 17:32	07:57 (LZ35) 08:16 (LZ35)	06:37 19:46	07:31 (LZ26) 08:10 (LZ26)	05:51 20:22
11	07:43 16:52	07:16 17:33	07:58 (LZ35) 08:15 (LZ35)	06:35 19:47	07:32 (LZ26) 08:10 (LZ26)	05:50 20:23
12	07:42 16:53	07:14 17:34	08:00 (LZ35) 08:14 (LZ35)	06:34 19:49	07:32 (LZ26) 08:09 (LZ26)	05:49 20:24
13	07:42 16:55	07:13 17:36	08:01 (LZ35) 08:11 (LZ35)	06:32 19:50	07:32 (LZ26) 08:07 (LZ26)	05:48 20:25
14	07:42 16:56	07:12 17:37	08:11 (LZ35) 18:14	06:30 19:51	07:33 (LZ26) 08:07 (LZ26)	05:46 20:26
15	07:41 16:57	07:10 17:38	06:24 18:15	06:29 19:52	07:33 (LZ26) 08:05 (LZ26)	05:45 20:27
16	07:41 16:58	07:09 17:40	06:22 18:16	06:27 19:53	07:34 (LZ26) 08:03 (LZ26)	05:44 20:29
17	07:40 16:59	07:07 17:41	06:20 18:17	06:25 19:55	07:36 (LZ26) 08:02 (LZ26)	05:43 20:30
18	07:40 17:01	07:06 17:43	06:18 18:18	06:24 19:56	07:37 (LZ26) 08:00 (LZ26)	05:42 20:31
19	07:39 17:02	07:04 17:44	06:17 18:20	06:22 19:57	07:38 (LZ26) 07:57 (LZ26)	05:41 20:32
20	07:38 17:03	07:03 17:45	06:15 18:21	06:20 19:58	07:42 (LZ26) 07:54 (LZ26)	05:40 20:33
21	07:38 17:05	07:01 17:47	06:13 18:22	06:19 19:59	07:54 (LZ26) 05:39	05:38 20:34
22	07:37 17:06	07:00 17:48	06:11 18:23	06:17 20:01	05:38 20:35	05:37 20:36
23	07:36 17:07	06:58 17:49	06:09 18:25	06:15 20:02	05:37 20:36	05:36 20:37
24	07:35 17:08	06:56 17:51	06:08 18:26	06:14 20:03	05:37 20:37	05:36 20:38
25	07:35 17:10	06:55 17:52	06:06 18:27	06:12 20:04	05:36 06:45 (LZ25)	05:36 20:38
26	07:34 17:11	06:53 17:53	06:04 18:28	06:11 20:05	05:35 06:43 (LZ25)	05:35 20:39
27	07:33 17:12	06:52 08:01 (LZ35)	06:02 17:54	06:09 18:29	05:34 06:40 (LZ25)	05:34 20:40
28	07:32 17:14	06:50 07:59 (LZ35)	06:00 08:10 (LZ35)	06:08 18:31	05:34 07:00 (LZ25)	05:34 20:41
29	07:31 17:15	06:49 07:57 (LZ35)	06:59 08:12 (LZ35)	06:06 19:32	05:33 08:11 (LZ26)	05:33 20:42
30	07:30 17:17	06:48 08:13 (LZ35)	06:57 08:13 (LZ35)	06:05 19:33	05:32 08:11 (LZ26)	05:32 20:42
31	07:29 17:18	06:47 07:56 (LZ35)	06:55 08:15 (LZ35)	06:04 19:34	05:31 07:36 (LZ26)	05:31 20:43
Potential sun hours	289	293	369	402	456	462
Total, worst case	66	257	182	796	498	
Sun reduction	0.28	0.29	0.31	0.40	0.47	
Oper. time red.	1.00	1.00	1.00	1.00	1.00	
Wind dir. red.	0.66	0.66	0.61	0.61	0.57	
Total reduction	0.18	0.19	0.19	0.24	0.27	
Total, real	12	49	34	191	132	

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)





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SeV\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -91.0° Slope: 90.0° (47)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

July				August				September				October				November				December	
1	05:31			05:57		06:45 (LZ25)	06:32		07:31 (LZ26)	07:06				06:44		07:26 (LZ35)	07:23				
	20:56			20:34	27	07:12 (LZ25)	19:47	38	08:09 (LZ26)	18:53				17:02	19	07:45 (LZ35)	16:34				
2	05:31			05:58		06:44 (LZ25)	06:33		07:30 (LZ26)	07:07				06:46		07:26 (LZ35)	07:24				
	20:56			20:33	29	07:13 (LZ25)	19:45	39	08:09 (LZ26)	18:51				17:00	21	07:47 (LZ35)	16:34				
3	05:32			05:59		06:44 (LZ25)	06:34		07:29 (LZ26)	07:08				06:47		07:25 (LZ35)	07:25				
	20:55			20:32	29	07:13 (LZ25)	19:44	40	08:09 (LZ26)	18:49				16:59	22	07:47 (LZ35)	16:33				
4	05:33			06:00		06:44 (LZ25)	06:35		07:28 (LZ26)	07:10				06:48		07:25 (LZ35)	07:26				
	20:55			20:31	29	07:13 (LZ25)	19:42	41	08:09 (LZ26)	18:47				16:58	23	07:48 (LZ35)	16:33				
5	05:33			06:02		06:43 (LZ25)	06:36		07:28 (LZ26)	07:11				06:50		07:25 (LZ35)	07:27				
	20:55			20:29	30	07:13 (LZ25)	19:40	41	08:09 (LZ26)	18:45				16:56	23	07:48 (LZ35)	16:33				
6	05:34			06:03		06:43 (LZ25)	06:38		07:28 (LZ26)	07:12				06:51		07:24 (LZ35)	07:28				
	20:55			20:28	30	07:13 (LZ25)	19:38	40	08:08 (LZ26)	18:44				16:55	23	07:47 (LZ35)	16:33				
7	05:34			06:04		06:43 (LZ25)	06:39		07:27 (LZ26)	07:13				06:52		07:25 (LZ35)	07:29				
	20:54			20:27	30	07:13 (LZ25)	19:37	41	08:08 (LZ26)	18:42				16:54	23	07:48 (LZ35)	16:32				
8	05:35			06:05		06:43 (LZ25)	06:40		07:27 (LZ26)	07:14				06:54		07:25 (LZ35)	07:30				
	20:54			20:25	30	07:13 (LZ25)	19:35	40	08:07 (LZ26)	18:40				16:53	22	07:47 (LZ35)	16:32				
9	05:36			06:06		06:43 (LZ25)	06:41		07:28 (LZ26)	07:16				06:55		07:26 (LZ35)	07:31				
	20:53			20:24	29	07:12 (LZ25)	19:33	39	08:07 (LZ26)	18:38				16:52	21	07:47 (LZ35)	16:32				
10	05:37			06:07		06:43 (LZ25)	06:42		07:28 (LZ26)	07:17				06:56		07:27 (LZ35)	07:32				
	20:53			20:23	29	07:12 (LZ25)	19:31	38	08:06 (LZ26)	18:37				16:50	20	07:47 (LZ35)	16:32				
11	05:37			06:08		06:43 (LZ25)	06:43		07:28 (LZ26)	07:18				06:58		07:27 (LZ35)	07:33				
	20:52			20:21	28	07:11 (LZ25)	19:29	37	08:05 (LZ26)	18:35				16:49	19	07:46 (LZ35)	16:32				
12	05:38			06:09		06:44 (LZ25)	06:44		07:29 (LZ26)	07:19				06:59		07:29 (LZ35)	07:34				
	20:52			20:20	26	07:10 (LZ25)	19:27	35	08:04 (LZ26)	18:33				16:48	16	07:45 (LZ35)	16:32				
13	05:39			06:10		06:44 (LZ25)	06:45		07:29 (LZ26)	07:20				07:00		07:30 (LZ35)	07:35				
	20:51			20:18	25	07:09 (LZ25)	19:26	34	08:03 (LZ26)	18:31				16:47	14	07:44 (LZ35)	16:32				
14	05:40			06:12		06:45 (LZ25)	06:47		07:30 (LZ26)	07:22				07:02		07:32 (LZ35)	07:35				
	20:51			20:17	23	07:08 (LZ25)	19:24	31	08:01 (LZ26)	18:30				16:46	11	07:43 (LZ35)	16:33				
15	05:41			06:13		06:47 (LZ25)	06:48		07:31 (LZ26)	07:23				07:03		07:34 (LZ35)	07:36				
	20:50			20:15	21	07:08 (LZ25)	19:22	28	07:59 (LZ26)	18:28				16:45	6	07:40 (LZ35)	16:33				
16	05:41			06:14		06:48 (LZ25)	06:49		07:32 (LZ26)	07:24				07:04			07:37				
	20:49			20:14	18	07:06 (LZ25)	19:20	25	07:57 (LZ26)	18:26				16:44			16:33				
17	05:42			06:15		06:50 (LZ25)	06:50		07:34 (LZ26)	07:25				07:05			07:38				
	20:49			20:12	14	07:04 (LZ25)	19:18	20	07:54 (LZ26)	18:25				16:43			16:33				
18	05:43			06:16		06:53 (LZ25)	06:51		07:37 (LZ26)	07:27				07:07			07:38				
	20:48			20:11	7	07:00 (LZ25)	19:16	13	07:50 (LZ26)	18:23				16:42			16:34				
19	05:44			06:17			06:52			07:28				07:08			07:39				
	20:47			20:09			19:15			18:21				16:41			16:34				
20	05:45			06:18			06:53			07:29				07:09			07:39				
	20:46			20:07			19:13			18:20				16:41			16:34				
21	05:46			06:20			06:55			07:30				07:11			07:40				
	20:46			20:06			19:11			18:18				16:40			16:35				
22	05:47			06:21			06:56			07:32				07:12			07:41				
	20:45			20:04			19:09			18:16				16:39			16:35				
23	05:48		06:55 (LZ25)	06:22		07:45 (LZ26)	06:57			07:33				07:13			07:41				
	20:44	7	07:02 (LZ25)	20:03	13	07:58 (LZ26)	19:07			18:15				16:38			16:36				
24	05:49		06:52 (LZ25)	06:23		07:42 (LZ26)	06:58			07:34				07:14			07:42				
	20:43	12	07:04 (LZ25)	20:01	19	08:01 (LZ26)	19:05			18:13				16:38			16:36				
25	05:50		06:51 (LZ25)	06:24		07:39 (LZ26)	06:59			06:35				07:16			07:42				
	20:42	15	07:06 (LZ25)	19:59	24	08:03 (LZ26)	19:04			17:12				16:37			16:37				
26	05:51		06:50 (LZ25)	06:25		07:37 (LZ26)	07:00			06:37				07:17			07:42				
	20:41	18	07:08 (LZ25)	19:58	27	08:04 (LZ26)	19:02			17:10				16:36			16:38				
27	05:52		06:49 (LZ25)	06:26		07:36 (LZ26)	07:01			06:38				07:18			07:43				
	20:40	20	07:09 (LZ25)	19:56	29	08:05 (LZ26)	19:00			17:09				16:36			16:38				
28	05:53		06:48 (LZ25)	06:27		07:35 (LZ26)	07:03			06:39			07:35 (LZ35)	07:19			07:43				
	20:39	22	07:10 (LZ25)	19:54	32	08:07 (LZ26)	18:58			17:07	2	07:37 (LZ35)	16:35			16:39					
29	05:54		06:47 (LZ25)	06:29		07:34 (LZ26)	07:04			06:41			07:30 (LZ35)	07:20			07:43				
	20:38	24	07:11 (LZ25)	19:52	34	08:08 (LZ26)	18:56			17:06	11	07:41 (LZ35)	16:35			16:40					
30	05:55		06:46 (LZ25)	06:30		07:33 (LZ26)	07:05			06:42			07:29 (LZ35)	07:22			07:43				
	20:37	25	07:11 (LZ25)	19:51	35	08:08 (LZ26)	18:54			17:04	15	07:44 (LZ35)	16:34			16:40					
31	05:56		06:45 (LZ25)	06:31		07:31 (LZ26)				06:43			07:27 (LZ35)			07:44					
	20:35	27	07:12 (LZ25)	19:49	38	08:09 (LZ26)				17:03	18	07:45 (LZ35)			16:41						
Potential sun hours		468		433			376			342			291			279					
Total, worst case		170		705			620			46			283								
Sun reduction		0.59		0.65			0.59			0.47			0.36								
Oper. time red.		1.00		1.00			1.00			1.00			1.00								
Wind dir. red.		0.57		0.58			0.61			0.66			0.66								
Total reduction		0.33		0.38			0.36			0.31			0.24								
Total, real		57		266			225			14			68								

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)



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SvO\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 84.6° Slope: 90.0° (60)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

		January	February	March	April	May		June		July		August	September	October	November	December
1	07:43 16:42	07:27 17:19	06:48 17:57	06:53 19:35	06:03 20:11		05:31 20:44	19:34 (LZ60) 20:55	05:31 20:55	14	19:44 (LZ60) 19:58 (LZ60)	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	07:22 16:34
2	07:43 16:43	07:26 17:20	06:46 17:58	06:51 19:36	06:02 20:12		05:30 20:44	19:34 (LZ60) 19:55 (LZ60)	05:31 20:55	15	19:43 (LZ60) 19:58 (LZ60)	05:58 20:32	06:33 19:45	07:07 18:50	06:45 17:00	07:23 16:33
3	07:43 16:44	07:25 17:22	06:44 17:59	06:49 19:37	06:00 20:13		05:30 20:45	19:35 (LZ60) 19:55 (LZ60)	05:32 20:55	15	19:44 (LZ60) 19:59 (LZ60)	05:59 20:31	06:34 19:43	07:08 18:48	06:47 16:59	07:24 16:33
4	07:43 16:45	07:24 17:23	06:43 18:00	06:47 19:39	05:59 20:14		05:29 20:46	19:35 (LZ60) 19:55 (LZ60)	05:32 20:55	16	19:43 (LZ60) 19:59 (LZ60)	06:00 20:30	06:35 19:41	07:09 18:47	06:48 16:57	07:25 16:33
5	07:43 16:46	07:23 17:24	06:41 18:02	06:46 19:40	05:57 20:15		05:29 20:47	19:36 (LZ60) 19:55 (LZ60)	05:33 20:54	17	19:43 (LZ60) 20:00 (LZ60)	06:01 20:29	06:36 19:40	07:10 18:45	06:49 16:56	07:26 16:32
6	07:43 16:47	07:22 17:26	06:39 18:03	06:44 19:41	05:56 20:17		05:29 20:47	19:37 (LZ60) 19:55 (LZ60)	05:33 20:54	18	19:43 (LZ60) 20:01 (LZ60)	06:02 20:27	06:37 19:38	07:11 18:43	06:51 16:55	07:27 16:32
7	07:43 16:48	07:20 17:27	06:38 18:04	06:42 19:42	05:55 20:18		05:28 20:48	19:37 (LZ60) 19:54 (LZ60)	05:34 20:54	18	19:42 (LZ60) 20:01 (LZ60)	06:03 20:26	06:38 19:36	07:13 18:41	06:52 16:54	07:28 16:32
8	07:43 16:49	07:19 17:29	06:36 18:06	06:40 19:43	05:53 20:19		05:28 20:49	19:38 (LZ60) 19:54 (LZ60)	05:35 20:53	19	19:43 (LZ60) 20:02 (LZ60)	06:05 20:25	06:39 19:34	07:14 18:40	06:53 16:52	07:29 16:32
9	07:43 16:50	07:18 17:30	06:34 18:07	06:39 19:45	05:52 20:20		05:28 20:49	19:38 (LZ60) 19:54 (LZ60)	05:36 20:53	20	19:43 (LZ60) 20:03 (LZ60)	06:06 20:23	06:41 19:32	07:15 18:38	06:54 16:51	07:30 16:32
10	07:43 16:51	07:16 17:31	06:32 18:08	06:37 19:46	05:51 20:21		05:27 20:50	19:39 (LZ60) 19:54 (LZ60)	05:36 20:52	20	19:42 (LZ60) 20:02 (LZ60)	06:07 20:22	06:42 19:31	07:16 18:36	06:56 16:50	07:31 16:32
11	07:42 16:52	07:15 17:33	06:31 18:09	06:35 19:47	05:50 20:22		05:27 20:51	19:40 (LZ60) 19:54 (LZ60)	05:37 20:52	21	19:42 (LZ60) 20:03 (LZ60)	06:08 20:21	06:43 19:29	07:17 18:34	06:57 16:49	07:32 16:32
12	07:42 16:53	07:14 17:34	06:29 18:11	06:33 19:48	05:48 20:24		05:27 20:51	19:40 (LZ60) 19:53 (LZ60)	05:38 20:51	21	19:42 (LZ60) 20:04 (LZ60)	06:09 20:19	06:44 19:27	07:19 18:33	06:58 16:48	07:33 16:32
13	07:42 16:54	07:12 17:35	06:27 18:12	06:32 19:49	05:47 20:25	10	05:27 19:38 (LZ60) 19:48 (LZ60)	05:39 20:52	06:10 20:51	22	19:42 (LZ60) 20:04 (LZ60)	06:10 20:18	06:45 19:25	07:20 18:31	07:00 16:47	07:34 16:32
14	07:41 16:55	07:11 17:37	06:25 18:13	06:30 19:51	05:46 20:26	14	05:27 19:36 (LZ60) 19:50 (LZ60)	05:39 20:52	06:11 20:50	23	19:41 (LZ60) 20:04 (LZ60)	06:11 20:16	06:46 19:23	07:21 18:29	07:01 16:46	07:35 16:32
15	07:41 16:57	07:10 17:38	06:23 18:14	06:28 19:52	05:45 20:27	16	05:27 19:35 (LZ60) 19:51 (LZ60)	05:40 20:53	06:12 20:50	23	19:41 (LZ60) 20:04 (LZ60)	06:12 20:15	06:47 19:21	07:22 18:28	07:02 16:45	07:35 16:32
16	07:40 16:58	07:08 17:39	06:22 18:16	06:27 19:53	05:44 20:28	18	05:27 19:34 (LZ60) 19:52 (LZ60)	05:41 20:53	06:14 20:49	24	19:41 (LZ60) 20:05 (LZ60)	06:14 20:13	06:48 19:20	07:24 18:26	07:04 16:44	07:36 16:33
17	07:40 16:59	07:07 17:41	06:20 18:17	06:25 19:54	05:43 20:29	20	05:27 19:33 (LZ60) 19:53 (LZ60)	05:42 20:53	06:15 20:48	23	19:42 (LZ60) 20:05 (LZ60)	06:15 20:12	06:50 19:18	07:25 18:24	07:05 16:43	07:37 16:33
18	07:39 17:00	07:05 17:42	06:18 18:18	06:23 19:55	05:42 20:30	20	05:27 19:33 (LZ60) 19:53 (LZ60)	05:43 20:54	06:16 20:47	23	19:42 (LZ60) 20:05 (LZ60)	06:16 20:10	06:51 19:16	07:26 18:23	07:06 16:42	07:38 16:33
19	07:38 17:02	07:04 17:43	06:16 18:19	06:22 19:56	05:41 20:31	22	05:27 19:32 (LZ60) 19:54 (LZ60)	05:44 20:54	06:17 20:47	23	19:42 (LZ60) 20:05 (LZ60)	06:17 20:08	06:52 19:14	07:27 18:21	07:07 16:41	07:38 16:34
20	07:38 17:03	07:02 17:45	06:14 18:20	06:20 19:58	05:40 20:32	22	05:27 19:33 (LZ60) 19:55 (LZ60)	05:45 20:54	06:18 20:46	24	19:42 (LZ60) 20:06 (LZ60)	06:18 20:07	06:53 19:12	07:29 18:19	07:09 16:40	07:39 16:34
21	07:37 17:04	07:01 17:46	06:13 18:22	06:18 19:59	05:39 20:33	23	05:27 19:32 (LZ60) 19:55 (LZ60)	05:46 20:55	06:19 20:45	24	19:41 (LZ60) 20:05 (LZ60)	06:19 20:05	06:54 19:10	07:30 18:18	07:10 16:39	07:39 16:34
22	07:36 17:05	06:59 17:47	06:11 18:23	06:17 20:00	05:38 20:34	23	05:27 19:32 (LZ60) 19:55 (LZ60)	05:47 20:55	06:20 20:44	23	19:42 (LZ60) 20:05 (LZ60)	06:20 20:04	06:55 19:09	07:31 18:16	07:11 16:39	07:40 16:35
23	07:36 17:07	06:57 17:49	06:09 18:24	06:15 20:01	05:37 20:35	23	05:28 19:32 (LZ60) 19:55 (LZ60)	05:48 20:55	06:21 20:43	23	19:42 (LZ60) 20:05 (LZ60)	06:21 20:02	06:56 19:07	07:32 18:15	07:13 16:38	07:40 16:35
24	07:35 17:08	06:56 17:50	06:07 18:25	06:13 20:02	05:36 20:36	23	05:28 19:32 (LZ60) 19:55 (LZ60)	05:49 20:55	06:23 20:42	22	19:42 (LZ60) 20:04 (LZ60)	06:23 20:00	06:58 19:05	07:34 18:13	07:14 16:37	07:41 16:36
25	07:34 17:09	06:54 17:51	06:05 18:27	06:12 20:04	05:36 20:37	24	05:28 19:32 (LZ60) 19:56 (LZ60)	05:50 20:55	06:24 20:41	21	19:43 (LZ60) 20:04 (LZ60)	06:24 19:59	06:59 19:03	07:35 17:11	07:15 16:37	07:41 16:37
26	07:33 17:11	06:53 17:53	06:04 18:28	06:10 20:05	05:35 20:38	24	05:28 19:32 (LZ60) 19:54 (LZ60)	05:51 20:55	06:25 20:40	20	19:43 (LZ60) 20:03 (LZ60)	06:25 19:57	07:00 19:01	06:36 17:10	07:16 16:36	07:42 16:37
27	07:32 17:12	06:51 17:54	06:02 18:29	06:09 20:06	05:34 20:39	23	05:29 19:32 (LZ60) 19:55 (LZ60)	05:52 20:55	06:26 20:39	19	19:44 (LZ60) 20:03 (LZ60)	06:26 19:55	07:01 18:59	06:37 17:08	07:17 16:36	07:42 16:38
28	07:31 17:13	06:49 17:55	06:00 18:30	06:07 20:07	05:33 20:40	23	05:29 19:33 (LZ60) 19:56 (LZ60)	05:53 20:55	06:27 20:38	17	19:45 (LZ60) 20:02 (LZ60)	06:27 19:54	07:02 18:58	06:39 17:07	07:19 16:35	07:42 16:39
29	07:30 17:15		06:58 19:31	06:06 20:08	05:33 20:41	23	05:30 19:33 (LZ60) 19:56 (LZ60)	05:54 20:55	06:28 20:37	15	19:46 (LZ60) 20:01 (LZ60)	06:28 19:52	07:03 18:56	06:40 17:06	07:20 16:35	07:43 16:39
30	07:29 17:16		06:56 19:33	06:04 20:10	05:32 20:42	22	05:30 19:34 (LZ60) 19:56 (LZ60)	05:55 20:55	06:29 20:36	12	19:47 (LZ60) 19:59 (LZ60)	06:29 19:50	07:04 18:54	06:41 17:04	07:21 16:34	07:43 16:40
31	07:28 17:18		06:55 19:34	06:03 20:43	05:31 20:43	21	05:30 19:34 (LZ60) 19:55 (LZ60)	05:56 20:35	06:30 20:35	7	19:50 (LZ60) 19:57 (LZ60)	06:30 19:48	06:43 17:03	07:43 16:41		
Potential sun hours	289	293	369	402	456		462		468		433		376	342	291	279
Total, worst case					394		398		604							
Sun reduction					0.47		0.49		0.59							
Oper. time red.					1.00		1.00		1.00							
Wind dir. red.					0.64		0.64		0.64							
Total reduction					0.30		0.31		0.37							
Total, real					117		125		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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SvO\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 85.2° Slope: 90.0° (61)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:43 16:42	07:27 17:19	06:48 17:57	06:53 19:35	06:03 20:11	05:31 20:44	05:31 20:55	20:05 (LZ60) 20:19 (LZ60)	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01
2	07:43 16:43	07:26 17:20	06:46 17:58	06:51 19:36	06:02 20:12	05:30 20:44	05:31 20:55	20:05 (LZ60) 20:18 (LZ60)	05:58 20:32	06:33 19:45	07:07 18:50	06:45 17:00
3	07:43 16:44	07:25 17:22	06:44 17:59	06:49 19:37	06:00 20:13	05:30 20:45	05:32 20:55	20:06 (LZ60) 20:18 (LZ60)	05:59 20:31	06:34 19:43	07:08 18:48	06:47 16:59
4	07:43 16:45	07:24 17:23	06:43 18:00	06:47 19:39	05:59 20:14	05:29 20:46	05:32 20:55	20:06 (LZ60) 20:17 (LZ60)	06:00 20:30	06:35 19:41	07:09 18:47	06:48 16:57
5	07:43 16:46	07:23 17:24	06:41 18:02	06:46 19:40	05:57 20:15	05:29 20:47	20:05 (LZ60) 20:07 (LZ60)	05:33 20:17 (LZ60)	06:01 20:29	06:36 19:40	07:10 18:45	06:49 16:56
6	07:43 16:47	07:22 17:26	06:39 18:03	06:44 19:41	05:56 20:17	05:29 20:47	20:03 (LZ60) 20:10 (LZ60)	05:33 20:54	06:02 20:27	06:37 19:38	07:11 18:43	06:51 16:55
7	07:43 16:48	07:20 17:27	06:38 18:04	06:42 19:42	05:55 20:18	05:28 20:48	20:02 (LZ60) 20:11 (LZ60)	05:34 20:54	06:03 20:26	06:38 19:36	07:13 18:41	06:52 16:54
8	07:43 16:49	07:19 17:29	06:36 18:06	06:40 19:43	05:53 20:19	05:28 20:49	20:01 (LZ60) 20:12 (LZ60)	05:35 20:53	06:05 20:25	06:39 19:34	07:14 18:40	06:53 16:52
9	07:43 16:50	07:18 17:30	06:34 18:07	06:39 19:45	05:52 20:20	05:28 20:49	20:01 (LZ60) 20:13 (LZ60)	05:36 20:53	06:06 20:23	06:41 19:32	07:15 18:38	06:54 16:51
10	07:42 16:51	07:16 17:31	06:32 18:08	06:37 19:46	05:51 20:21	05:27 20:50	20:01 (LZ60) 20:14 (LZ60)	05:36 20:52	06:07 20:22	06:42 19:31	07:16 18:36	06:56 16:50
11	07:42 16:52	07:15 17:33	06:31 18:09	06:35 19:47	05:50 20:22	05:27 20:51	20:01 (LZ60) 20:15 (LZ60)	05:37 20:52	06:08 20:21	06:43 19:29	07:17 18:34	06:57 16:49
12	07:42 16:53	07:14 17:34	06:29 18:11	06:33 19:48	05:48 20:24	05:27 20:51	20:00 (LZ60) 20:14 (LZ60)	05:38 20:51	06:09 20:19	06:44 19:27	07:19 18:33	06:58 16:48
13	07:42 16:54	07:12 17:35	06:27 18:12	06:32 19:49	05:47 20:25	05:27 20:52	20:00 (LZ60) 20:15 (LZ60)	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	07:00 16:47
14	07:41 16:56	07:11 17:37	06:25 18:13	06:30 19:51	05:46 20:26	05:27 20:52	20:00 (LZ60) 20:15 (LZ60)	05:39 20:50	06:11 20:16	06:46 19:23	07:21 18:29	07:01 16:46
15	07:41 16:57	07:10 17:38	06:23 18:14	06:28 19:52	05:45 20:27	05:27 20:53	20:00 (LZ60) 20:16 (LZ60)	05:40 20:50	06:12 20:15	06:47 19:21	07:22 18:28	07:02 16:45
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24	07:35 17:08	06:56 17:50	06:07 18:25	06:13 20:02	05:36 20:36	05:28 20:55	20:02 (LZ60) 20:19 (LZ60)	05:49 20:42	06:23 20:00	06:58 19:05	07:34 18:13	07:14 16:37
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28	07:31 17:13	06:49 17:55	06:00 18:30	06:07 20:07	05:33 20:40	05:29 20:55	20:03 (LZ60) 20:19 (LZ60)	05:53 20:38	06:27 19:54	07:02 18:58	06:39 17:07	07:19 16:35
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31	07:28 17:18		06:55 19:34		05:31 20:43			05:56 20:35	06:30 19:48		06:43 17:03	
Potential sun hours	289	293	369	402	456	462	468	433	376	342	291	279
Total, worst case						375						
Sun reduction						0.49						
Oper. time red.						1.00						
Wind dir. red.						0.65						
Total reduction						0.32						
Total, real						121						

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SvO\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 86.6° Slope: 90.0° (62)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:43 16:42	07:27 17:19	06:48 17:57	06:53 19:35	06:03 20:11	05:31 20:44	05:31 20:55	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	07:22 16:34
2	07:43 16:43	07:26 17:20	06:46 17:58	06:51 19:36	06:02 20:12	05:30 20:44	05:31 20:55	05:58 20:32	06:33 19:45	07:07 18:50	06:45 17:00	07:23 16:33
3	07:43 16:44	07:25 17:22	06:44 17:59	06:49 19:37	06:00 20:13	05:30 20:45	05:32 20:55	05:59 20:31	06:34 19:43	07:08 18:49	06:47 16:59	07:24 16:33
4	07:43 16:45	07:24 17:23	06:43 18:01	06:47 19:39	05:59 20:14	05:29 20:46	05:32 20:55	06:00 20:30	06:35 19:41	07:09 18:47	06:48 16:57	07:25 16:33
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11	07:42 16:52	07:15 17:33	06:31 18:09	06:35 19:47	05:50 20:22	05:27 20:51	05:37 20:52	06:08 20:21	06:43 19:29	07:17 18:34	06:57 16:49	07:32 16:32
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14	07:41 16:56	07:11 17:37	06:25 18:13	06:30 19:51	05:46 20:26	05:27 20:52	05:39 20:50	06:11 20:16	06:46 19:23	07:21 18:29	07:01 16:46	07:35 16:32
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22	07:36 17:06	06:59 17:47	06:11 18:23	06:17 20:00	05:38 20:34	05:27 20:55	05:47 20:44	06:20 20:04	06:55 19:09	07:31 18:16	07:11 16:39	07:40 16:35
23	07:36 17:07	06:57 17:49	06:09 18:24	06:15 20:01	05:37 20:35	05:28 20:55	05:48 20:43	06:21 20:02	06:56 19:07	07:32 18:15	07:13 16:38	07:40 16:35
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31	07:28 17:18		06:55 19:34		05:31 20:43		05:56 20:35	06:30 19:48		06:43 17:03		07:43 16:41
Potential sun hours	289	293	369	402	456	462	468	433	376	342	291	279
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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: SvO\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 82.7° Slope: 90.0° (63)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:43 16:42	07:27 17:19	06:48 17:57	06:53 19:35	06:03 20:11	05:31 20:44	05:31 20:55	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	07:22 16:34
2	07:43 16:43	07:26 17:20	06:46 17:58	06:51 19:36	06:02 20:12	05:30 20:44	05:31 20:55	05:58 20:32	06:33 19:45	07:07 18:50	06:45 17:00	07:23 16:33
3	07:43 16:44	07:25 17:22	06:44 17:59	06:49 19:37	06:00 20:13	05:30 20:45	05:32 20:55	05:59 20:31	06:34 19:43	07:08 18:49	06:47 16:59	07:24 16:33
4	07:43 16:45	07:24 17:23	06:43 18:01	06:47 19:39	05:59 20:14	05:29 20:46	05:32 20:54	06:00 20:30	06:35 19:41	07:09 18:47	06:48 16:57	07:25 16:33
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23	07:36 17:07	06:57 17:49	06:09 18:24	06:15 20:01	05:37 20:35	05:28 20:55	05:48 20:43	06:21 20:02	06:56 19:07	07:32 18:15	07:13 16:38	07:40 16:35
24	07:35 17:08	06:56 17:50	06:07 18:25	06:14 20:02	05:36 20:36	05:28 20:55	05:49 20:42	06:23 20:00	06:58 19:05	07:34 18:13	07:14 16:37	07:41 16:36
25	07:34 17:09	06:54 17:51	06:05 18:27	06:12 20:04	05:36 20:37	05:28 20:55	05:50 20:41	06:24 19:59	06:59 19:03	06:35 17:11	07:15 16:37	07:41 16:37
26	07:33 17:11	06:53 17:53	06:04 18:28	06:10 20:05	05:35 20:38	05:28 20:55	05:51 20:40	06:25 19:57	07:00 19:01	06:36 17:10	07:16 16:36	07:42 16:37
27	07:32 17:12	06:51 17:54	06:02 18:29	06:09 20:06	05:34 20:39	05:29 20:55	05:52 20:39	06:26 19:55	07:01 18:59	06:37 17:08	07:17 16:36	07:42 16:38
28	07:31 17:13	06:49 17:55	06:00 18:30	06:07 20:07	05:33 20:40	05:29 20:55	05:53 20:38	06:27 19:54	07:02 18:58	06:39 17:07	07:19 16:35	07:42 16:39
29	07:30 17:15		06:58 19:31	06:06 20:08	05:33 20:41	05:30 20:55	05:54 20:37	06:28 19:52	07:03 18:56	06:40 17:06	07:20 16:35	07:43 16:39
30	07:29 17:16		06:56 19:33	06:04 20:10	05:32 20:42	05:30 20:55	05:55 20:36	06:29 19:50	07:04 18:54	06:41 17:04	07:21 16:34	07:43 16:40
31	07:28 17:18		06:55 19:34		05:31 20:43		05:56 20:35	06:30 19:48		06:43 17:03		07:43 16:41
Potential sun hours	289	293	369	402	456	462	468	433	376	342	291	279
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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -94.9° Slope: 90.0° (51)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January			February			March			April			May			June		
1	07:43		08:28 (LZ56)	07:27		06:48		07:36 (LZ45)	06:53		07:22 (LZ40)	06:03		06:33 (LZ32)	05:31		
	16:42	24	08:52 (LZ56)	17:19		17:57	30	08:06 (LZ45)	19:35		07:50 (LZ40)	20:11	23	06:56 (LZ32)	20:44		
2	07:44		08:28 (LZ56)	07:26		06:46		07:36 (LZ45)	06:51		07:21 (LZ40)	06:02		06:33 (LZ32)	05:30		
	16:43	23	08:51 (LZ56)	17:20		17:58	29	08:05 (LZ45)	19:36	29	07:50 (LZ40)	20:12	23	06:56 (LZ32)	20:45		
3	07:44		08:29 (LZ56)	07:25		06:45		07:37 (LZ45)	06:49		07:20 (LZ40)	06:00		06:33 (LZ32)	05:30		
	16:44	22	08:51 (LZ56)	17:22		17:59	26	08:03 (LZ45)	19:37	29	07:49 (LZ40)	20:13	22	06:55 (LZ32)	20:45		
4	07:44		08:30 (LZ56)	07:24		06:43		07:39 (LZ45)	06:47		07:21 (LZ40)	05:59		06:34 (LZ32)	05:29		
	16:45	22	08:52 (LZ56)	17:23		18:01	23	08:02 (LZ45)	19:39	29	07:50 (LZ40)	20:15	21	06:55 (LZ32)	20:46		
5	07:44		08:30 (LZ56)	07:23		06:41		07:40 (LZ45)	06:46		07:20 (LZ40)	05:57		06:34 (LZ32)	05:29		
	16:46	22	08:52 (LZ56)	17:24		18:02	20	08:00 (LZ45)	19:40	29	07:49 (LZ40)	20:16	21	06:55 (LZ32)	20:47		
6	07:43		08:31 (LZ56)	07:22		06:39		07:43 (LZ45)	06:44		07:20 (LZ40)	05:56		06:35 (LZ32)	05:29		
	16:47	21	08:52 (LZ56)	17:26		18:03	13	07:56 (LZ45)	19:41	29	07:49 (LZ40)	20:17	19	06:54 (LZ32)	20:48		
7	07:43		08:32 (LZ56)	07:20		06:38			06:42		07:20 (LZ40)	05:55		06:36 (LZ32)	05:28		
	16:48	20	08:52 (LZ56)	17:27		18:04			19:42	28	07:48 (LZ40)	20:18	16	06:52 (LZ32)	20:48		
8	07:43		08:34 (LZ56)	07:19		06:36			06:40		07:20 (LZ40)	05:53		06:37 (LZ32)	05:28		
	16:49	18	08:52 (LZ56)	17:29		18:06			19:43	28	07:48 (LZ40)	20:19	14	06:51 (LZ32)	20:49		
9	07:43		08:34 (LZ56)	07:18		06:34			06:39		07:21 (LZ40)	05:52		06:39 (LZ32)	05:28		
	16:50	18	08:52 (LZ56)	17:30		18:07			19:45	25	07:46 (LZ40)	20:20	10	06:49 (LZ32)	20:50		
10	07:43		08:35 (LZ56)	07:17		06:32			06:37		07:21 (LZ40)	05:51			05:27		
	16:51	17	08:52 (LZ56)	17:31		18:08			19:46	24	07:45 (LZ40)	20:21			05:27		
11	07:42		08:36 (LZ56)	07:15		06:31			06:35		07:21 (LZ40)	05:50			05:27		
	16:52	15	08:51 (LZ56)	17:33	5	07:55 (LZ45)	18:09		19:47	22	07:43 (LZ40)	20:23			05:27		
12	07:42		08:38 (LZ56)	07:14		06:29			06:33		07:23 (LZ40)	05:49			05:27		
	16:53	12	08:50 (LZ56)	17:34	14	07:59 (LZ45)	18:11		19:48	19	07:42 (LZ40)	20:24			05:27		
13	07:42		08:40 (LZ56)	07:13		06:27			06:32		07:25 (LZ40)	05:47			05:27		
	16:54	10	08:50 (LZ56)	17:35	19	08:02 (LZ45)	18:12		19:49	14	07:39 (LZ40)	20:25			05:27		
14	07:41		08:42 (LZ56)	07:11		06:25			06:30		07:28 (LZ40)	05:46			05:27		
	16:56	5	08:47 (LZ56)	17:37	23	08:04 (LZ45)	18:13		19:51	7	07:35 (LZ40)	20:26			05:27		
15	07:41			07:10		06:24			06:28			05:45			05:27		
	16:57			17:38	26	08:05 (LZ45)	18:14		19:52			20:27			05:27		
16	07:40			07:08		06:22			06:27			05:44			05:27		
	16:58			17:39	29	08:07 (LZ45)	18:16		19:53			20:28			05:27		
17	07:40			07:07		06:20			06:25			05:43			05:27		
	16:59			17:41	30	08:07 (LZ45)	18:17		19:54			20:29			05:27		
18	07:39			07:05		06:18			06:23			05:42			05:27		
	17:00			17:42	32	08:09 (LZ45)	18:18		19:55			20:30			05:27		
19	07:39			07:04		06:16			06:22			05:41			05:27		
	17:02			17:44	33	08:09 (LZ45)	18:19		19:57			20:31			05:27		
20	07:38			07:02		06:15			06:20			05:40			05:27		
	17:03			17:45	34	08:09 (LZ45)	18:21		19:58			20:32			05:27		
21	07:37			07:01		06:13			06:18			05:39			05:27		
	17:04			17:46	35	08:10 (LZ45)	18:22		19:59			20:33			05:27		
22	07:37			06:59		06:11			06:17		06:41 (LZ32)	05:38			05:27		
	17:06			17:48	35	08:09 (LZ45)	18:23		20:00	10	06:51 (LZ32)	20:34			05:27		
23	07:36			06:58		06:09			06:15		06:39 (LZ32)	05:37			05:28		
	17:07			17:49	36	08:10 (LZ45)	18:24		20:01	14	06:53 (LZ32)	20:35			05:28		
24	07:35			06:56		06:07			06:14		06:37 (LZ32)	05:36			05:28		
	17:08			17:50	35	08:09 (LZ45)	18:25		20:03	17	06:54 (LZ32)	20:36			05:28		
25	07:34			06:54		06:05			06:12		06:36 (LZ32)	05:36			05:28		
	17:09			17:52	35	08:09 (LZ45)	18:27		20:04	20	06:56 (LZ32)	20:37			05:28		
26	07:33			06:53		06:04			06:10		06:35 (LZ32)	05:35			05:28		
	17:11			17:53	35	08:09 (LZ45)	18:28		20:05	21	06:56 (LZ32)	20:38			05:28		
27	07:32			06:51		06:02		06:31 (LZ40)	06:09		06:35 (LZ32)	05:34			05:29		
	17:12			17:54	34	08:08 (LZ45)	18:29	13	06:44 (LZ40)	22	06:57 (LZ32)	20:39			05:29		
28	07:31			06:50		06:00			06:28 (LZ40)	06:07	06:33 (LZ32)	05:33			05:29		
	17:13			17:55	33	08:07 (LZ45)	18:30	18	06:46 (LZ40)	23	06:56 (LZ32)	20:40			05:30		
29	07:31					06:58			07:26 (LZ40)	06:06	06:34 (LZ32)	05:33			05:30		
	17:15					19:31	21	07:47 (LZ40)	20:09	23	06:57 (LZ32)	20:41			05:30		
30	07:30					06:56			07:25 (LZ40)	06:04	06:34 (LZ32)	05:32			05:30		
	17:16					19:33	24	07:49 (LZ40)	20:10	23	06:57 (LZ32)	20:42			05:30		
31	07:29					06:55			07:24 (LZ40)			05:31			05:31		
	17:18					19:34	25	07:49 (LZ40)				20:43			05:31		
Potential sun hours	289			293		369			402			456			462		
Total, worst case		249		523		242			513			169					
Sun reduction		0.28		0.29		0.31			0.40			0.47					
Oper. time red.		1.00		1.00		1.00			1.00			1.00					
Wind dir. red.		0.66		0.64		0.63			0.59			0.57					
Total reduction		0.19		0.19		0.19			0.24			0.27					
Total, real		46		97		46			121			45					

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -94.9° Slope: 90.0° (51)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July	August	September	October	November	December
1	05:31 20:55	05:57 20:34	06:32 19:47	07:21 (LZ40) 18:52	06:44 17:01	07:22 16:34 15 08:18 (LZ56)
2	05:31 20:55	05:58 20:33	06:33 19:45	07:20 (LZ40) 18:50	06:45 17:00	07:23 16:33 17 08:18 (LZ56)
3	05:32 20:55	05:59 20:31 6 06:51 (LZ32)	06:34 19:43	07:19 (LZ40) 18:49	06:47 16:59	07:24 16:33 18 08:18 (LZ56)
4	05:32 20:55	06:00 20:30 11 06:59 (LZ32)	06:35 19:42	07:17 (LZ40) 18:47	07:09 16:57	07:26 16:33 19 08:18 (LZ56)
5	05:33 20:54	06:01 20:29 15 07:02 (LZ32)	06:36 19:40	07:17 (LZ40) 18:45	07:10 16:56	07:27 16:33 20 08:17 (LZ56)
6	05:33 20:54	06:02 20:28 17 07:03 (LZ32)	06:37 19:38	07:16 (LZ40) 18:43	07:12 16:55	07:28 16:32 21 08:17 (LZ56)
7	05:34 20:54	06:03 20:26 19 07:04 (LZ32)	06:38 19:36	07:15 (LZ40) 18:41	06:52 16:54	07:29 16:32 22 08:17 (LZ56)
8	05:35 20:53	06:05 20:25 20 07:04 (LZ32)	06:40 19:34	07:15 (LZ40) 18:40	06:53 16:52	07:30 16:32 22 08:18 (LZ56)
9	05:36 20:53	06:06 20:24 22 07:05 (LZ32)	06:41 19:33	07:15 (LZ40) 18:38	06:55 16:51	07:31 16:32 22 08:18 (LZ56)
10	05:36 20:53	06:07 20:22 23 07:05 (LZ32)	06:42 19:31	07:14 (LZ40) 18:36	06:56 16:50	07:32 16:32 23 08:18 (LZ56)
11	05:37 20:52	06:08 20:21 23 07:05 (LZ32)	06:43 19:29	07:14 (LZ40) 18:34	06:57 16:49	07:32 16:32 24 08:18 (LZ56)
12	05:38 20:52	06:09 20:19 23 07:05 (LZ32)	06:44 19:27	07:15 (LZ40) 18:33	06:59 16:48	07:33 16:32 23 08:19 (LZ56)
13	05:39 20:51	06:10 20:18 24 07:05 (LZ32)	06:45 19:25	07:16 (LZ40) 18:31	07:00 16:47	07:34 16:32 24 08:18 (LZ56)
14	05:39 20:50	06:11 20:16 23 07:04 (LZ32)	06:46 19:23	07:17 (LZ40) 18:29	07:01 16:46	07:35 16:32 24 08:19 (LZ56)
15	05:40 20:50	06:12 20:15 23 07:04 (LZ32)	06:47 19:22	07:18 (LZ40) 18:28	07:03 16:45	07:36 16:32 24 08:20 (LZ56)
16	05:41 20:49	06:14 20:13 22 07:03 (LZ32)	06:49 19:20	07:20 (LZ40) 18:26	07:04 16:44	07:36 16:33 25 08:20 (LZ56)
17	05:42 20:48	06:15 20:12 20 07:02 (LZ32)	06:50 19:18	07:24 (LZ40) 18:24	07:05 16:43	07:37 16:33 24 08:20 (LZ56)
18	05:43 20:48	06:16 20:10 19 07:01 (LZ32)	06:51 19:16	07:26 (LZ40) 18:23	07:06 16:42	07:38 16:33 24 08:21 (LZ56)
19	05:44 20:47	06:17 20:09 17 07:01 (LZ32)	06:52 19:14	07:27 (LZ40) 18:21	07:08 16:41	07:38 16:34 24 08:22 (LZ56)
20	05:45 20:46	06:18 20:07 14 06:59 (LZ32)	06:53 19:12	07:29 (LZ40) 18:19	07:09 16:40	07:39 16:34 25 08:21 (LZ56)
21	05:46 20:45	06:19 20:05 8 06:56 (LZ32)	06:54 19:11	07:30 (LZ40) 18:18	07:10 16:40	07:40 16:34 25 08:22 (LZ56)
22	05:47 20:44	06:20 20:04 06:55	06:55 19:09	07:31 (LZ40) 18:16	07:11 16:39	07:40 16:35 25 08:22 (LZ56)
23	05:48 20:43	06:21 20:02 06:56	06:56 19:07	07:32 (LZ40) 18:15	07:13 16:38	07:41 16:35 25 08:23 (LZ56)
24	05:49 20:42	06:23 20:01 19:05	06:58 19:05	07:34 (LZ40) 18:13	07:14 16:37	07:41 16:36 24 08:24 (LZ56)
25	05:50 20:41	06:24 19:59 19:03	06:59 19:03	07:35 (LZ40) 17:12	07:15 16:37	07:42 16:37 24 08:24 (LZ56)
26	05:51 20:40	06:25 19:57 19:01	07:00 19:01	07:36 (LZ40) 17:10	07:16 16:36	07:42 16:37 24 08:25 (LZ56)
27	05:52 20:39	06:26 19:55 19:00	07:01 19:00	07:37 (LZ40) 17:09	07:18 16:36	07:42 16:38 24 08:25 (LZ56)
28	05:53 20:38	06:27 19:54 18:58	07:02 18:58	07:38 (LZ40) 17:07	07:19 16:35	07:43 16:39 25 08:25 (LZ56)
29	05:54 20:37	06:28 19:52 9 07:28 (LZ40)	07:03 18:56	07:39 (LZ40) 17:06	07:20 16:34	07:43 16:39 24 08:26 (LZ56)
30	05:55 20:36	06:29 19:50 14 07:37 (LZ40)	07:05 18:54	07:40 (LZ40) 17:04	07:21 16:34	07:43 16:40 24 08:26 (LZ56)
31	05:56 20:35	06:31 19:49 19 07:22 (LZ40)	07:06 19:41	07:41 (LZ40) 17:03	07:22 16:41	07:43 16:41 23 08:27 (LZ56)
Potential sun hours	468	433	376	342	291	279
Total, worst case		391	411	672	26	707
Sun reduction		0.65	0.59	0.47	0.36	0.26
Oper. time red.		1.00	1.00	1.00	1.00	1.00
Wind dir. red.		0.57	0.61	0.64	0.66	0.66
Total reduction		0.37	0.36	0.30	0.24	0.18
Total, real		144	148	203	6	124

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -83.7° Slope: 90.0° (52)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January			February			March			April			May			June		
1	07:43		08:14 (LZ56)	07:27	06:48				06:53			06:03			05:31		
	16:42	14	08:28 (LZ56)	17:19	17:57				19:35			20:11			20:44		
2	07:44		08:14 (LZ56)	07:26	06:46			07:21 (LZ45)	06:51			06:02			05:30		
	16:43	15	08:29 (LZ56)	17:20	17:58	7		07:28 (LZ45)	19:36			20:12			20:45		
3	07:44		08:14 (LZ56)	07:25	06:45			07:16 (LZ45)	06:49			06:00			05:30		
	16:44	17	08:31 (LZ56)	17:22	17:59	16		07:32 (LZ45)	19:37			20:13			20:45		
4	07:44		08:14 (LZ56)	07:24	06:43			07:14 (LZ45)	06:47			05:59		06:25 (LZ32)	05:29		
	16:45	18	08:32 (LZ56)	17:23	18:01	21		07:35 (LZ45)	19:39			20:14	6	06:31 (LZ32)	20:46		
5	07:44		08:14 (LZ56)	07:23	06:41			07:12 (LZ45)	06:46			05:57		06:23 (LZ32)	05:29		
	16:46	19	08:33 (LZ56)	17:24	18:02	24		07:36 (LZ45)	19:40			20:16	11	06:34 (LZ32)	20:47		
6	07:43		08:14 (LZ56)	07:22	06:39			07:10 (LZ45)	06:44			05:56		06:21 (LZ32)	05:29		
	16:47	20	08:34 (LZ56)	17:26	18:03	27		07:37 (LZ45)	19:41			20:17	15	06:36 (LZ32)	20:48		
7	07:43		08:14 (LZ56)	07:20	06:38			07:08 (LZ45)	06:42			05:55		06:19 (LZ32)	05:28		
	16:48	21	08:35 (LZ56)	17:27	18:04	30		07:38 (LZ45)	19:42			20:18	17	06:36 (LZ32)	20:48		
8	07:43		08:15 (LZ56)	07:19	06:36			07:07 (LZ45)	06:40			05:53		06:18 (LZ32)	05:28		
	16:49	21	08:36 (LZ56)	17:29	18:06	31		07:38 (LZ45)	19:43			20:19	19	06:37 (LZ32)	20:49		
9	07:43		08:14 (LZ56)	07:18	06:34			07:06 (LZ45)	06:39			05:52		06:18 (LZ32)	05:28		
	16:50	22	08:36 (LZ56)	17:30	18:07	34		07:40 (LZ45)	19:45			20:20	20	06:38 (LZ32)	20:50		
10	07:43		08:14 (LZ56)	07:17	06:32			07:05 (LZ45)	06:37			05:51		06:17 (LZ32)	05:27		
	16:51	23	08:37 (LZ56)	17:31	18:08	35		07:40 (LZ45)	19:46	7	07:15 (LZ40)	20:21	22	06:39 (LZ32)	20:50		
11	07:42		08:14 (LZ56)	07:15	06:31			07:04 (LZ45)	06:35			05:50		06:17 (LZ32)	05:27		
	16:52	23	08:37 (LZ56)	17:33	18:09	36		07:40 (LZ45)	19:47	14	07:18 (LZ40)	20:23	22	06:39 (LZ32)	20:51		
12	07:42		08:14 (LZ56)	07:14	06:29			07:04 (LZ45)	06:33			07:02 (LZ40)	05:49	06:17 (LZ32)	05:27		
	16:53	24	08:38 (LZ56)	17:34	18:11	35		07:39 (LZ45)	19:48	19	07:21 (LZ40)	20:24	22	06:39 (LZ32)	20:51		
13	07:42		08:15 (LZ56)	07:13	06:27			07:04 (LZ45)	06:32			07:00 (LZ40)	05:47	06:16 (LZ32)	05:27		
	16:54	25	08:40 (LZ56)	17:35	18:12	36		07:40 (LZ45)	19:49	22	07:22 (LZ40)	20:25	23	06:39 (LZ32)	20:52		
14	07:41		08:14 (LZ56)	07:11	06:25			07:04 (LZ45)	06:30			06:58 (LZ40)	05:46	06:16 (LZ32)	05:27		
	16:56	26	08:40 (LZ56)	17:37	18:13	36		07:40 (LZ45)	19:51	24	07:22 (LZ40)	20:26	23	06:39 (LZ32)	20:52		
15	07:41		08:14 (LZ56)	07:10	06:24			07:03 (LZ45)	06:28			06:58 (LZ40)	05:45	06:16 (LZ32)	05:27		
	16:57	26	08:40 (LZ56)	17:38	18:14	36		07:39 (LZ45)	19:52	26	07:24 (LZ40)	20:27	23	06:39 (LZ32)	20:53		
16	07:40		08:15 (LZ56)	07:08	06:22			07:03 (LZ45)	06:27			06:57 (LZ40)	05:44	06:16 (LZ32)	05:27		
	16:58	26	08:41 (LZ56)	17:40	18:16	35		07:38 (LZ45)	19:53	27	07:24 (LZ40)	20:28	23	06:39 (LZ32)	20:53		
17	07:40		08:15 (LZ56)	07:07	06:20			07:03 (LZ45)	06:25			06:56 (LZ40)	05:43	06:16 (LZ32)	05:27		
	16:59	26	08:41 (LZ56)	17:41	18:17	34		07:37 (LZ45)	19:54	27	07:23 (LZ40)	20:29	22	06:38 (LZ32)	20:54		
18	07:39		08:16 (LZ56)	07:05	06:18			07:03 (LZ45)	06:23			06:56 (LZ40)	05:42	06:17 (LZ32)	05:27		
	17:00	26	08:42 (LZ56)	17:42	18:18	33		07:36 (LZ45)	19:55	28	07:24 (LZ40)	20:30	21	06:38 (LZ32)	20:54		
19	07:39		08:16 (LZ56)	07:04	06:16			07:05 (LZ45)	06:22			06:55 (LZ40)	05:41	06:18 (LZ32)	05:27		
	17:02	26	08:42 (LZ56)	17:44	18:19	31		07:36 (LZ45)	19:57	29	07:24 (LZ40)	20:31	21	06:39 (LZ32)	20:54		
20	07:38		08:16 (LZ56)	07:02	06:15			07:05 (LZ45)	06:20			06:55 (LZ40)	05:40	06:18 (LZ32)	05:27		
	17:03	26	08:42 (LZ56)	17:45	18:21	29		07:34 (LZ45)	19:58	29	07:24 (LZ40)	20:32	20	06:38 (LZ32)	20:55		
21	07:37		08:16 (LZ56)	07:01	06:13			07:06 (LZ45)	06:18			06:55 (LZ40)	05:39	06:19 (LZ32)	05:27		
	17:04	26	08:42 (LZ56)	17:46	18:22	26		07:32 (LZ45)	19:59	28	07:23 (LZ40)	20:33	18	06:37 (LZ32)	20:55		
22	07:37		08:17 (LZ56)	06:59	06:11			07:07 (LZ45)	06:17			06:54 (LZ40)	05:38	06:19 (LZ32)	05:27		
	17:06	26	08:43 (LZ56)	17:48	18:23	23		07:30 (LZ45)	20:00	28	07:22 (LZ40)	20:34	17	06:36 (LZ32)	20:55		
23	07:36		08:18 (LZ56)	06:58	06:09			07:09 (LZ45)	06:15			06:55 (LZ40)	05:37	06:20 (LZ32)	05:28		
	17:07	25	08:43 (LZ56)	17:49	18:24	18		07:27 (LZ45)	20:01	27	07:22 (LZ40)	20:35	16	06:36 (LZ32)	20:55		
24	07:35		08:18 (LZ56)	06:56	06:07			07:12 (LZ45)	06:14			06:55 (LZ40)	05:36	06:21 (LZ32)	05:28		
	17:08	24	08:42 (LZ56)	17:50	18:25	13		07:25 (LZ45)	20:03	26	07:21 (LZ40)	20:36	13	06:34 (LZ32)	20:55		
25	07:34		08:19 (LZ56)	06:54	06:05				06:12			06:56 (LZ40)	05:36	06:23 (LZ32)	05:28		
	17:09	23	08:42 (LZ56)	17:52	18:27				20:04	25	07:21 (LZ40)	20:37	11	06:34 (LZ32)	20:55		
26	07:33		08:20 (LZ56)	06:53	06:04				06:10			06:56 (LZ40)	05:35	06:24 (LZ32)	05:28		
	17:11	22	08:42 (LZ56)	17:53	18:28				20:05	23	07:19 (LZ40)	20:38	8	06:32 (LZ32)	20:56		
27	07:32		08:21 (LZ56)	06:51	06:02				06:09			06:57 (LZ40)	05:34	06:27 (LZ32)	05:29		
	17:12	20	08:41 (LZ56)	17:54	18:29				20:06	21	07:18 (LZ40)	20:39	2	06:29 (LZ32)	20:56		
28	07:31		08:22 (LZ56)	06:50	06:00				06:07			06:58 (LZ40)	05:33		05:29		
	17:14	18	08:40 (LZ56)	17:55	18:30				20:07	18	07:16 (LZ40)	20:40			20:56		
29	07:31		08:24 (LZ56)		06:58				06:06			07:00 (LZ40)	05:33		05:30		
	17:15	15	08:39 (LZ56)		19:31				20:09	14	07:14 (LZ40)	20:41			20:56		
30	07:30		08:26 (LZ56)		06:56				06:04			07:03 (LZ40)	05:32		05:30		
	17:16	11	08:37 (LZ56)		19:33				20:10	9	07:12 (LZ40)	20:42			20:55		
31	07:29		08:30 (LZ56)		06:55							05:31					
	17:18	4	08:34 (LZ56)		19:34							20:43					
Potential sun hours	289			293	369			402				456			462		
Total, worst case		658			646			471				415					
Sun reduction		0.28			0.31			0.40				0.47					
Oper. time red.		1.00			1.00			1.00				1.00					
Wind dir. red.		0.67			0.61			0.59				0.58					
Total reduction		0.19			0.19			0.23				0.27					
Total, real		122			121			110				113					

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -83.7° Slope: 90.0° (52)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

July		August		September		October		November		December	
1	05:31	05:57	06:27 (LZ32)	06:32	07:04 (LZ40)	07:06	07:43 (LZ45)	06:44	07:22	07:56 (LZ56)	
	20:55	20:34	06:49 (LZ32)	19:47	14	07:18 (LZ40)	18:52	08:19 (LZ45)	17:01	16:34	23
2	05:31	05:58	06:27 (LZ32)	06:33	07:07 (LZ40)	07:07	07:43 (LZ45)	06:45	07:23	07:57 (LZ56)	
	20:55	20:33	06:49 (LZ32)	19:45	7	07:14 (LZ40)	18:50	08:18 (LZ45)	17:00	16:33	23
3	05:32	05:59	06:27 (LZ32)	06:34		07:08	07:43 (LZ45)	06:47	07:24	07:58 (LZ56)	
	20:55	20:31	06:48 (LZ32)	19:43		18:49	08:18 (LZ45)	16:59	16:33	22	08:20 (LZ56)
4	05:32	06:00	06:28 (LZ32)	06:35		07:09	07:43 (LZ45)	06:48	07:26	07:59 (LZ56)	
	20:55	20:30	06:47 (LZ32)	19:42		18:47	08:17 (LZ45)	16:57	16:33	21	08:20 (LZ56)
5	05:33	06:01	06:29 (LZ32)	06:36		07:10	07:44 (LZ45)	06:49	07:27	07:59 (LZ56)	
	20:54	20:29	06:48 (LZ32)	19:40		18:45	08:17 (LZ45)	16:56	16:33	21	08:20 (LZ56)
6	05:33	06:02	06:30 (LZ32)	06:37		07:12	07:44 (LZ45)	06:51	07:28	08:00 (LZ56)	
	20:54	20:28	06:46 (LZ32)	19:38		18:43	08:15 (LZ45)	16:55	16:32	20	08:20 (LZ56)
7	05:34	06:03	06:31 (LZ32)	06:38		07:13	07:45 (LZ45)	06:52	07:29	08:01 (LZ56)	
	20:54	20:26	06:45 (LZ32)	19:36		18:41	08:14 (LZ45)	16:54	16:32	19	08:20 (LZ56)
8	05:35	06:05	06:33 (LZ32)	06:40		07:14	07:46 (LZ45)	06:53	07:30	08:02 (LZ56)	
	20:53	20:25	06:43 (LZ32)	19:34		18:40	08:12 (LZ45)	16:52	16:32	18	08:20 (LZ56)
9	05:36	06:06		06:41		07:15	07:47 (LZ45)	06:55	07:31	08:03 (LZ56)	
	20:53	20:24		19:33		18:38	08:10 (LZ45)	16:51	16:32	17	08:20 (LZ56)
10	05:36	06:07		06:42		07:16	07:49 (LZ45)	06:56	07:32	08:04 (LZ56)	
	20:53	20:22		19:31		18:36	08:08 (LZ45)	16:50	16:32	16	08:20 (LZ56)
11	05:37	06:08		06:43		07:18	07:52 (LZ45)	06:57	07:32	08:05 (LZ56)	
	20:52	20:21		19:29		18:34	08:04 (LZ45)	16:49	6	08:06 (LZ56)	15
12	05:38	06:09		06:44		07:19		06:59	07:57 (LZ56)	07:33	08:06 (LZ56)
	20:52	20:19		19:27		18:33		16:48	12	08:09 (LZ56)	14
13	05:39	06:10	07:10 (LZ40)	06:45		07:20		07:00	08:06 (LZ56)	16:32	08:20 (LZ56)
	20:51	20:18	07:20 (LZ40)	19:25		18:31		16:47	15	08:11 (LZ56)	13
14	05:39	06:11	07:07 (LZ40)	06:46		07:21		07:01	08:11 (LZ56)	16:32	08:19 (LZ56)
	20:50	20:16	07:23 (LZ40)	19:23		18:29		16:46	18	08:12 (LZ56)	11
15	05:40	06:12	07:05 (LZ40)	06:47		07:22		07:03	08:12 (LZ56)	16:32	08:19 (LZ56)
	20:50	20:15	07:24 (LZ40)	19:22		18:28		16:45	20	08:14 (LZ56)	10
16	05:41	06:14	07:04 (LZ40)	06:49		07:24		07:04	08:14 (LZ56)	16:32	08:19 (LZ56)
	20:49	20:13	07:25 (LZ40)	19:20		18:26		16:44	22	08:15 (LZ56)	9
17	05:42	06:15	07:02 (LZ40)	06:50		07:25		07:05	08:15 (LZ56)	16:33	08:19 (LZ56)
	20:48	20:12	07:26 (LZ40)	19:18		18:24		16:43	23	08:16 (LZ56)	8
18	05:43	06:16	07:01 (LZ40)	06:51		07:26		07:06	08:16 (LZ56)	16:33	08:19 (LZ56)
	20:48	20:10	07:26 (LZ40)	19:16		18:23		16:42	24	08:17 (LZ56)	7
19	05:44	06:17	07:01 (LZ40)	06:52	08:00 (LZ45)	07:27		07:08	08:17 (LZ56)	16:34	08:19 (LZ56)
	20:47	20:09	07:28 (LZ40)	19:14	10	08:10 (LZ45)	18:21	16:41	25	08:18 (LZ56)	6
20	05:45	06:18	07:01 (LZ40)	06:53	07:56 (LZ45)	07:29		07:09	08:18 (LZ56)	16:34	08:19 (LZ56)
	20:46	20:07	07:28 (LZ40)	19:12	17	08:13 (LZ45)	18:19	16:40	26	08:19 (LZ56)	6
21	05:46	06:19	07:00 (LZ40)	06:54	07:53 (LZ45)	07:30		07:10	08:19 (LZ56)	16:34	08:19 (LZ56)
	20:45	20:05	07:28 (LZ40)	19:11	22	08:15 (LZ45)	18:18	16:40	26	08:18 (LZ56)	6
22	05:47	06:20	06:59 (LZ40)	06:55	07:52 (LZ45)	07:31		07:11	08:18 (LZ56)	16:34	08:20 (LZ56)
	20:44	20:04	07:28 (LZ40)	19:09	25	08:17 (LZ45)	18:16	16:39	26	08:18 (LZ56)	6
23	05:48	06:21	06:59 (LZ40)	06:56	07:50 (LZ45)	07:32		07:13	08:19 (LZ56)	16:35	08:20 (LZ56)
	20:43	20:02	07:28 (LZ40)	19:07	28	08:18 (LZ45)	18:15	16:38	26	08:19 (LZ56)	6
24	05:49	06:23	06:59 (LZ40)	06:58	07:48 (LZ45)	07:34		07:14	08:20 (LZ56)	16:35	08:21 (LZ56)
	20:42	20:01	07:27 (LZ40)	19:05	31	08:19 (LZ45)	18:13	16:37	26	08:19 (LZ56)	6
25	05:50	06:24	06:58 (LZ40)	06:59	07:47 (LZ45)	06:35		07:15	08:20 (LZ56)	16:36	08:21 (LZ56)
	20:41	19:59	07:27 (LZ40)	19:03	32	08:19 (LZ45)	17:12	16:37	26	08:19 (LZ56)	7
26	05:51	06:25	06:58 (LZ40)	07:00	07:46 (LZ45)	06:36		07:16	08:20 (LZ56)	16:37	08:21 (LZ56)
	20:40	19:57	07:26 (LZ40)	19:01	33	08:19 (LZ45)	17:10	16:36	26	08:19 (LZ56)	7
27	05:52	06:26	06:59 (LZ40)	07:01	07:45 (LZ45)	06:38		07:18	08:20 (LZ56)	16:37	08:21 (LZ56)
	20:39	19:55	07:25 (LZ40)	19:00	34	08:19 (LZ45)	17:09	16:36	26	08:20 (LZ56)	9
28	05:53	06:27	06:59 (LZ40)	07:02	07:44 (LZ45)	06:39		07:19	08:21 (LZ56)	16:38	08:21 (LZ56)
	20:38	19:54	07:24 (LZ40)	18:58	35	08:19 (LZ45)	17:07	16:35	26	08:20 (LZ56)	10
29	05:54	06:28	06:59 (LZ40)	07:03	07:44 (LZ45)	06:40		07:20	08:21 (LZ56)	16:39	08:21 (LZ56)
	20:37	19:52	07:23 (LZ40)	18:56	36	08:20 (LZ45)	17:06	16:35	25	08:20 (LZ56)	10
30	05:55	06:29	07:00 (LZ40)	07:05	07:44 (LZ45)	06:41		07:21	08:21 (LZ56)	16:39	08:21 (LZ56)
	20:36	19:50	07:22 (LZ40)	18:54	36	08:20 (LZ45)	17:04	16:34	25	08:20 (LZ56)	12
31	05:56	06:31	07:01 (LZ40)			06:43				07:43	08:21 (LZ56)
	20:35	19:49	07:20 (LZ40)			17:03				16:41	13
Potential sun hours	468	433		376		342		291		279	
Total, worst case	270	599		360		313		449		391	
Sun reduction	0.59	0.65		0.59		0.47		0.36		0.26	
Oper. time red.	1.00	1.00		1.00		1.00		1.00		1.00	
Wind dir. red.	0.58	0.59		0.61		0.61		0.67		0.67	
Total reduction	0.34	0.38		0.36		0.29		0.24		0.18	
Total, real	92	228		131		91		109		69	

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)





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 85.2° Slope: 90.0° (53)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

January		February		March		April	May	June
1	07:43 16:42	07:27 17:19	15 16:15 (LZ54) 16:30 (LZ54)	06:48 17:57		06:53 19:35	06:03 20:11	05:31 20:44
2	07:44 16:43	07:26 17:20	11 16:16 (LZ54) 16:27 (LZ54)	06:46 17:58		06:51 19:36	06:02 20:12	05:30 20:45
3	07:44 16:44	07:25 17:22	5 16:19 (LZ54) 16:24 (LZ54)	06:45 17:59		06:49 19:37	06:00 20:13	05:30 20:45
4	07:44 16:45	07:24 17:23		06:43 18:01		06:47 19:39	05:59 20:15	05:29 20:46
5	07:44 16:46	07:23 17:24		06:41 18:02		06:46 19:40	05:57 20:16	05:29 20:47
6	07:43 16:47	07:22 17:26		06:39 18:03		06:44 19:41	05:56 20:17	05:29 20:48
7	07:43 16:48	07:20 17:27		06:38 18:04	9 17:30 (LZ47) 17:39 (LZ47)	06:42 19:42	05:55 20:18	05:28 20:48
8	07:43 16:49	07:19 17:29		06:36 18:06	14 17:28 (LZ47) 17:42 (LZ47)	06:40 19:44	05:53 20:19	05:28 20:49
9	07:43 16:50	16:12 (LZ54) 16:17 (LZ54)	07:18 17:30	06:34 18:07	17 17:26 (LZ47) 17:43 (LZ47)	06:39 19:45	05:52 20:20	05:28 20:50
10	07:43 16:51	9 16:20 (LZ54) 16:25 (LZ54)	07:17 17:31	06:32 18:08	20 17:24 (LZ47) 17:44 (LZ47)	06:37 19:46	05:51 20:21	05:27 20:50
11	07:42 16:52	12 16:21 (LZ54) 16:26 (LZ54)	07:15 17:33	06:31 18:09	21 17:23 (LZ47) 17:44 (LZ47)	06:35 19:47	05:50 20:23	05:27 20:51
12	07:42 16:53	14 16:23 (LZ54) 16:28 (LZ54)	07:14 17:34	06:29 18:11	22 17:22 (LZ47) 17:44 (LZ47)	06:33 19:48	05:49 20:24	05:27 20:51
13	07:42 16:54	15 16:24 (LZ54) 16:29 (LZ54)	07:13 17:35	06:27 18:12	22 17:23 (LZ47) 17:45 (LZ47)	06:32 19:49	05:47 20:25	05:27 20:52
14	07:41 16:56	17 16:25 (LZ54) 16:30 (LZ54)	07:11 17:37	06:25 18:13	23 17:22 (LZ47) 17:45 (LZ47)	06:30 19:51	05:46 20:26	05:27 20:52
15	07:41 16:57	19 16:26 (LZ54) 16:31 (LZ54)	07:10 17:38	06:24 18:14	22 17:22 (LZ47) 17:44 (LZ47)	06:28 19:52	05:45 20:27	05:27 20:53
16	07:40 16:58	19 16:27 (LZ54) 16:32 (LZ54)	07:08 17:40	06:22 18:16	21 17:22 (LZ47) 17:43 (LZ47)	06:27 19:53	05:44 20:28	05:27 20:53
17	07:40 16:59	21 16:28 (LZ54) 16:33 (LZ54)	07:07 17:41	06:20 18:17	20 17:22 (LZ47) 17:42 (LZ47)	06:25 19:54	05:43 20:29	05:27 20:54
18	07:39 17:00	21 16:29 (LZ54) 16:34 (LZ54)	07:05 17:42	06:18 18:18	17 17:24 (LZ47) 17:41 (LZ47)	06:23 19:55	05:42 20:30	05:27 20:54
19	07:39 17:02	23 16:29 (LZ54) 16:34 (LZ54)	07:04 17:44	06:16 18:19	14 17:25 (LZ47) 17:39 (LZ47)	06:22 19:57	05:41 20:31	05:27 20:54
20	07:38 17:03	23 16:29 (LZ54) 16:34 (LZ54)	07:02 17:45	06:15 18:21	9 17:27 (LZ47) 17:36 (LZ47)	06:20 19:58	05:40 20:32	05:27 20:55
21	07:37 17:04	23 16:29 (LZ54) 16:34 (LZ54)	07:01 17:46	06:13 18:22		06:18 19:59	05:39 20:33	05:27 20:55
22	07:37 17:06	24 16:30 (LZ54) 16:35 (LZ54)	06:59 17:48	06:11 18:23		06:17 20:00	05:38 20:34	05:27 20:55
23	07:36 17:07	24 16:31 (LZ54) 16:36 (LZ54)	06:58 17:49	06:09 18:24		06:15 20:01	05:37 20:35	05:28 20:55
24	07:35 17:08	24 16:32 (LZ54) 16:37 (LZ54)	06:56 17:50	06:07 18:25		06:14 20:03	05:36 20:36	05:28 20:55
25	07:34 17:09	24 16:32 (LZ54) 16:37 (LZ54)	06:54 17:52	06:05 18:27		06:12 20:04	05:36 20:37	05:28 20:55
26	07:33 17:11	23 16:33 (LZ54) 16:38 (LZ54)	06:53 17:53	06:04 18:28		06:10 20:05	05:35 20:38	05:28 20:56
27	07:32 17:12	23 16:33 (LZ54) 16:38 (LZ54)	06:51 17:54	06:02 18:29		06:09 20:06	05:34 20:39	05:29 20:56
28	07:32 17:14	22 16:34 (LZ54) 16:39 (LZ54)	06:50 17:55	06:00 18:30		06:07 20:07	05:33 20:40	05:29 20:56
29	07:31 17:15	21 16:34 (LZ54) 16:39 (LZ54)		06:58 19:31		06:06 20:09	05:33 20:41	05:30 20:56
30	07:30 17:16	19 16:35 (LZ54) 16:40 (LZ54)		06:56 19:33		06:04 20:10	05:32 20:42	05:30 20:55
31	07:29 17:18	17 16:35 (LZ54) 16:40 (LZ54)		06:55 19:34			05:31 20:43	
Potential sun hours	289	293	369	402	456	462		
Total, worst case	442	31	251					
Sun reduction	0.28	0.29	0.31					
Oper. time red.	1.00	1.00	1.00					
Wind dir. red.	0.61	0.61	0.58					
Total reduction	0.17	0.18	0.18					
Total, real	75	5	45					

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)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_03 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 85.2° Slope: 90.0° (53)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]  
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July	August	September	October	November	December
1	05:31 20:55	05:57 20:34	06:32 19:47	07:06 18:52	18:02 (LZ47) 17:01	07:22 16:34
2	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:50	18:02 (LZ47) 17:00	07:23 16:33
3	05:32 20:55	05:59 20:31	06:34 19:43	07:08 18:49	18:02 (LZ47) 16:59	07:25 16:33
4	05:32 20:55	06:00 20:30	06:35 19:42	07:09 18:47	18:02 (LZ47) 16:57	07:26 16:33
5	05:33 20:54	06:01 20:29	06:36 19:40	07:10 18:45	18:04 (LZ47) 16:56	07:27 16:33
6	05:34 20:54	06:02 20:28	06:37 19:38	07:12 18:43	18:05 (LZ47) 16:55	07:28 16:32
7	05:34 20:54	06:04 20:26	06:38 19:36	07:13 18:41	18:09 (LZ47) 16:54	07:29 16:32
8	05:35 20:53	06:05 20:25	06:40 19:34	07:14 18:40	16:53 16:52	07:30 16:32
9	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	16:55 16:51	07:31 16:32
10	05:36 20:53	06:07 20:22	06:42 19:31	07:16 18:36	16:56 16:50	07:32 16:32
11	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:34	16:57 16:49	07:32 16:32
12	05:38 20:52	06:09 20:19	06:44 19:27	07:19 18:33	16:59 16:48	07:33 16:32
13	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	16:59 16:47	07:34 16:32
14	05:39 20:50	06:11 20:16	06:46 19:23	07:21 18:29	16:59 16:46	07:35 16:32
15	05:40 20:50	06:12 20:15	06:47 19:22	07:22 18:28	16:59 16:45	07:36 16:32
16	05:41 20:49	06:14 20:13	06:49 19:20	07:24 18:26	16:59 16:44	07:36 16:33
17	05:42 20:48	06:15 20:12	06:50 19:18	07:25 18:24	16:59 16:43	07:37 16:33
18	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	16:59 16:42	07:38 16:33
19	05:44 20:47	06:17 20:09	06:52 19:14	07:27 18:21	16:59 16:41	07:38 16:34
20	05:45 20:46	06:18 20:07	06:53 19:12	07:29 18:19	16:59 16:40	07:39 16:34
21	05:46 20:45	06:19 20:05	06:54 19:11	07:30 18:18	16:59 16:40	07:40 16:34
22	05:47 20:44	06:20 20:04	06:55 19:09	07:31 18:16	16:59 16:39	07:40 16:35
23	05:48 20:43	06:21 20:02	06:57 19:07	18:12 (LZ47) 18:20 (LZ47)	16:59 16:38	07:41 16:35
24	05:49 20:42	06:23 20:01	06:58 19:05	18:09 (LZ47) 18:22 (LZ47)	16:59 16:37	07:41 16:36
25	05:50 20:42	06:24 19:59	06:59 19:03	18:07 (LZ47) 18:23 (LZ47)	16:59 16:37	07:42 16:37
26	05:51 20:41	06:25 19:57	07:00 19:01	18:05 (LZ47) 18:24 (LZ47)	16:59 16:36	07:42 16:37
27	05:52 20:39	06:26 19:55	07:01 19:00	18:04 (LZ47) 18:24 (LZ47)	16:59 16:36	07:42 16:38
28	05:53 20:38	06:27 19:54	07:02 18:58	18:03 (LZ47) 18:24 (LZ47)	16:59 16:35	07:43 16:39
29	05:54 20:37	06:28 19:52	07:03 18:56	18:03 (LZ47) 18:25 (LZ47)	16:59 16:35	07:43 16:39
30	05:55 20:36	06:29 19:50	07:05 18:54	18:02 (LZ47) 18:25 (LZ47)	16:59 16:34	07:43 16:40
31	05:56 20:35	06:31 19:49		06:43 17:03		07:43 16:41
Potential sun hours	468	433	376	342	291	279
Total, worst case			142	114	451	26
Sun reduction			0.59	0.47	0.36	0.26
Oper. time red.			1.00	1.00	1.00	1.00
Wind dir. red.			0.58	0.58	0.61	0.61
Total reduction			0.35	0.28	0.22	0.16
Total, real			49	31	100	4

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

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





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 76.5° Slope: 90.0° (68)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	January	February	March	April	May	June
1	07:43 16:42	07:27 17:19	16:32 (LZ54) 16:51 (LZ54)	06:48 17:57	06:53 19:35	05:31 20:44
2	07:44 16:43	07:26 17:20	16:31 (LZ54) 16:51 (LZ54)	06:46 17:58	06:51 19:36	05:30 20:45
3	07:44 16:44	07:25 17:22	16:31 (LZ54) 16:52 (LZ54)	06:45 17:59	06:49 19:37	05:30 20:45
4	07:44 16:45	07:24 17:23	16:30 (LZ54) 16:53 (LZ54)	06:43 18:01	06:47 19:39	05:29 20:46
5	07:44 16:46	07:23 17:24	16:31 (LZ54) 16:53 (LZ54)	06:41 18:02	06:46 19:40	05:29 20:47
6	07:43 16:47	07:22 17:26	16:31 (LZ54) 16:54 (LZ54)	06:39 18:03	06:44 19:41	05:29 20:48
7	07:43 16:48	07:20 17:27	16:30 (LZ54) 16:53 (LZ54)	06:38 18:04	06:42 19:42	05:28 20:48
8	07:43 16:49	07:19 17:29	16:31 (LZ54) 16:53 (LZ54)	06:36 18:06	06:40 19:43	05:28 20:49
9	07:43 16:50	07:18 17:30	16:32 (LZ54) 16:54 (LZ54)	06:34 18:07	06:39 19:45	05:28 20:50
10	07:43 16:51	07:17 17:31	16:31 (LZ54) 16:53 (LZ54)	06:32 18:08	06:37 19:46	05:27 20:50
11	07:42 16:52	07:15 17:33	16:33 (LZ54) 16:52 (LZ54)	06:31 18:09	06:35 19:47	05:27 20:51
12	07:42 16:53	07:14 17:34	16:33 (LZ54) 16:51 (LZ54)	06:29 18:11	06:33 19:48	05:27 20:51
13	07:42 16:54	07:13 17:35	16:35 (LZ54) 16:50 (LZ54)	06:27 18:12	06:32 19:49	05:27 20:52
14	07:41 16:56	07:11 17:37	16:37 (LZ54) 16:48 (LZ54)	06:25 18:13	06:30 19:51	05:27 20:52
15	07:41 16:57	07:10 17:38	06:24 18:14	06:28 19:52	05:45 20:27	05:27 20:53
16	07:40 16:58	07:08 17:40	06:22 18:16	17:41 (LZ47) 17:52 (LZ47)	06:27 19:53	05:44 20:53
17	07:40 16:59	07:07 17:41	06:20 18:17	17:39 (LZ47) 17:54 (LZ47)	06:25 19:54	05:43 20:54
18	07:39 17:00	07:05 17:42	06:18 18:18	17:37 (LZ47) 17:55 (LZ47)	06:23 19:55	05:42 20:54
19	07:39 17:02	07:04 17:44	06:16 18:19	17:37 (LZ47) 17:56 (LZ47)	06:22 19:57	05:41 20:54
20	07:38 17:03	07:02 17:45	06:15 18:21	17:36 (LZ47) 17:56 (LZ47)	06:20 19:58	05:40 20:55
21	07:37 17:04	07:01 17:46	06:13 18:22	17:35 (LZ47) 17:56 (LZ47)	06:18 19:59	05:39 20:55
22	07:37 17:06	06:59 17:48	06:11 18:23	17:34 (LZ47) 17:55 (LZ47)	06:17 20:00	05:38 20:55
23	07:36 17:07	06:58 17:49	06:09 18:24	17:34 (LZ47) 17:55 (LZ47)	06:15 20:01	05:37 20:55
24	07:35 17:08	06:56 17:50	06:07 18:25	17:35 (LZ47) 17:55 (LZ47)	06:14 20:03	05:36 20:55
25	07:34 17:09	06:54 17:52	06:05 18:27	17:35 (LZ47) 17:54 (LZ47)	06:12 20:04	05:36 20:55
26	07:33 17:11	06:53 17:53	06:04 18:28	17:36 (LZ47) 17:52 (LZ47)	06:10 20:05	05:35 20:56
27	07:32 17:12	06:51 17:54	06:02 18:29	17:37 (LZ47) 17:50 (LZ47)	06:09 20:06	05:34 20:56
28	07:32 17:14	16:38 (LZ54) 16:43 (LZ54)	06:50 17:55	06:00 18:30	17:39 (LZ47) 17:47 (LZ47)	05:33 20:56
29	07:31 17:15	16:35 (LZ54) 16:46 (LZ54)	06:58 19:31	06:06 20:09	06:06 20:41	05:33 20:56
30	07:30 17:16	16:34 (LZ54) 16:48 (LZ54)	06:56 19:33	06:04 20:10	05:32 20:42	05:30 20:55
31	07:29 17:18	16:33 (LZ54) 16:50 (LZ54)	06:55 19:34	06:55 20:43	05:31 20:43	
Potential sun hours	289	293	369	402	456	462
Total, worst case	47	280	222			
Sun reduction	0.28	0.29	0.31			
Oper. time red.	1.00	1.00	1.00			
Wind dir. red.	0.60	0.60	0.60			
Total reduction	0.17	0.17	0.18			
Total, real	8	49	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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZaG\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 76.5° Slope: 90.0° (68)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	July	August	September	October	November	December
1	05:31 20:55	05:57 20:34	06:32 19:47	07:06 18:52	06:44 17:01	16:01 (LZ54) 16:22 (LZ54)
2	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:50	06:45 17:00	16:00 (LZ54) 16:22 (LZ54)
3	05:32 20:55	05:59 20:31	06:34 19:43	07:08 18:49	06:47 16:59	16:01 (LZ54) 16:23 (LZ54)
4	05:32 20:55	06:00 20:30	06:35 19:42	07:09 18:47	06:48 16:57	16:00 (LZ54) 16:23 (LZ54)
5	05:33 20:54	06:01 20:29	06:36 19:40	07:10 18:45	06:49 16:56	16:01 (LZ54) 16:24 (LZ54)
6	05:34 20:54	06:02 20:28	06:37 19:38	07:12 18:43	06:51 16:55	16:00 (LZ54) 16:23 (LZ54)
7	05:34 20:54	06:04 20:26	06:38 19:36	07:13 18:41	06:52 16:54	16:00 (LZ54) 16:23 (LZ54)
8	05:35 20:53	06:05 20:25	06:40 19:34	07:14 18:40	06:53 16:52	16:01 (LZ54) 16:23 (LZ54)
9	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	06:55 16:51	16:02 (LZ54) 16:22 (LZ54)
10	05:36 20:53	06:07 20:22	06:42 19:31	07:16 18:36	06:56 16:50	16:03 (LZ54) 16:22 (LZ54)
11	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:34	06:57 16:49	16:04 (LZ54) 16:20 (LZ54)
12	05:38 20:52	06:09 20:19	06:44 19:27	07:19 18:33	06:59 16:48	16:05 (LZ54) 16:19 (LZ54)
13	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	07:00 16:47	16:07 (LZ54) 16:18 (LZ54)
14	05:39 20:50	06:11 20:16	06:46 19:23	07:21 18:29	07:01 16:46	16:10 (LZ54) 16:14 (LZ54)
15	05:40 20:50	06:12 20:15	06:47 19:22	18:30 (LZ47) 18:36 (LZ47)	07:03 16:45	07:36 16:32
16	05:41 20:49	06:14 20:13	06:49 19:20	18:27 (LZ47) 18:39 (LZ47)	07:04 16:44	07:36 16:33
17	05:42 20:48	06:15 20:12	06:50 19:18	18:24 (LZ47) 18:40 (LZ47)	07:05 16:43	07:37 16:33
18	05:43 20:48	06:16 20:10	06:51 19:16	18:23 (LZ47) 18:41 (LZ47)	07:06 16:42	07:38 16:33
19	05:44 20:47	06:17 20:09	06:52 19:14	18:22 (LZ47) 18:41 (LZ47)	07:08 16:41	07:38 16:34
20	05:45 20:46	06:18 20:07	06:53 19:12	18:21 (LZ47) 18:41 (LZ47)	07:09 16:40	07:39 16:34
21	05:46 20:45	06:19 20:05	06:54 19:11	18:20 (LZ47) 18:41 (LZ47)	07:10 16:40	07:40 16:34
22	05:47 20:44	06:20 20:04	06:55 19:09	18:20 (LZ47) 18:41 (LZ47)	07:11 16:39	07:40 16:35
23	05:48 20:43	06:21 20:02	06:56 19:07	18:20 (LZ47) 18:41 (LZ47)	07:13 16:38	07:41 16:35
24	05:49 20:42	06:23 20:01	06:58 19:05	18:20 (LZ47) 18:40 (LZ47)	07:14 16:37	07:41 16:36
25	05:50 20:41	06:24 19:59	06:59 19:03	18:20 (LZ47) 18:38 (LZ47)	07:15 16:37	07:42 16:37
26	05:51 20:40	06:25 19:57	07:00 19:01	18:21 (LZ47) 18:37 (LZ47)	07:16 16:36	07:42 16:37
27	05:52 20:39	06:26 19:55	07:01 19:00	18:22 (LZ47) 18:34 (LZ47)	16:09 (LZ54) 16:15 (LZ54)	07:18 16:36
28	05:53 20:38	06:27 19:54	07:02 18:58	18:25 (LZ47) 18:31 (LZ47)	16:06 (LZ54) 16:17 (LZ54)	07:19 16:35
29	05:54 20:37	06:28 19:52	07:03 18:56	06:40 17:06	16:04 (LZ54) 16:20 (LZ54)	07:20 16:35
30	05:55 20:36	06:29 19:50	07:05 18:54	06:42 17:04	16:03 (LZ54) 16:21 (LZ54)	07:21 16:40
31	05:56 20:35	06:31 19:49		06:43 17:03	16:02 (LZ54) 16:22 (LZ54)	07:43 16:41
Potential sun hours	468	433	376	342	291	279
Total, worst case			226	71	263	
Sun reduction			0.59	0.47	0.36	
Oper. time red.			1.00	1.00	1.00	
Wind dir. red.			0.60	0.60	0.60	
Total reduction			0.35	0.28	0.22	
Total, real			80	20	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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		



## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZeM\_01 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -91.1° Slope: 90.0° (48)  
Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:44 16:42	07:27 17:19	06:48 17:57	06:53 19:35	07:49 (LZ21) 21	06:03 08:10 (LZ21)	05:31 20:11	05:31 20:44	05:57 20:55	06:32 20:34	07:34 (LZ21) 18:52	07:06 17:01	06:44 16:34	07:22 16:34
2	07:44 16:43	07:26 17:20	06:46 17:58	06:51 19:36	07:46 (LZ21) 26	06:02 08:12 (LZ21)	05:30 20:12	05:31 20:45	05:58 20:55	06:33 20:33	07:34 (LZ21) 18:50	07:07 17:00	06:45 16:33	07:23 16:33
3	07:44 16:44	07:25 17:22	06:45 17:59	06:49 19:38	07:44 (LZ21) 29	06:00 08:13 (LZ21)	05:30 20:13	05:32 20:45	05:59 20:55	06:34 20:31	07:34 (LZ21) 18:49	07:08 16:59	06:47 16:33	07:25 16:33
4	07:44 16:45	07:24 17:23	06:43 18:01	06:47 19:39	07:42 (LZ21) 34	05:59 08:16 (LZ21)	05:29 20:15	05:32 20:46	06:00 20:55	06:35 20:30	07:34 (LZ21) 18:47	07:09 16:57	06:48 16:33	07:26 16:33
5	07:44 16:46	07:23 17:24	06:41 18:02	06:46 19:40	07:41 (LZ21) 35	05:57 08:16 (LZ21)	05:29 20:16	05:33 20:47	06:01 20:55	06:36 20:29	07:35 (LZ21) 18:45	07:10 16:56	06:49 16:32	07:27 16:32
6	07:44 16:47	07:22 17:26	06:39 18:03	06:44 19:41	07:39 (LZ21) 38	05:56 08:17 (LZ21)	05:28 20:17	05:33 20:48	06:02 20:54	06:37 20:28	07:35 (LZ21) 18:43	07:12 16:51	06:51 16:32	07:28 16:32
7	07:43 16:48	07:21 17:27	06:38 18:04	06:42 19:42	07:38 (LZ21) 39	05:55 08:17 (LZ21)	05:28 20:18	05:34 20:48	06:03 20:54	06:38 19:36	07:36 (LZ21) 18:41	07:13 16:54	06:52 16:32	07:29 16:32
8	07:43 16:49	07:19 17:29	06:36 18:06	06:40 19:44	07:37 (LZ21) 41	05:53 08:18 (LZ21)	05:28 20:19	05:35 20:49	06:05 20:25	06:40 19:34	07:36 (LZ21) 18:40	07:14 16:52	06:53 16:32	07:30 16:32
9	07:43 16:50	07:18 17:30	06:34 18:07	06:39 19:45	07:36 (LZ21) 42	05:52 08:18 (LZ21)	05:28 20:20	05:35 20:50	06:06 20:53	06:41 20:24	07:38 (LZ21) 18:38	07:15 16:51	06:55 16:32	07:31 16:32
10	07:43 16:51	07:17 17:31	06:32 18:08	06:37 19:46	07:35 (LZ21) 43	05:51 08:18 (LZ21)	05:27 20:22	05:36 20:50	06:07 20:53	06:42 20:22	07:39 (LZ21) 18:36	07:16 16:50	06:56 16:32	07:32 16:32
11	07:42 16:52	07:15 17:33	06:31 18:09	06:35 19:47	07:34 (LZ21) 44	05:50 08:18 (LZ21)	05:27 20:23	05:37 20:51	06:08 20:52	06:43 20:21	07:41 (LZ21) 18:34	07:18 16:49	06:57 16:32	07:32 16:32
12	07:42 16:53	07:14 17:34	06:29 18:11	06:33 19:48	07:34 (LZ21) 44	05:48 08:18 (LZ21)	05:27 20:24	05:38 20:51	06:09 20:52	06:44 20:19	07:44 (LZ21) 18:33	07:19 16:48	06:59 16:32	07:33 16:32
13	07:42 16:54	07:13 17:35	06:27 18:12	06:32 19:50	07:33 (LZ21) 45	05:47 08:18 (LZ21)	05:27 20:25	05:39 20:51	06:10 20:18	06:45 10	07:54 (LZ21) 08:04 (LZ21)	07:20 19:25	07:00 18:31	07:34 16:32
14	07:41 16:55	07:11 17:37	06:25 18:13	06:30 19:51	07:33 (LZ21) 44	05:46 08:17 (LZ21)	05:27 20:26	05:39 20:50	06:11 20:16	06:46 18	07:50 (LZ21) 08:08 (LZ21)	07:21 19:23	07:01 18:29	07:35 16:32
15	07:41 16:57	07:10 17:38	06:24 18:14	06:28 19:52	07:33 (LZ21) 44	05:45 08:17 (LZ21)	05:27 20:27	05:40 20:53	06:12 20:50	06:47 23	07:47 (LZ21) 08:10 (LZ21)	07:22 19:22	07:03 18:28	07:36 16:32
16	07:40 16:58	07:08 17:39	06:22 18:16	06:27 19:53	07:33 (LZ21) 44	05:44 08:17 (LZ21)	05:27 20:28	05:41 20:53	06:14 20:49	06:49 26	07:45 (LZ21) 08:11 (LZ21)	07:24 19:20	07:04 18:26	07:37 16:33
17	07:40 16:59	07:07 17:41	06:20 18:17	06:25 19:54	07:32 (LZ21) 44	05:43 08:16 (LZ21)	05:27 20:29	05:42 20:54	06:15 20:48	06:50 29	07:44 (LZ21) 08:13 (LZ21)	07:25 19:18	07:05 18:24	07:37 16:33
18	07:39 17:00	07:05 17:42	06:18 18:18	06:23 19:56	07:33 (LZ21) 43	05:42 08:16 (LZ21)	05:27 20:30	05:43 20:54	06:16 20:48	06:51 32	07:42 (LZ21) 08:14 (LZ21)	07:26 19:16	07:06 18:23	07:38 16:33
19	07:39 17:02	07:04 17:44	06:16 18:19	06:22 19:57	07:33 (LZ21) 41	05:41 08:14 (LZ21)	05:27 20:31	05:44 20:54	06:17 20:47	06:52 34	07:41 (LZ21) 08:15 (LZ21)	07:27 19:14	07:08 18:21	07:39 16:34
20	07:38 17:03	07:02 17:45	06:15 18:21	06:20 19:58	07:34 (LZ21) 40	05:40 08:14 (LZ21)	05:27 20:32	05:45 20:55	06:18 20:46	06:53 37	07:40 (LZ21) 08:17 (LZ21)	07:29 19:12	07:09 18:19	07:39 16:34
21	07:37 17:04	07:01 17:46	06:13 18:22	06:18 19:59	07:34 (LZ21) 39	05:39 08:13 (LZ21)	05:27 20:34	05:46 20:55	06:19 20:45	06:54 38	07:39 (LZ21) 08:17 (LZ21)	07:30 19:11	07:10 18:18	07:40 16:34
22	07:37 17:05	06:59 17:48	06:11 18:23	06:17 20:00	07:34 (LZ21) 37	05:38 08:11 (LZ21)	05:27 20:35	05:47 20:55	06:20 20:44	06:55 40	07:38 (LZ21) 08:18 (LZ21)	07:31 19:09	07:12 18:16	07:40 16:35
23	07:36 17:07	06:58 17:49	06:09 18:24	06:15 20:01	07:35 (LZ21) 36	05:37 08:11 (LZ21)	05:27 20:36	05:48 20:55	06:21 20:43	06:56 41	07:37 (LZ21) 08:18 (LZ21)	07:33 19:07	07:13 18:15	07:41 16:35
24	07:35 17:08	06:56 17:50	06:07 18:25	06:14 20:03	07:35 (LZ21) 34	05:36 08:09 (LZ21)	05:28 20:37	05:49 20:55	06:23 20:43	06:58 42	07:36 (LZ21) 08:18 (LZ21)	07:34 19:05	07:14 18:13	07:41 16:36
25	07:34 17:09	06:54 17:51	06:05 18:27	06:12 20:04	07:36 (LZ21) 32	05:36 08:08 (LZ21)	05:28 20:37	05:50 20:56	06:24 20:42	06:59 42	07:36 (LZ21) 08:18 (LZ21)	07:35 19:03	07:15 17:12	07:42 16:37
26	07:33 17:11	06:53 17:53	06:04 18:28	06:10 20:05	07:37 (LZ21) 29	05:35 08:06 (LZ21)	05:28 20:38	05:51 20:56	06:25 20:41	07:00 44	07:35 (LZ21) 08:19 (LZ21)	07:31 19:01	07:16 17:10	07:42 16:37
27	07:32 17:12	06:51 17:54	06:02 18:29	06:09 20:06	07:39 (LZ21) 25	05:34 08:04 (LZ21)	05:29 20:39	05:52 20:56	06:26 20:40	07:01 43	07:35 (LZ21) 08:18 (LZ21)	07:01 19:00	07:18 17:09	07:42 16:38
28	07:32 17:13	06:50 17:55	06:00 18:30	06:07 20:07	07:40 (LZ21) 22	05:33 08:02 (LZ21)	05:29 20:40	05:53 20:56	06:27 20:38	07:02 44	07:34 (LZ21) 08:18 (LZ21)	07:02 18:58	07:19 17:07	07:43 16:39
29	07:31 17:15	06:58 18:01	06:00 18:31	06:06 20:09	07:43 (LZ21) 16	05:33 07:59 (LZ21)	05:30 20:41	05:54 20:56	06:28 20:37	07:03 44	07:34 (LZ21) 08:18 (LZ21)	07:03 18:56	07:20 17:06	07:43 16:39
30	07:30 17:16	06:56 18:03	06:00 18:33	06:04 20:10	07:47 (LZ21) 8	05:32 07:55 (LZ21)	05:30 20:42	05:55 20:56	06:29 20:36	07:05 45	07:33 (LZ21) 08:18 (LZ21)	07:05 18:54	07:21 17:04	07:43 16:40
31	07:29 17:18	06:55 18:07	06:00 18:34	06:05 20:10	07:53 (LZ21) 08:07 (LZ21)	05:31 20:43	05:31 20:43	05:56 20:35	06:31 19:49	07:00 44	07:33 (LZ21) 08:17 (LZ21)	07:01 17:03	07:21 16:41	07:43 16:41
Potential sun hours	289	293	369	402		456	462	468	433	376		342	291	279
Total, worst case			14	1059					676	410				
Sun reduction			0.31	0.40					0.65	0.59				
Oper. time red.			1.00	1.00					1.00	1.00				
Wind dir. red.			0.61	0.61					0.61	0.61				
Total reduction			0.19	0.24					0.39	0.36				
Total, real			3	256					267	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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZeM\_02 - Shadow Receptor: 1.0 ? 1.0 Azimuth: -90.0° Slope: 90.0° (49)  
Assumptions for shadow calculations  
Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

### Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:44 16:42	07:27 17:19	06:48 17:57	06:53 19:35	06:03 20:11	07:03 (LZ21) 20:44	05:31 20:55	07:21 (LZ21) 20:34	07:10 (LZ21) 20:33	06:32 19:47	07:06 18:52	06:44 17:01
2	07:44 16:43	07:26 17:20	06:46 17:58	06:51 19:36	06:02 20:12	07:03 (LZ21) 20:45	05:31 20:55	07:20 (LZ21) 20:33	07:10 (LZ21) 20:33	06:33 19:45	07:07 18:50	06:45 17:00
3	07:44 16:44	07:25 17:22	06:45 17:59	06:49 19:38	06:00 20:13	07:02 (LZ21) 20:45	05:32 20:55	07:20 (LZ21) 20:31	07:10 (LZ21) 20:31	06:34 19:43	07:08 18:59	06:47 16:59
4	07:44 16:45	07:24 17:23	06:43 18:01	06:47 19:39	05:59 20:15	07:01 (LZ21) 20:46	05:29 20:55	07:19 (LZ21) 20:30	07:10 (LZ21) 20:30	06:35 19:42	07:09 18:47	06:48 16:57
5	07:44 16:46	07:23 17:24	06:41 18:02	06:46 19:40	05:57 20:16	07:01 (LZ21) 20:47	05:29 20:55	07:19 (LZ21) 20:29	07:10 (LZ21) 20:29	06:36 19:40	07:10 18:45	06:49 16:56
6	07:44 16:47	07:22 17:26	06:39 18:03	06:44 19:41	05:56 20:17	07:01 (LZ21) 20:48	05:28 20:54	07:19 (LZ21) 20:28	07:11 (LZ21) 20:28	06:37 19:38	07:12 18:43	06:51 16:55
7	07:43 16:48	07:21 17:27	06:38 18:04	06:42 19:42	05:55 20:18	07:00 (LZ21) 20:48	05:28 20:54	07:18 (LZ21) 20:26	07:11 (LZ21) 20:26	06:38 19:36	07:13 18:41	06:52 16:54
8	07:43 16:49	07:19 17:29	06:36 18:06	06:40 19:44	05:53 20:19	07:00 (LZ21) 20:49	05:28 20:54	07:18 (LZ21) 20:25	07:11 (LZ21) 20:25	06:38 19:34	07:14 18:40	06:53 16:52
9	07:43 16:50	07:18 17:30	06:34 18:07	06:39 19:45	05:52 20:20	07:00 (LZ21) 20:50	05:28 20:53	07:18 (LZ21) 20:24	07:11 (LZ21) 20:24	06:41 19:33	07:15 18:38	06:55 16:51
10	07:43 16:51	07:17 17:31	06:32 18:08	06:37 19:46	05:51 20:22	07:00 (LZ21) 20:50	05:27 20:53	07:17 (LZ21) 20:22	07:11 (LZ21) 20:22	06:42 19:31	07:16 18:36	06:56 16:50
11	07:42 16:52	07:15 17:33	06:31 18:09	06:35 19:47	05:50 20:23	07:00 (LZ21) 20:51	05:27 20:52	07:16 (LZ21) 20:21	07:12 (LZ21) 20:21	06:43 19:29	07:18 18:34	06:57 16:49
12	07:42 16:53	07:14 17:34	06:29 18:11	06:33 19:48	05:48 20:24	06:59 (LZ21) 20:51	05:27 20:52	07:16 (LZ21) 20:19	07:12 (LZ21) 20:19	06:44 19:27	07:19 18:33	06:59 16:48
13	07:42 16:54	07:13 17:35	06:27 18:12	06:32 19:50	05:47 20:25	06:59 (LZ21) 20:52	05:27 20:51	07:18 (LZ21) 20:18	07:13 (LZ21) 20:18	06:45 19:25	07:20 18:31	07:00 16:47
14	07:41 16:55	07:11 17:37	06:25 18:13	06:30 19:51	05:46 20:26	06:59 (LZ21) 20:52	05:27 20:50	07:19 (LZ21) 20:16	07:13 (LZ21) 20:16	06:46 19:23	07:21 18:29	07:01 16:46
15	07:41 16:57	07:10 17:38	06:24 18:14	06:28 19:52	05:45 20:27	07:00 (LZ21) 20:53	05:27 20:50	07:19 (LZ21) 20:12	07:14 (LZ21) 20:12	06:47 19:22	07:22 18:28	07:03 16:45
16	07:40 16:58	07:08 17:39	06:22 18:16	06:27 19:53	05:44 20:28	07:00 (LZ21) 20:53	05:27 20:49	07:20 (LZ21) 20:13	07:15 (LZ21) 20:13	06:48 19:20	07:24 18:26	07:04 16:44
17	07:40 16:59	07:07 17:41	06:20 18:17	06:25 19:54	05:43 20:29	07:00 (LZ21) 20:54	05:27 20:48	07:21 (LZ21) 20:12	07:16 (LZ21) 20:12	06:49 19:18	07:25 18:24	07:05 16:43
18	07:39 17:00	07:05 17:42	06:18 18:18	06:23 19:55	05:42 20:30	07:00 (LZ21) 20:54	05:27 20:48	07:22 (LZ21) 20:10	07:17 (LZ21) 20:10	06:51 19:16	07:26 18:23	07:06 16:42
19	07:39 17:02	07:04 17:44	06:16 18:19	06:22 19:57	05:41 20:31	07:00 (LZ21) 20:54	05:27 20:47	07:23 (LZ21) 20:09	07:19 (LZ21) 20:09	06:52 19:14	07:27 18:21	07:08 16:41
20	07:38 17:03	07:02 17:45	06:15 18:21	06:20 19:58	05:40 20:32	07:00 (LZ21) 20:55	05:27 20:46	07:24 (LZ21) 20:07	07:20 (LZ21) 20:07	06:53 19:12	07:29 18:19	07:09 16:40
21	07:37 17:04	07:01 17:46	06:13 18:22	06:18 19:59	05:39 20:34	07:00 (LZ21) 20:55	05:27 20:45	07:25 (LZ21) 20:05	07:21 (LZ21) 20:05	06:54 19:11	07:30 18:18	07:10 16:39
22	07:37 17:05	06:59 17:48	06:11 18:23	06:17 20:00	05:38 20:35	07:02 (LZ21) 20:55	05:27 20:44	07:26 (LZ21) 20:04	07:22 (LZ21) 20:04	06:55 19:09	07:31 18:16	07:12 16:35
23	07:36 17:07	06:58 17:49	06:09 18:24	06:15 20:01	05:37 20:36	07:02 (LZ21) 20:55	05:27 20:43	07:27 (LZ21) 20:02	07:23 (LZ21) 20:02	06:56 19:07	07:33 18:15	07:13 16:38
24	07:35 17:08	06:56 17:50	06:07 18:25	06:14 20:03	05:36 20:37	07:03 (LZ21) 20:55	05:28 20:43	07:28 (LZ21) 20:01	07:24 (LZ21) 20:01	06:58 19:05	07:34 18:13	07:14 16:37
25	07:34 17:09	06:54 17:51	06:05 18:27	06:12 20:04	05:35 20:38	07:04 (LZ21) 20:56	05:28 20:42	07:29 (LZ21) 20:00	07:25 (LZ21) 20:00	06:59 19:03	07:35 18:12	07:15 16:37
26	07:33 17:11	06:53 17:53	06:04 18:28	06:10 20:05	05:35 20:39	07:04 (LZ21) 20:56	05:28 20:41	07:30 (LZ21) 20:00	07:26 (LZ21) 20:00	06:59 19:01	07:36 18:10	07:16 16:37
27	07:32 17:12	06:51 17:54	06:02 18:29	06:09 20:06	05:34 20:40	07:05 (LZ21) 20:56	05:29 20:40	07:31 (LZ21) 20:00	07:27 (LZ21) 20:00	06:58 19:00	07:37 18:09	07:17 16:38
28	07:32 17:13	06:50 17:55	06:00 18:30	06:07 20:07	05:33 20:41	07:06 (LZ21) 20:56	05:29 20:38	07:32 (LZ21) 20:00	07:28 (LZ21) 20:00	06:57 19:00	07:38 18:07	07:18 16:39
29	07:31 17:15	06:58 18:30	06:06 20:07	06:14 20:09	05:33 20:42	07:07 (LZ21) 20:56	05:30 20:37	07:33 (LZ21) 20:00	07:29 (LZ21) 20:00	06:56 18:56	07:39 18:06	07:19 16:35
30	07:30 17:16	06:56 18:33	06:04 20:10	06:14 20:10	05:32 20:42	07:08 (LZ21) 20:55	05:30 20:36	07:34 (LZ21) 20:00	07:30 (LZ21) 20:00	06:55 18:54	07:40 18:04	07:21 16:34
31	07:29 17:18	06:55 17:34	06:03 18:24	06:12 19:54	05:31 20:43	07:09 (LZ21) 20:56	05:31 20:35	07:35 (LZ21) 20:00	07:31 (LZ21) 20:00	06:54 18:53	07:41 18:03	07:22 16:41
Potential sun hours	289	293	369	402	456	462	468	433	376	342	291	279
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)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		







## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZeM\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 74.0° Slope: 90.0° (67)  
Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.61	3.03	3.64	5.32	6.89	7.61	8.86	9.04	7.43	5.21	3.54	2.37

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
1,100	811	599	537	466	626	951	657	457	913	862	781	8,760

	January	February	March	April	May	June
1	07:44 16:42	07:28 17:19	06:48 17:57	06:53 19:35	06:03 20:11	05:31 20:44
2	07:44 16:43	07:26 17:20	06:46 17:58	06:51 19:36	06:02 20:12	05:30 20:45
3	07:44 16:44	07:25 17:22	06:45 17:59	17:22 (LZ30) 17:29 (LZ30)	06:49 19:38	18:49 (LZ22) 19:13 (LZ22)
4	07:44 16:45	07:24 17:23	06:43 18:01	17:19 (LZ30) 17:32 (LZ30)	06:47 19:39	20:11 19:10 (LZ22)
5	07:44 16:46	07:23 17:24	06:41 18:02	17:16 (LZ30) 17:34 (LZ30)	06:46 19:40	18:53 (LZ22) 19:09 (LZ22)
6	07:44 16:47	07:22 17:26	06:39 18:03	17:14 (LZ30) 17:35 (LZ30)	06:44 19:41	18:56 (LZ22) 19:13 (LZ22)
7	07:43 16:48	07:21 17:27	06:38 18:04	17:13 (LZ30) 17:35 (LZ30)	06:42 19:42	20:17 20:18
8	07:43 16:49	07:19 17:29	06:36 18:06	17:13 (LZ30) 17:37 (LZ30)	06:40 19:44	05:28 20:19
9	07:43 16:50	07:18 17:30	06:34 18:07	17:12 (LZ30) 17:37 (LZ30)	06:39 19:45	05:28 20:50
10	07:43 16:51	07:17 17:31	06:32 18:08	17:11 (LZ30) 17:36 (LZ30)	06:37 19:46	05:27 20:50
11	07:42 16:52	07:15 17:33	06:31 18:09	17:11 (LZ30) 17:36 (LZ30)	06:35 19:47	05:27 20:51
12	07:42 16:53	07:14 17:34	06:29 18:11	17:10 (LZ30) 17:35 (LZ30)	06:33 19:48	19:03 (LZ22) 19:08 (LZ22)
13	07:42 16:54	07:13 17:35	06:27 18:12	17:11 (LZ30) 17:36 (LZ30)	06:32 19:50	20:24 20:25
14	07:41 16:56	07:11 17:37	06:25 18:13	17:11 (LZ30) 17:35 (LZ30)	06:30 19:51	18:55 (LZ22) 19:14 (LZ22)
15	07:41 16:57	07:10 17:38	06:24 18:14	17:12 (LZ30) 17:33 (LZ30)	06:28 19:52	20:26 20:27
16	07:40 16:58	07:08 17:40	06:22 18:16	17:13 (LZ30) 17:32 (LZ30)	06:27 19:53	20:44 20:28
17	07:40 16:59	07:07 17:41	06:20 18:17	17:14 (LZ30) 17:30 (LZ30)	06:25 19:54	05:43 20:29
18	07:39 17:00	07:05 17:42	06:18 18:18	17:17 (LZ30) 17:28 (LZ30)	06:23 19:56	05:42 20:30
19	07:39 17:02	07:04 17:44	06:16 18:19	06:22 19:57	18:48 (LZ22) 19:18 (LZ22)	05:41 20:31
20	07:38 17:03	07:02 17:45	06:15 18:21	06:20 19:58	18:48 (LZ22) 19:19 (LZ22)	05:40 20:32
21	07:37 17:04	07:01 17:46	06:13 18:22	06:18 19:59	18:47 (LZ22) 19:19 (LZ22)	05:39 20:34
22	07:37 17:06	06:59 17:48	06:11 18:23	06:17 20:00	18:46 (LZ22) 19:18 (LZ22)	05:38 20:35
23	07:36 17:07	06:58 17:49	06:09 18:24	06:15 20:01	18:47 (LZ22) 19:19 (LZ22)	05:37 20:36
24	07:35 17:08	06:56 17:50	06:07 18:25	06:14 20:03	18:46 (LZ22) 19:18 (LZ22)	05:36 20:37
25	07:34 17:09	06:54 17:52	06:06 18:27	06:12 20:04	18:47 (LZ22) 19:18 (LZ22)	05:36 20:38
26	07:33 17:11	06:53 17:53	06:04 18:28	06:10 20:05	18:46 (LZ22) 19:17 (LZ22)	05:35 20:38
27	07:32 17:12	06:51 17:54	06:02 18:29	06:09 20:06	18:47 (LZ22) 19:17 (LZ22)	05:34 20:39
28	07:32 17:13	06:50 17:55	06:00 18:30	06:07 20:07	18:47 (LZ22) 19:16 (LZ22)	05:33 20:40
29	07:31 17:15		06:58 19:32	06:06 20:09	18:48 (LZ22) 19:16 (LZ22)	05:33 20:41
30	07:30 17:16		06:56 19:33	06:04 20:10	18:49 (LZ22) 19:15 (LZ22)	05:32 20:42
31	07:29 17:18		06:55 19:34			05:31 20:43
Potential sun hours	289	293	369	402	456	462
Total, worst case			321	505		91
Sun reduction			0.31	0.40		0.47
Oper. time red.			1.00	1.00		1.00
Wind dir. red.			0.57	0.62		0.62
Total reduction			0.18	0.24		0.29
Total, real			56	123		26

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)
	Minutes with flicker		





## SHADOW - Calendar

Calculation: Real\_Case\_Operational\_Time Shadow receptor: ZeM\_04 - Shadow Receptor: 1.0 ? 1.0 Azimuth: 74.0° Slope: 90.0° (67)  
Assumptions for shadow calculations Sunshine probability S (Average daily sunshine hours) [VARNA]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
2.61 3.03 3.64 5.32 6.89 7.61 8.86 9.04 7.43 5.21 3.54 2.37

Operational time  
N NNE ENE E SSE S SSW WSW W WNW NNW Sum  
1,100 811 599 537 466 626 951 657 457 913 862 781 8,760

	July	August	September	October	November	December
1	05:31 20:55	05:57 20:34	06:32 19:47	07:06 18:52	17:50 (LZ30) 18:15 (LZ30)	06:44 17:01
2	05:31 20:55	05:58 20:33	06:33 19:45	07:07 18:50	17:49 (LZ30) 18:15 (LZ30)	06:45 17:00
3	05:32 20:55	05:59 20:32	06:34 19:43	07:08 18:49	17:49 (LZ30) 18:14 (LZ30)	06:47 16:59
4	05:32 20:55	06:00 20:30	06:35 19:42	07:09 18:47	17:49 (LZ30) 18:14 (LZ30)	06:48 16:57
5	05:33 20:55	06:01 20:29	06:36 19:40	07:10 18:45	17:49 (LZ30) 18:14 (LZ30)	06:49 16:56
6	05:33 20:54	06:02 20:28	06:37 19:38	07:12 18:43	17:49 (LZ30) 18:13 (LZ30)	06:51 16:55
7	05:34 20:54	06:03 20:26	06:38 19:36	07:13 18:41	17:50 (LZ30) 18:11 (LZ30)	06:52 16:54
8	05:35 20:54	06:05 20:25	06:40 19:34	07:14 18:40	17:50 (LZ30) 18:10 (LZ30)	06:53 16:52
9	05:36 20:53	06:06 20:24	06:41 19:33	07:15 18:38	17:52 (LZ30) 18:08 (LZ30)	06:55 16:51
10	05:36 20:53	06:07 20:22	06:42 19:31	07:16 18:36	17:54 (LZ30) 18:06 (LZ30)	06:56 16:50
11	05:37 20:52	06:08 20:21	06:43 19:29	07:18 18:34	06:57 16:49	07:32 16:32
12	05:38 20:52	06:09 20:19	06:44 19:27	07:19 18:33	06:59 16:48	07:33 16:32
13	05:39 20:51	06:10 20:18	06:45 19:25	07:20 18:31	07:00 16:47	07:34 16:32
14	05:39 20:50	06:11 20:16	06:46 19:23	07:21 18:29	07:01 16:46	07:35 16:32
15	05:40 20:50	06:12 20:15	06:47 19:22	07:23 18:28	07:03 16:45	07:36 16:32
16	05:41 20:49	06:14 20:13	06:49 19:20	07:24 18:26	07:04 16:44	07:37 16:33
17	05:42 20:48	06:15 20:12	06:50 19:18	07:25 18:24	07:05 16:43	07:37 16:33
18	05:43 20:48	06:16 20:10	06:51 19:16	07:26 18:23	07:06 16:42	07:38 16:33
19	05:44 20:47	06:17 20:09	06:52 19:14	07:27 18:21	07:08 16:41	07:39 16:34
20	05:45 20:46	06:18 20:07	06:53 19:12	07:29 18:19	07:09 16:40	07:39 16:34
21	05:46 20:45	06:19 20:05	06:54 19:11	07:30 18:18	07:10 16:39	07:40 16:34
22	05:47 20:44	06:20 20:04	06:55 19:09	07:31 18:16	07:12 16:39	07:40 16:35
23	05:48 20:43	06:21 20:02	06:57 19:07	07:33 18:15	07:13 16:38	07:41 16:35
24	05:49 20:43	06:23 20:01	06:58 19:05	07:34 18:13	07:14 16:37	07:41 16:36
25	05:50 20:42	06:24 19:59	06:59 19:03	18:00 (LZ30) 18:09 (LZ30)	06:35 17:12	07:15 16:37
26	05:51 20:41	06:25 19:57	07:00 19:01	17:57 (LZ30) 18:12 (LZ30)	06:36 17:10	07:16 16:37
27	05:52 20:40	06:26 19:56	07:01 19:00	17:55 (LZ30) 18:13 (LZ30)	06:38 17:09	07:18 16:38
28	05:53 20:38	06:27 19:54	07:02 18:58	17:53 (LZ30) 18:14 (LZ30)	06:39 17:07	07:19 16:39
29	05:54 20:37	06:28 19:52	07:03 18:56	17:52 (LZ30) 18:15 (LZ30)	06:40 17:06	07:20 16:39
30	05:55 20:36	06:29 19:50	07:05 18:54	17:51 (LZ30) 18:15 (LZ30)	06:42 17:04	07:21 16:40
31	05:56 20:35	06:31 19:49	07:07 (LZ22) 19:07 (LZ22)	06:43 17:03	16:34 16:41	07:43 16:41
Potential sun hours	468	433	376	342	291	279
Total, worst case		608	110	219		
Sun reduction		0.65	0.59	0.47		
Oper. time red.		1.00	1.00	1.00		
Wind dir. red.		0.62	0.57	0.57		
Total reduction		0.40	0.34	0.27		
Total, real		242	37	59		

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)
	Minutes with flicker		