



SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)

Assumptions for shadow calculations

Maximum distance for influence

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

Please look in WTG table

Minimum sun height over horizon for influence

3 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational hours are calculated from WTGs in calculation and wind distribution:

WASP object (LT)

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	717	1.321	1.489	903	589	370	8.459	

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

Flicker curtailment by stopping specific turbines

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Elevation Grid Data Object: WP A15-Lingewaard_EMDG

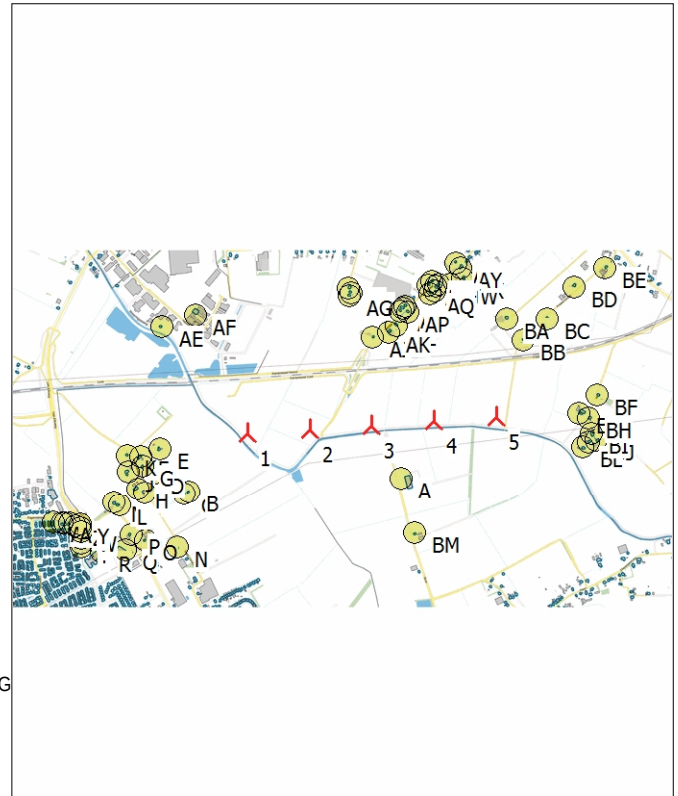
Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m

All coordinates are in

Dutch Stereo-RD/NAP 2000



▲ New WTG

● Shadow receptor

WTGs

	X (east)	Y (north)	Z	Row data/Description	WTG type		Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.	Type-generator			Calculation distance [m]	RPM [RPM]
1	192.319	434.749	10,0	WT1	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812 11,7
2	192.733	434.778	8,0	WT2	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812 11,7
3	193.147	434.804	7,3	WT3	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812 11,7
4	193.561	434.831	6,5	WT4	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812 11,7
5	193.975	434.858	7,7	WT5	No	VESTAS	V150-4.20 (SW)-4.000	4.000	150,0	166,0	1.812 11,7

Shadow receptor-Input

No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
	[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
A	193.340	434.448	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
B	191.934	434.359	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
C	191.903	434.345	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
D	191.698	434.481	10,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
E	191.742	434.648	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
F	191.617	434.598	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
G	191.629	434.528	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
H	191.593	434.381	10,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
I	191.640	434.355	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
J	191.529	434.496	11,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
K	191.525	434.604	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
L	191.470	434.268	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
M	191.438	434.287	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
N	191.857	433.988	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
O	191.642	434.033	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
P	191.549	434.067	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"

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SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)

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No.	X (east)	Y (north)	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
Q	191.509	433.967	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
R	191.352	433.953	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
S	191.221	433.987	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
T	191.218	434.014	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
U	191.217	434.041	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
V	191.216	434.063	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
W	191.217	434.090	9,4	4,0	4,0	1,0	0,0	90,0	"Green house mode"
X	191.213	434.112	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
Y	191.214	434.140	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
Z	191.177	434.130	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AA	191.141	434.143	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AB	191.113	434.143	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AC	191.090	434.146	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AD	191.033	434.155	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AE	191.756	435.463	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AF	191.983	435.542	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AG	192.999	435.668	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AH	193.013	435.690	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AI	192.996	435.719	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AJ	193.155	435.391	9,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AK	193.259	435.427	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AL	193.310	435.469	9,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AM	193.337	435.568	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AN	193.357	435.585	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AO	193.371	435.598	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AP	193.387	435.558	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AQ	193.536	435.685	9,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AR	193.524	435.742	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AS	193.549	435.766	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AT	193.566	435.698	10,0	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AU	193.571	435.736	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AV	193.591	435.746	9,8	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AW	193.667	435.744	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AX	193.751	435.785	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AY	193.736	435.858	10,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
AZ	193.706	435.887	10,9	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BA	194.043	435.512	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BB	194.150	435.373	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BC	194.311	435.517	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BD	194.491	435.729	11,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BE	194.697	435.856	10,7	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BF	194.642	435.006	10,3	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BG	194.521	434.886	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BH	194.586	434.854	10,2	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BI	194.601	434.752	10,3	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BJ	194.637	434.703	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BK	194.583	434.695	10,1	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BL	194.542	434.658	10,6	4,0	4,0	1,0	0,0	90,0	"Green house mode"
BM	193.431	434.081	10,3	4,0	4,0	1,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, expected values

No.	Shadow hours per year [h/year]	Avoided hours per year [h/year]
A*	5:03	6:22
AA*	0:30	12:07
AB*	0:31	11:44
AC*	0:32	11:17
AD*	0:30	8:34
AE*	3:48	5:31
AF*	5:17	5:07

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SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)

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Shadow, expected values

No.	Shadow hours per year [h/year]	Avoided hours per year [h/year]
AG*	2:02	12:42
AH*	0:53	12:26
AI*	0:11	10:54
AJ*	0:44	36:43
AK*	1:29	32:48
AL*	1:59	28:27
AM*	0:47	22:51
AN*	0:00	22:42
AO*	0:00	21:52
AP*	0:10	24:33
AQ*	1:08	14:30
AR*	0:00	11:39
AS*	0:00	10:33
AT*	0:30	13:57
AU*	0:26	11:34
AV*	0:46	10:44
AW*	1:53	8:57
AX*	1:21	7:06
AY*	0:15	6:55
AZ*	0:04	6:16
B*	4:21	14:24
BA*	5:35	16:46
BB*	5:13	22:30
BC*	3:53	14:08
BD*	2:27	7:34
BE*	2:56	3:29
BF*	4:22	10:38
BG*	5:29	21:18
BH*	5:04	17:05
BI*	4:17	23:15
BJ*	2:08	23:51
BK*	1:36	26:44
BL*	0:57	25:28
BM	4:20	
C*	4:03	14:29
D*	1:15	24:47
E*	1:02	31:29
F*	0:41	20:07
G*	1:03	26:10
H*	1:04	19:09
I*	0:43	15:42
J*	1:03	21:24
K*	0:47	12:53
L*	0:12	15:45
M*	0:14	17:13
N	5:31	
O*	4:59	2:35
P*	3:27	6:56
Q*	0:24	3:40
R*	0:00	6:36
S*	0:17	6:51
T*	0:10	7:47
U*	0:03	8:58
V*	0:04	9:50
W*	0:09	10:44
X*	0:16	11:25
Y*	0:23	12:11
Z*	0:26	12:04

* Receptors where shadow flicker is reduced by curtailment

Project:
WP A15-Lingewaard

Licensed user:
Solidwinds
A: Toernooiveld 200
NL-6525 EC Nijmegen
+31 (0)6 832 17 832
Dominique Deen / dominique.deen@solidwinds.com
Calculated:
13-12-2017 11:35/3.1.617



SHADOW - Main Result

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)

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

No.	Name	Worst case [h/year]	Stopped due to flicker curtailment [h/year]	Expected [h/year]
1	WT1	64:46	382:30	9:40
2	WT2	89:29	302:20	16:48
3	WT3	143:44	281:02	32:53
4	WT4	66:59	361:07	14:35
5	WT5	79:02	607:16	9:29

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 1 - WT1

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370 8.459

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

	January		February		March	April	May	June	
1	08:45	10:40-11:22/42	08:18	16:45-16:50/5	07:25	07:14	06:09	05:24	20:49-21:08/19
	16:36		17:24		18:15	20:09	21:00	21:46	05:59-06:00/1
2	08:45	10:41-11:23/42	08:16	16:46-16:50/4	07:22	07:12	06:07	05:23	20:49-21:09/20
	16:37		17:25		18:17	20:11	21:02	21:47	05:58-06:00/2
3	08:44	10:41-11:22/41	08:15	16:48-16:51/3	07:20	07:09	06:05	05:22	20:48-21:09/21
	16:38		17:27		18:19	20:12	21:03	21:48	05:57-05:59/2
4	08:44	10:41-11:23/42	08:13	16:48-16:51/3	07:18	07:07	06:04	05:22	20:48-21:10/22
	16:39		17:29		18:20	20:14	21:05	21:49	05:57-05:58/1
5	08:44	10:43-11:24/41	08:11	16:49-16:51/2	07:16	07:05	06:02	05:21	20:48-21:11/23
	16:40		17:31	16:11-16:12/1	18:22	20:16	21:07	21:50	
6	08:44	10:43-11:23/40	08:10	16:49-16:50/1	07:14	07:03	06:00	05:20	20:47-21:11/24
	16:41		17:33	16:11-16:12/1	18:24	20:18	21:08	21:51	
7	08:43	10:44-11:24/40	08:08	16:10-16:13/3	07:11	07:00	05:58	05:20	20:47-21:12/25
	16:43		17:35		18:26	20:19	21:10	21:52	
8	08:43	10:44-11:24/40	08:06	16:11-16:14/3	07:09	06:58	05:56	05:19	20:48-21:13/25
	16:44		17:36		18:28	20:21	21:11	21:53	
9	08:42	10:44-11:23/39	08:05	16:11-16:15/4	07:07	06:56	05:55	05:19	20:47-21:12/25
	16:45		17:38		18:29	20:23	21:13	21:53	
10	08:42	10:46-11:24/38	08:03	16:11-16:16/5	07:05	06:54	05:53	05:18	20:47-21:13/26
	16:47		17:40		18:31	20:24	21:15	21:54	
11	08:41	10:46-11:24/38	08:01	16:11-16:17/6	07:02	06:51	05:51	05:18	20:47-21:14/27
	16:48		17:42		18:33	20:26	21:16	21:55	
12	08:41	10:47-11:24/37	07:59	16:11-16:19/8	07:00	06:49	05:50	05:18	20:47-21:13/26
	16:50		17:44		18:35	20:28	21:18	21:56	
13	08:40	10:48-11:23/35	07:57	16:11-16:20/9	06:58	06:47	05:48	05:17	20:47-21:14/27
	16:51		17:46		18:36	20:29	21:19	21:56	
14	08:39	10:49-11:23/34	07:55	16:12-16:21/9	06:55	06:45	05:46	05:17	20:47-21:14/27
	16:53		17:48		18:38	20:31	21:21	21:57	
15	08:38	10:50-11:22/32	07:53	16:12-16:21/9	06:53	06:42	05:45	05:17	20:47-21:15/28
	16:54		17:50		18:40	20:33	21:23	21:58	
16	08:37	10:51-11:22/31	07:51	16:13-16:22/9	06:51	06:40	05:43	05:17	20:48-21:15/27
	16:56		17:51		18:42	20:35	21:24	21:58	
17	08:37	16:21-16:24/3	07:49	16:14-16:23/9	06:49	06:38	05:42	05:17	20:48-21:15/27
	16:57	10:52-11:21/29	17:53		18:43	20:36	21:26	21:59	
18	08:36	10:54-11:21/27	07:47	16:15-16:24/9	06:46	06:36	05:40	05:17	20:48-21:16/28
	16:59		17:55		18:45	20:38	21:27	21:59	
19	08:35	10:55-11:20/25	07:45	16:17-16:26/9	06:44	06:34	05:39	05:17	20:48-21:16/28
	17:01		17:57		18:47	20:40	21:29	21:59	
20	08:34	10:58-11:19/21	07:43	16:19-16:28/9	06:42	06:32	05:37	05:17	20:48-21:16/28
	17:02		17:59		18:49	20:41	21:30	22:00	
21	08:33	10:59-11:16/17	07:41	16:21-16:30/9	06:39	06:29	05:36	05:17	20:48-21:16/28
	17:04		18:01		18:50	20:43	21:31	22:00	
22	08:31	16:32-16:34/2	07:39		06:37	06:27	05:35	05:17	20:49-21:17/28
	17:06	11:03-11:13/10	18:02		18:52	20:45	21:33	22:00	
23	08:30	16:34-16:36/2	07:37		06:35	06:25	05:34	05:17	20:49-21:17/28
	17:07		18:04		18:54	20:46	21:34	22:00	
24	08:29	16:34-16:37/3	07:35		06:32	06:23	05:32	05:18	20:49-21:17/28
	17:09		18:06		18:55	20:48	21:36	22:00	
25	08:28	16:35-16:39/4	07:33		06:30	06:21	05:31	05:18	20:50-21:17/27
	17:11		18:08		18:57	20:50	21:37	22:00	
26	08:26	16:36-16:41/5	07:31		06:28	06:19	05:30	05:18	20:50-21:17/27
	17:13		18:10		18:59	20:51	21:38	22:00	
27	08:25	16:38-16:43/5	07:29		06:25	06:17	05:29	05:19	20:50-21:17/27
	17:14		18:11		19:00	20:53	21:40	22:00	
28	08:24	16:40-16:45/5	07:27		06:23	06:15	05:28	05:19	20:50-21:18/28
	17:16		18:13		19:02	20:55	21:41	22:00	
29	08:22	16:42-16:47/5			07:21	06:13	05:27	05:20	20:50-21:17/27
	17:18				20:04	20:57	21:42	22:00	06:01-06:02/1
30	08:21	16:42-16:49/7			07:19	06:11	05:26	05:20	20:51-21:18/27
	17:20				20:06	20:58	21:43	22:00	06:00-06:01/1
31	08:19	16:44-16:50/6			07:16		05:25		20:49-21:06/17
	17:22				20:07		21:45		05:59-06:00/1
Potential sun hours	259		278		367	416	485	499	
Sum of minutes with flicker	788		130		0	0	62	784	

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

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



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 1 - WT1

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 20:52-21:18/26 22:00	05:57 21:28 20:26	06:47 20:26 19:16	07:36 19:16 17:10	07:30 15:40-15:45/5 17:10	08:21 10:29-11:06/37 16:30
2	05:22 20:51-21:17/26 21:59	05:59 21:26 20:24	06:49 20:24 19:14	07:38 19:14 17:09	07:32 15:39-15:44/5 17:09	08:22 10:28-11:06/38 16:29
3	05:22 20:52-21:18/26 21:59	06:01 21:24 20:21	06:50 20:21 19:12	07:39 19:12 17:07	07:33 15:40-15:43/3 17:07	08:24 10:29-11:07/38 16:29
4	05:23 20:53-21:18/25 21:59	06:02 21:23 20:19	06:52 20:19 19:10	07:41 19:10 17:05	07:35 15:40-15:42/2 17:05	08:25 10:28-11:08/40 16:28
5	05:24 20:53-21:18/25 21:58	06:04 21:21 20:17	06:54 20:17 19:07	07:43 19:07 17:03	07:37 16:19-16:20/1 17:03	08:26 10:29-11:09/40 16:28
6	05:25 20:53-21:17/24 21:58	06:05 21:19 20:15	06:55 20:15 19:05	07:44 19:05 17:01	07:39 16:19-16:21/2 17:01	08:28 10:29-11:09/40 16:27
7	05:26 20:54-21:17/23 21:57	06:07 21:17 20:12	06:57 20:12 19:03	07:46 19:03 17:00	07:41 16:18-16:21/3 17:00	08:29 10:29-11:10/41 16:27
8	05:27 20:54-21:17/23 21:56	06:08 21:16 20:10	06:59 20:10 19:00	07:48 19:00 16:58	07:42 16:18-16:21/3 16:58	08:30 10:30-11:11/41 16:27
9	05:28 20:55-21:17/22 21:56	06:10 21:14 20:08	07:00 20:08 18:58	07:50 18:58 16:56	07:44 16:17-16:21/4 16:56	08:31 10:30-11:11/41 16:26
10	05:29 20:56-21:16/20 21:55	06:12 21:12 20:05	07:02 20:05 18:56	07:51 18:56 16:55	07:46 16:16-16:21/5 16:55	08:32 10:30-11:12/42 16:26
11	05:30 20:57-21:16/19 21:54	06:13 21:10 20:03	07:03 20:03 18:54	07:53 18:54 16:53	07:48 16:15-16:21/6 16:53	08:33 10:30-11:12/42 16:26
12	05:31 20:57-21:15/18 21:53	06:15 21:08 20:01	07:05 20:01 18:52	07:55 18:52 16:52	07:49 16:14-16:21/7 16:52	08:34 10:30-11:13/43 16:26
13	05:32 20:58-21:15/17 21:52	06:16 21:06 19:58	07:07 19:58 18:49	07:56 18:49 16:50	07:51 16:13-16:19/6 16:50	08:35 10:31-11:13/42 16:26
14	05:33 20:59-21:14/15 21:51	06:18 21:04 19:56	07:08 19:56 18:47	07:58 18:47 16:49	07:53 16:12-16:18/6 16:49	08:36 10:31-11:14/43 16:26
15	05:34 21:01-21:12/11 21:51	06:20 21:02 19:54	07:10 19:54 18:45	08:00 18:45 16:47	07:55 16:11-16:16/5 16:47	08:37 10:31-11:14/43 16:26
16	05:35 21:03-21:10/7 21:50	06:21 21:00 19:51	07:11 19:51 18:43	08:01 18:43 16:46	07:56 16:09-16:15/6 16:46	08:38 10:32-11:15/43 16:26
17	05:36 21:48 21:48	06:23 20:58 19:49	07:13 19:49 18:41	08:03 18:41 16:44	07:58 16:08-16:12/4 16:44	08:39 10:33-11:16/43 16:26
18	05:38 21:47 21:47	06:24 20:56 19:47	07:15 19:47 18:38	08:05 18:38 16:43	08:00 16:08-16:11/3 16:43	08:40 10:33-11:17/44 16:26
19	05:39 21:46 21:46	06:26 20:54 19:44	07:16 19:44 18:36	08:07 18:36 16:42	08:02 16:08-16:10/2 16:42	08:40 10:33-11:16/43 16:27
20	05:40 21:45 21:45	06:28 20:52 19:42	07:18 19:42 18:34	08:08 18:34 16:41	08:03 16:07-16:09/2 16:41	08:41 10:34-11:17/43 16:27
21	05:42 21:44 21:44	06:29 20:50 19:40	07:20 19:40 18:32	08:10 18:32 16:39	08:05 10:35-10:52/17 16:39	08:42 10:34-11:17/43 16:27
22	05:43 21:43 21:43	06:31 20:48 19:37	07:21 19:37 18:30	08:12 18:30 16:38	08:07 10:34-10:55/21 16:38	08:42 10:35-11:18/43 16:28
23	05:44 21:41 21:41	06:33 20:46 19:35	07:23 19:35 18:28	08:14 18:28 16:37	08:08 10:33-10:57/24 16:37	08:43 10:35-11:18/43 16:28
24	05:46 21:40 21:40	06:34 20:43 19:33	07:25 19:33 18:26	08:16 18:26 16:36	08:10 10:31-10:58/27 16:36	08:43 10:36-11:19/43 16:29
25	05:47 21:38 21:38	06:36 20:41 19:30	07:26 19:30 17:24	08:17 17:24 16:35	08:12 15:59-16:02/3 16:35	08:44 10:36-11:19/43 16:30
26	05:49 21:37 21:37	06:37 20:39 19:28	07:28 19:28 17:22	08:19 17:22 16:34	08:13 10:30-11:01/31 16:34	08:44 10:36-11:20/44 16:30
27	05:50 21:36 21:36	06:39 20:37 19:26	07:29 19:26 17:20	08:21 17:20 16:33	08:15 10:29-11:01/32 16:33	08:44 10:37-11:20/43 16:31
28	05:51 21:34 21:34	06:41 20:35 19:23	07:31 19:23 17:18	08:23 17:18 16:32	08:16 10:29-11:03/34 16:32	08:44 10:37-11:20/43 16:32
29	05:53 21:33 21:33	06:42 20:33 19:21	07:33 19:21 17:16	08:24 17:16 16:32	08:18 10:29-11:04/35 16:32	08:44 10:38-11:21/43 16:33
30	05:54 21:31 21:31	06:44 20:30 19:19	07:34 19:19 17:14	08:26 17:14 16:31	08:19 10:28-11:05/37 16:31	08:45 10:38-11:21/43 16:34
31	05:56 21:29 21:29	06:46 20:28 19:17	07:28 19:17 17:12	08:28 17:12 16:30	15:40-15:47/7 16:30	08:45 10:39-11:21/42 16:34
Potential sun hours	502	454	381	331	266	244
Sum of minutes with flicker	336	0	0	104	382	1300

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

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

Project:

WP A15-Lingewaard

Licensed user:

Solidwinds

A: Toernooiveld 200

NL-6525 EC Nijmegen

+31 (0)6 832 17 832

Dominique Deen / dominique.deen@solidwinds.com

Calculated:

13-12-2017 11:35/3.1.617



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 2 - WT2

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370 8.459

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

	January	February	March	April	May	June
1	08:45 15:56-15:57/1 13:41-13:45/4	08:18 16:06-16:11/5	07:24 17:12-17:34/22	07:14	06:09 06:34-06:41/7	05:24 05:56-05:57/1
	16:36 13:56-14:08/12	17:23 08:53-09:14/21	18:15	20:09	21:00 07:21-07:23/2	21:46 20:26-20:42/16
2	08:45 13:55-14:08/13	08:16 16:05-16:06/1	07:22 17:13-17:33/20	07:12	06:07 06:32-06:39/7	05:23 05:54-05:57/3
	16:37 13:42-13:48/6	17:25 08:51-09:14/23	18:17	20:11	21:02 07:21-07:25/4	21:47 20:24-20:44/20
3	08:44 15:58-16:00/2	08:15 08:51-09:16/25	07:20 17:13-17:31/18	07:09	06:05 06:30-06:38/8	05:22 05:53-05:56/3
	16:38 13:43-14:07/24	17:27	18:19	20:12	21:03 07:21-07:27/6	21:48 20:22-20:45/23
4	08:44 15:59-16:02/3	08:13 08:50-09:17/27	07:18 17:15-17:29/14	07:07	06:04 06:28-06:36/8	05:22 05:53-05:57/4
	16:39 13:44-14:07/23	17:29	18:20	20:14	21:05 07:21-07:27/6	21:49 20:22-20:47/25
5	08:44 16:01-16:03/2	08:11 08:50-09:17/27	07:16 17:18-17:27/9	07:05	06:02 06:27-06:35/8	05:21 05:52-05:57/5
	16:40 13:46-14:07/21	17:31	18:22	20:16	21:07 07:21-07:27/6	21:50 20:21-20:47/26
6	08:44 16:01-16:04/3	08:10 08:49-09:18/29	07:13	07:03	06:00 06:25-06:33/8	05:20 05:52-05:56/4
	16:41 13:47-14:06/19	17:33	18:24	20:18	21:08 07:21-07:25/4	21:51 20:20-20:48/28
7	08:43 16:03-16:06/3	08:08 08:49-09:18/29	07:11	07:00	05:58 06:26-06:32/6 07:20-07:24/4	05:20 05:51-05:55/4
	16:43 13:49-14:06/17	17:35	18:26	20:19	21:10 06:23-06:25/2	21:52 20:20-20:49/29
8	08:43 16:03-16:07/4	08:06 16:57-17:05/8	07:09	06:58 07:29-07:36/7	05:56 06:31-06:32/1	05:19 05:52-05:54/2
	16:44 13:50-14:05/15	17:36 08:49-09:19/30	18:28	20:21	21:11 07:21-07:23/2	21:53 20:20-20:50/30
9	08:42 16:04-16:08/4	08:05 16:56-17:09/13	07:07	06:56 07:25-07:31/6	05:55	05:19 05:51-05:53/2
	16:45 13:53-14:03/10	17:38 08:49-09:19/30	18:29	20:23	21:13	21:53 20:19-20:51/32
10	08:42 16:06-16:09/3	08:03 16:54-17:11/17	07:05	06:53 07:22-07:28/6	05:53	05:18 05:51-05:53/2
	16:47	17:40 08:49-09:19/30	18:31	20:24	21:15	21:54 20:19-20:52/33
11	08:41 16:06-16:10/4	08:01 16:53-17:12/19	07:02	06:51 07:20-07:26/6	05:51	05:18 05:51-05:53/2
	16:48	17:42 08:49-09:19/30	18:33	20:26	21:16	21:55 20:19-20:52/33
12	08:41 16:07-16:11/4	07:59 16:52-17:13/21	07:00	06:49 07:19-07:24/5	05:49	05:18 05:50-05:52/2
	16:50	17:44 08:49-09:19/30	18:35	20:28	21:18	21:56 20:18-20:52/34
13	08:40 16:07-16:11/4	07:57 16:51-17:13/22	06:58	06:47 07:18-07:23/5	05:48	05:17 05:51-05:52/1
	16:51	17:46 08:50-09:19/29	18:36	20:29	21:19	21:56 20:18-20:53/35
14	08:39 16:08-16:12/4	07:55 17:15-17:20/5 08:50-09:18/28	06:55	06:45 07:17-07:22/5	05:46 06:12-06:13/1	05:17 05:51-05:52/1
	16:53	17:48 16:51-17:14/23	18:38	20:31	21:21	21:57 20:18-20:54/36
15	08:38 16:09-16:13/4	07:53 16:50-17:22/32	06:53	06:42 07:15-07:20/5	05:45 06:11-06:13/2	05:17 05:51-05:52/1
	16:54	17:49 08:51-09:17/26	18:40	20:33	21:23	21:58 20:18-20:54/36
16	08:37 16:09-16:14/5	07:51 16:50-17:24/34	06:51	06:40 07:12-07:19/7	05:43 06:10-06:13/3	05:17 05:51-05:52/1
	16:56	17:51 08:52-09:17/25	18:42	20:35	21:24	21:58 20:18-20:55/37
17	08:37 16:10-16:14/4	07:49 16:50-17:26/36	06:49	06:38 07:07-07:19/12	05:42 06:08-06:12/4	05:17 05:51-05:52/1
	16:57	17:53 08:53-09:15/22	18:43	20:36	21:26	21:59 20:18-20:55/37
18	08:36 16:10-16:15/5	07:47 16:51-17:28/37	06:46	06:36 07:05-07:18/13	05:40 06:07-06:12/5	05:17 05:51-05:52/1
	16:59	17:55 08:54-09:14/20	18:45	20:38	21:27	21:59 20:18-20:55/37
19	08:35 16:11-16:16/5	07:45 16:51-17:29/38	06:44	06:34 07:03-07:18/15	05:39 06:07-06:12/5	05:17 05:51-05:52/1
	17:01	17:57 08:56-09:12/16	18:47	20:40	21:29	21:59 20:18-20:56/38
20	08:34 16:11-16:16/5	07:43 16:51-17:31/40	06:42	06:32 07:01-07:18/17	05:37 06:06-06:12/6	05:17 20:18-20:56/38
	17:02	17:59 09:00-09:08/8	18:48	20:41	21:30	22:00
21	08:32 16:11-16:16/5	07:41 16:52-17:32/40	06:39	06:29 07:00-07:17/17	05:36 06:08-06:12/4	05:17 20:18-20:56/38
	17:04	18:01	18:50	20:43	21:31	22:00
22	08:31 16:11-16:16/5	07:39 16:53-17:33/40	06:37	06:27 07:08-07:17/9	05:35 06:11-06:12/1	05:17 20:19-20:57/38
	17:06	18:02	18:52	20:45 06:59-07:04/5	21:33	22:00
23	08:30 16:12-16:17/5	07:37 16:55-17:34/39	06:35	06:25 07:13-07:17/4	05:34	05:17 20:19-20:57/38
	17:07	18:04	18:54	20:46 06:58-06:59/1	21:34	22:00
24	08:29 16:11-16:16/5	07:35 17:08-17:35/27	06:32	06:23 07:15-07:18/3	05:32	05:18 05:52-05:53/1
	17:09	18:06 16:58-17:06/8	18:55	20:48	21:36	22:00 20:19-20:57/38
25	08:28 16:12-16:17/5	07:33 17:09-17:35/26	06:30	06:21 07:17-07:18/1	05:31	05:18 05:53-05:54/1
	17:11	18:08	18:57	20:50	21:37	22:00 20:20-20:57/37
26	08:26 16:11-16:16/5	07:31 17:10-17:35/25	06:28	06:19	05:30	05:18 05:53-05:54/1
	17:13	18:10	18:59	20:51	21:38	22:00 20:20-20:57/37
27	08:25 16:11-16:16/5	07:29 17:11-17:34/23	06:25	06:17 06:41-06:47/6	05:29	05:19 05:54-05:55/1
	17:14	18:11	19:00	20:53	21:40	22:00 20:20-20:56/36
28	08:24 16:10-16:15/5	07:27 17:12-17:34/22	06:23	06:15 06:39-06:46/7	05:28	05:19 05:54-05:55/1
	17:16	18:13	19:02	20:55	21:41	22:00 20:21-20:57/36
29	08:22 16:10-16:15/5		07:21	06:13 06:37-06:44/7	05:27	05:20 05:55-05:56/1
	17:18 08:58-09:07/9		20:04	20:57	21:42	22:00 20:21-20:56/35
30	08:21 16:09-16:14/5		07:19	06:11 06:35-06:42/7	05:26 20:32-20:35/3	05:20 05:55-05:56/1
	17:20 08:55-09:10/15		20:06	20:58 07:20-07:21/1	21:43	22:00 20:22-20:57/35
31	08:19 16:08-16:14/6		07:16		05:25 20:27-20:39/12	
	17:22 08:54-09:12/18		20:07		21:44	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	331	1106	83	177	135	1039

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

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

Project:

WP A15-Lingewaard

Licensed user:

Solidwinds

A: Toernooiveld 200

NL-6525 EC Nijmegen

+31 (0)6 832 17 832

Dominique Deen / dominique.deen@solidwinds.com

Calculated:

13-12-2017 11:35/3.1.617



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 2 - WT2

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1,80 2,50 4,10 5,50 6,70 7,20 6,50 5,90 4,80 3,20 1,80 1,40

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
393 430 818 642 394 394 717 1.321 1.489 903 589 370 8.459
Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:21 05:55-05:57/2 22:00 20:23-20:57/34	05:57 21:28	06:47 07:19-07:25/6 20:26	07:36 19:16	07:30 16:24-16:40/16 17:10 08:19-08:49/30	08:21 15:48-15:52/4 16:30
2	05:22 05:55-05:57/2 21:59 20:23-20:56/33	05:59 21:26	06:49 07:21-07:27/6 20:24	07:38 19:14	07:32 16:25-16:37/12 17:08 08:19-08:49/30	08:22 15:48-15:51/3 16:29
3	05:22 05:56-05:58/2 21:59 20:24-20:56/32	06:01 21:24	06:50 07:22-07:28/6 20:21	07:39 19:12	07:33 16:27-16:35/8 17:07 08:19-08:49/30	08:24 15:48-15:52/4 16:29 13:37-13:47/10
4	05:23 05:57-05:59/2 21:58 20:25-20:56/31	06:02 07:31-07:32/1 21:23	06:52 07:26-07:33/7 20:19	07:41 19:10	07:35 08:18-08:48/30 17:05	08:25 15:48-15:51/3 16:28 13:35-13:49/14
5	05:24 05:57-06:01/4 21:58 20:26-20:56/30	06:04 06:40-06:42/2 21:21 07:30-07:33/3	06:54 20:17	07:43 19:07	07:37 08:19-08:48/29 17:03	08:26 15:48-15:51/3 16:28 13:34-13:51/17
6	05:25 05:57-06:01/4 21:57 20:26-20:54/28	06:05 06:34-06:43/9 21:19 07:31-07:34/3	06:55 20:14	07:44 19:05	07:39 08:19-08:47/28 17:01	08:28 15:48-15:50/2 16:27 13:33-13:52/19
7	05:26 05:58-06:03/5 21:57 20:27-20:54/27	06:07 06:35-06:43/8 21:17 07:31-07:35/4	06:57 20:12	07:46 19:03	07:41 08:20-08:47/27 17:00	08:29 15:47-15:50/3 16:27 13:32-13:53/21
8	05:27 05:59-06:03/4 21:56 20:28-20:53/25	06:08 06:37-06:45/8 21:16 07:30-07:36/6	06:58 20:10	07:48 17:56-17:59/3 19:00	07:42 08:21-08:46/25 16:58	08:30 15:48-15:50/2 16:26 13:32-13:55/23
9	05:28 06:00-06:04/4 21:56 20:29-20:53/24	06:10 06:38-06:46/8 21:14 07:30-07:37/7	07:00 20:08	07:49 17:52-18:03/11 18:58	07:44 15:35-15:38/3 16:56 08:22-08:45/23	08:31 15:47-15:49/2 16:26 13:32-13:56/24
10	05:29 06:01-06:04/3 21:55 20:31-20:52/21	06:12 06:40-06:47/7 21:12 07:29-07:35/6	07:02 20:05	07:51 17:49-18:05/16 18:56	07:46 15:37-15:42/5 16:55 08:24-08:44/20	08:32 13:44-13:57/13 16:26 13:31-13:37/6
11	05:30 06:02-06:04/2 21:54 20:32-20:50/18	06:13 06:41-06:48/7 21:10 07:30-07:33/3	07:03 20:03	07:53 17:47-18:05/18 18:54	07:48 15:39-15:44/5 16:53 08:25-08:43/18	08:33 15:46-15:47/1 13:31-13:35/4 16:26 13:46-13:58/12
12	05:31 06:04-06:05/1 21:53 20:34-20:49/15	06:15 06:43-06:50/7 21:08	07:05 20:01	07:55 17:46-18:06/20 18:51	07:49 15:41-15:46/5 16:52 08:27-08:42/15	08:34 15:46-15:47/1 13:31-13:34/3 16:26 13:48-13:59/11
13	05:32 20:37-20:46/9 21:52	06:16 06:44-06:51/7 21:06 07:28-07:29/1	07:07 19:58	07:56 17:45-18:07/22 18:49	07:51 15:42-15:47/5 16:50 08:30-08:39/9	08:35 15:46-15:47/1 13:31-13:34/3 16:26 13:49-14:00/11
14	05:33 21:51	06:18 06:46-06:53/7 21:04 07:28-07:29/1	07:08 19:56	07:58 17:45-18:07/22 18:47	07:53 15:43-15:48/5 16:49	08:36 15:45-15:47/2 13:31-13:34/3 16:26 13:50-14:01/11
15	05:34 21:51	06:20 06:47-06:55/8 21:02	07:10 19:54	08:00 17:43-18:07/24 18:45	07:55 15:44-15:49/5 16:47	08:37 15:45-15:48/3 13:32-13:33/1 16:26 13:51-14:01/10
16	05:35 21:49	06:21 06:49-06:54/5 21:00	07:11 19:51	08:01 17:42-18:07/25 18:43	07:56 15:45-15:50/5 16:46	08:38 15:45-15:48/3 13:32-13:34/2 16:26 13:52-14:02/10
17	05:36 21:48	06:23 07:24-07:25/1 20:58	07:13 19:49	08:03 17:40-18:06/26 18:41	07:58 15:45-15:50/5 16:44	08:39 15:45-15:49/4 13:32-13:34/2 16:26 13:53-14:03/10
18	05:38 21:47	06:24 07:23-07:24/1 20:56	07:15 19:47	08:05 17:39-18:06/27 18:38 17:28-17:38/10	08:00 15:45-15:50/5 16:43	08:40 15:43-15:48/5 13:32-13:33/1 16:26 13:53-14:03/10
19	05:39 21:46	06:26 07:20-07:23/3 20:54	07:16 19:44	08:07 17:26-18:05/39 18:36	08:02 15:46-15:51/5 16:42	08:40 15:44-15:49/5 13:33-13:34/1 16:27 13:54-14:04/10
20	05:40 21:45	06:28 07:18-07:23/5 20:52 07:04-07:06/2	07:18 19:42	08:08 17:24-18:04/40 18:34	08:03 15:46-15:51/5 16:41	08:41 15:45-15:50/5 13:33-13:35/2 16:27 13:55-14:05/10
21	05:42 21:44	06:29 07:04-07:22/18 20:50	07:20 19:40	08:10 17:23-18:03/40 18:32	08:05 15:47-15:52/5 16:39	08:42 15:44-15:50/6 13:33-13:35/2 16:27 13:55-14:05/10
22	05:43 06:21-06:23/2 21:43	06:31 07:05-07:22/17 20:48	07:21 19:37	08:12 17:21-18:00/39 18:30 09:29-09:40/11	08:07 15:48-15:52/4 16:38	08:42 15:45-15:51/6 13:34-13:35/1 16:28 13:56-14:06/10
23	05:44 06:17-06:22/5 21:41	06:32 07:05-07:21/16 20:46	07:23 19:35	08:14 17:20-17:58/38 18:28 09:25-09:42/17	08:08 15:47-15:52/5 16:37	08:43 15:46-15:51/5 13:34-13:36/2 16:28 13:56-14:06/10
24	05:46 06:17-06:22/5 21:40	06:34 07:07-07:22/15 20:43	07:24 19:33	08:15 17:20-17:57/37 18:26 09:23-09:44/21	08:10 15:47-15:52/5 16:36	08:43 15:47-15:51/4 13:36-13:37/1 16:29 13:57-14:07/10
25	05:47 06:18-06:23/5 21:38	06:36 07:08-07:21/13 20:41	07:26 19:30	07:17 16:20-16:55/35 17:24 08:22-08:45/23	08:12 15:48-15:52/4 16:35	08:44 15:47-15:52/5 13:36-13:37/1 16:30 13:57-14:07/10
26	05:49 06:18-06:23/5 21:37	06:37 07:10-07:21/11 20:39	07:28 19:28	07:19 16:20-16:53/33 17:22 08:21-08:46/25	08:13 15:48-15:53/5 16:34	08:44 15:48-15:52/4 13:36-13:38/2 16:30 13:57-14:07/10
27	05:50 06:19-06:22/3 21:36	06:39 07:16-07:21/5 20:37	07:29 19:26	07:21 16:20-16:51/31 17:20 08:20-08:47/27	08:15 15:48-15:52/4 16:33	08:44 15:50-15:53/3 13:37-13:38/1 16:31 13:57-14:07/10
28	05:51 06:21-06:23/2 21:34	06:41 07:17-07:22/5 20:35	07:31 19:23	07:23 16:46-16:49/3 08:20-08:48/28 17:18 16:20-16:43/23	08:16 15:48-15:52/4 16:32	08:44 15:51-15:54/3 13:37-13:39/2 16:32 13:57-14:07/10
29	05:53 06:22-06:23/1 21:33	06:42 07:18-07:23/5 20:33	07:33 19:21	07:24 16:21-16:43/22 17:16 08:19-08:48/29	08:18 15:48-15:53/5 16:32	08:44 15:52-15:54/2 13:38-13:40/2 16:33 13:57-14:07/10
30	05:54 21:31	06:44 07:18-07:23/5 20:30	07:34 19:19	07:26 16:22-16:42/20 17:14 08:19-08:49/30	08:19 15:48-15:52/4 16:31	08:45 15:53-15:55/2 13:39-13:41/2 16:33 13:57-14:08/11
31	05:56 21:29	06:45 07:19-07:24/5 20:28	 	07:28 16:23-16:41/18 17:12 08:19-08:49/30	 	08:45 15:55-15:56/1 13:40-13:43/3 16:34 13:57-14:08/11
Potential sun hours	502	454	381	332	266	244
Sum of minutes with flicker	390	245	25	883	453	502

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

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

Project:

WP A15-Lingewaard

Licensed user:

Solidwinds

A: Toernooiveld 200

NL-6525 EC Nijmegen

+31 (0)6 832 17 832

Dominique Deen / dominique.deen@solidwinds.com

Calculated:

13-12-2017 11:35/3.1.617



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 3 - WT3

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January		February		March		April		May		June		
1	08:45	11:46-11:56/10	08:18	16:11-16:53/42	07:24	16:49-17:04/15	07:14	19:26-19:41/15	06:09	07:03-07:14/11	05:24	05:55-06:29/34	
	16:36		17:23		18:15		20:09		21:00	06:38-06:41/3	21:46		
2	08:45	12:07-12:08/1	08:16	16:11-16:54/43	07:22	16:53-17:00/7	07:12	19:41-19:44/3	06:07	07:02-07:08/6	05:23	05:54-06:29/35	
	16:37	11:48-11:58/10	17:25		18:17		20:11	19:25-19:37/12	21:02	06:36-06:41/5	21:47		
3	08:44	11:48-12:07/19	08:15	16:11-16:55/44	07:20		07:09	19:45-19:46/1	06:05	07:01-07:07/6	05:22	05:53-06:28/35	
	16:38		17:27		18:19		20:12	19:24-19:33/9	21:03	06:35-06:41/6	21:48		
4	08:44	11:50-12:07/17	08:13	16:11-16:56/45	07:18		07:07	19:23-19:31/8	06:03	06:59-07:05/6	05:22	05:54-06:28/34	
	16:39		17:29		18:20		20:14	07:34-07:40/6	21:05	06:34-06:41/7	21:49		
5	08:44	11:52-12:06/14	08:11	16:10-16:58/48	07:16		07:05	19:20-19:28/8	06:02	06:59-07:05/6	05:21	05:53-06:27/34	
	16:40		17:31		18:22		20:16	07:27-07:42/15	21:06	06:34-06:42/8	21:50		
6	08:44	11:54-12:04/10	08:10	16:10-17:00/50	07:13		07:02	19:17-19:27/10	06:00	06:25-06:30/5	06:33-06:43/10	05:20	05:53-06:27/34
	16:41		17:33		18:24		20:18	07:34-07:44/10	21:08	06:57-07:03/6	21:51		
7	08:43		08:08	16:10-17:02/52	07:11		07:00	19:49-19:51/2	05:58	06:23-06:44/21	05:20	05:53-06:26/33	
	16:43		17:35		18:26		20:19	19:13-19:26/13	21:10	06:55-07:02/7	21:52		
8	08:43		08:06	16:10-17:03/53	07:09		06:58	19:50-19:53/3	05:56	06:22-06:46/24	05:19	05:53-06:26/33	
	16:44		17:36		18:28		20:21	19:19-19:26/7	21:11	06:54-07:01/7	21:53		
9	08:42		08:04	16:11-17:05/54	07:07		06:56	19:49-19:52/3	05:55	06:20-07:01/41	05:19	06:17-06:25/8	
	16:45		17:38		18:29		20:23	19:18-19:24/6	21:13		21:53	05:53-06:16/23	
10	08:42		08:03	16:12-17:06/54	07:05		06:53	19:49-19:53/4	05:53	06:18-07:00/42	05:18	06:18-06:25/7	
	16:47		17:40		18:31		20:24	19:19-19:24/5	21:15		21:54	05:53-06:17/24	
11	08:41		08:01	16:12-17:06/54	07:02		06:51	19:49-19:54/5	05:51	06:17-07:01/44	05:18	06:20-06:24/4	
	16:48		17:42		18:33		20:26	19:20-19:24/4	21:16		21:55	05:53-06:17/24	
12	08:41		07:59	16:13-17:08/55	07:00		06:49	19:48-19:54/6	05:49	06:15-07:00/45	05:18	05:53-06:17/24	
	16:50		17:44		18:35		20:28	19:21-19:24/3	21:18		21:56		
13	08:40		07:57	16:14-17:09/55	06:58		06:47	19:48-19:54/6	05:48	06:14-07:01/47	05:17	05:53-06:17/24	
	16:51		17:46	08:23-08:31/8	18:36		20:29	19:23-19:25/2	21:19		21:56		
14	08:39		07:55	16:40-17:10/30	08:21-08:34/13	06:55	18:05-18:10/5	06:45	19:46-19:53/7	05:46	06:12-07:00/48	05:17	05:53-06:18/25
	16:53		17:48	16:15-16:39/24	18:38		20:31	07:08-07:10/2	21:21		21:57		
15	08:38		07:53	16:40-17:11/31	08:19-08:35/16	06:53	18:02-18:14/12	06:42	19:45-19:52/7	05:45	06:11-07:00/49	05:17	05:54-06:18/24
	16:54		17:49	16:16-16:38/22	18:40		20:33	07:06-07:08/2	21:22		21:58		
16	08:37		07:51	16:40-17:12/32	08:18-08:37/19	06:51	17:59-18:15/16	06:40	19:44-19:52/8	05:43	06:10-07:00/50	05:17	05:54-06:19/25
	16:56		17:51	16:18-16:37/19	18:42		20:35	07:04-07:08/4	21:24		21:58		
17	08:37		07:49	16:41-17:12/31	08:17-08:38/21	06:49	17:57-18:16/19	06:38	19:42-19:51/9	05:42	06:09-06:59/50	05:17	05:54-06:19/25
	16:57		17:53	16:20-16:34/14	18:43		20:36	07:03-07:07/4	21:26		21:58		
18	08:36		07:47	16:42-17:13/31	08:16-08:38/22	06:46	17:56-18:17/21	06:36	19:39-19:50/11	05:40	06:09-06:58/49	05:17	05:54-06:19/25
	16:59		17:55	16:25-16:30/5	18:45		20:38	19:29-19:30/1	21:27		21:59		
19	08:35		07:45	16:42-17:13/31		06:44	17:56-18:18/22	06:34	19:30-19:49/19	05:39	06:08-06:58/50	05:17	05:54-06:19/25
	17:01		17:57	08:16-08:39/23	18:47		20:40	06:57-07:07/10	21:29		21:59		
20	08:34		07:43	16:41-17:12/31		06:42	17:54-18:18/24	06:32	19:31-19:47/16	05:37	06:08-06:56/48	05:17	05:54-06:19/25
	17:02		17:59	08:16-08:39/23	18:48		20:41	06:55-07:07/12	21:30		22:00		
21	08:32		07:41	16:41-17:12/31		06:39	17:54-18:16/22	06:29	19:33-19:45/12	05:36	06:08-06:36/28	05:17	05:54-06:19/25
	17:04		18:01	08:15-08:38/23	18:50		20:43	06:59-07:07/8	21:31	06:37-06:56/19	22:00		
22	08:31		07:39	16:41-17:12/31		06:37	17:54-18:12/18	06:27	19:38-19:40/2	05:35	06:08-06:35/27	05:17	05:55-06:20/25
	17:06		18:02	08:15-08:38/23	18:52		20:45	07:01-07:08/7	21:33	06:38-06:55/17	22:00		
23	08:30		07:37	16:42-17:12/30		06:35	17:54-18:09/15	06:25	07:02-07:09/7	05:33	06:08-06:35/27	05:17	05:55-06:20/25
	17:07		18:04	08:15-08:38/23	18:54		20:46		21:34	06:39-06:54/15	22:00		
24	08:29	16:21-16:26/5	07:35	16:42-17:11/29		06:32	18:27-18:28/1	06:23	07:03-07:10/7	05:32	06:08-06:34/26	05:18	05:55-06:20/25
	17:09		18:06	08:16-08:37/21		18:55	17:54-18:07/13	20:48		21:36	06:41-06:53/12	22:00	
25	08:28	16:18-16:30/12	07:33	16:43-17:10/27		06:30	18:28-18:30/2	06:21	07:04-07:11/7	05:31	06:08-06:33/25	05:18	05:56-06:21/25
	17:11		18:08	08:17-08:36/19		18:57	17:55-18:06/11	20:50		21:37	06:43-06:51/8	22:00	
26	08:26	16:16-16:32/16	07:31	16:44-17:09/25		06:28	18:28-18:31/3	06:19	07:04-07:14/10	05:30	06:09-06:32/23	05:18	05:56-06:21/25
	17:13		18:10	08:18-08:35/17		18:59	17:55-18:04/9	20:51	07:20-07:21/1	21:38	06:01-06:05/4	22:00	
27	08:25	16:15-16:34/19	07:29	16:45-17:07/22		06:25	18:29-18:32/3	06:17	07:04-07:21/17	05:29	06:09-06:31/22	05:19	05:57-06:21/24
	17:14		18:11	08:19-08:32/13		19:00	17:57-18:04/7	20:53		21:40	05:59-06:08/9	22:00	
28	08:24	16:41-16:45/4	07:27	16:47-17:06/19		06:23	18:29-18:33/4	06:15	07:04-07:19/15	05:28	05:57-06:30/33	05:19	05:57-06:21/24
	17:16	16:13-16:35/22	18:13	08:21-08:30/9		19:02	17:59-18:03/4	20:55		21:41		22:00	
29	08:22	16:39-16:47/8				07:21	19:28-19:32/4	06:13	07:03-07:18/15	05:27	05:56-06:30/34	05:20	05:57-06:22/25
	17:18	16:13-16:37/24				20:04		20:57		21:42		22:00	
30	08:21	16:12-16:49/37				07:19	19:28-19:38/10	06:11	07:03-07:16/13	05:26	05:55-06:29/34	05:20	05:57-06:21/24
	17:20					20:06		20:58	06:39-06:40/1	21:43		22:00	
31	08:19	16:12-16:52/40				07:16	19:28-19:41/13			05:25	05:54-06:29/35		
	17:22					20:07				21:44			
Potential sun hours		259	278		367		416		485		499		
Sum of minutes with flicker		268	1457		280		506		1105		831		

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

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

Project:

WP A15-Lingewaard

Licensed user:

Solidwinds

A: Toernooiveld 200

NL-6525 EC Nijmegen

+31 (0)6 832 17 832

Dominique Deen / dominique.deen@solidwinds.com

Calculated:

13-12-2017 11:35/3.1.617



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 3 - WT3

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 06:25-06:27/2 22:00 05:58-06:22/24	05:57 06:26-07:11/45 21:28	06:47 19:48-19:52/4 07:39-07:46/7 20:26 19:19-19:23/4 07:13-07:14/1	07:36 19:16	07:30 15:41-16:34/53 17:10	08:21 16:30
2	05:22 06:23-06:28/5 21:59 05:57-06:21/24	05:59 06:28-07:11/43 21:26	06:49 19:48-19:52/4 07:38-07:46/8 20:24 19:18-19:23/5	07:38 19:14	07:32 15:40-16:33/53 17:08	08:22 16:29
3	05:22 06:22-06:30/8 21:59 05:58-06:21/23	06:00 06:29-07:11/42 21:24	06:50 19:47-19:51/4 07:37-07:44/7 20:21 19:16-19:22/6	07:39 19:12	07:33 15:40-16:32/52 17:07	08:24 16:29
4	05:23 05:58-06:31/33 21:58	06:02 06:31-07:11/40 21:23	06:52 19:47-19:50/3 07:36-07:44/8 20:19 19:16-19:23/7	07:41 19:09	07:35 15:40-16:31/51 17:05	08:25 16:28
5	05:24 05:59-06:32/33 21:58	06:04 06:32-06:55/23 21:21 07:04-07:11/7	06:54 19:45-19:47/2 07:33-07:42/9 20:17 19:09-19:22/13 07:19-07:20/1	07:43 19:07	07:37 15:40-16:29/49 17:03	08:26 16:28
6	05:25 05:59-06:32/33 21:57	06:05 06:34-06:42/8 06:43-06:54/11 21:19 07:06-07:13/7	06:55 19:45-19:46/1 07:30-07:40/10 20:14 19:13-19:23/10 07:21-07:22/1	07:44 19:05	07:39 15:40-16:27/47 17:01	08:27 11:41-11:49/8 16:27
7	05:26 05:59-06:33/34 21:57	06:07 06:36-06:37/1 06:43-06:52/9 21:17 07:07-07:13/6	06:57 19:15-19:23/8 20:12 07:23-07:39/16	07:46 19:03	07:41 15:41-16:25/44 17:00	08:29 11:39-11:52/13 16:27
8	05:27 06:00-06:34/34 21:56	06:08 07:09-07:15/6 21:16 06:43-06:51/8	06:58 19:41-19:42/1 07:28-07:34/6 20:10 19:17-19:25/8	07:48 19:00	07:42 15:41-16:25/44 16:58	08:30 11:38-11:55/17 16:26
9	05:28 06:00-06:35/35 21:56	06:10 07:09-07:15/6 21:14 06:44-06:50/6	07:00 19:39-19:40/1 20:08 19:18-19:27/9	07:49 18:58	07:44 15:42-16:25/43 16:56	08:31 11:37-11:56/19 16:26
10	05:29 06:01-06:36/35 21:55	06:11 07:11-07:16/5 21:12 06:44-06:50/6	07:02 19:35-19:37/2 20:05 19:18-19:30/12	07:51 18:56	07:46 15:42-16:24/42 16:55	08:32 11:56-11:57/1 16:26
11	05:30 06:02-06:37/35 21:54	06:13 07:11-07:19/8 21:10 06:45-06:49/4	07:03 19:19-19:35/16 20:03	07:53 18:54	07:48 15:43-16:22/39 16:53	08:33 11:36-11:46/10 16:26
12	05:31 06:02-06:37/35 21:53	06:15 07:12-07:24/12 21:08 06:46-06:49/3	07:05 19:19-19:32/13 20:01	07:55 17:24-17:35/11 18:51	07:49 15:44-16:21/37 16:52	08:34 11:36-11:45/9 16:26
13	05:32 06:03-06:38/35 21:52	06:16 07:12-07:25/13 21:06	07:07 19:19-19:30/11 19:58	07:56 17:21-17:38/17 18:49	07:51 16:11-16:19/8 16:50 15:45-16:09/24	08:35 11:36-11:45/9 16:26
14	05:33 06:04-06:38/34 21:51	06:18 07:12-07:27/15 21:04	07:08 19:18-19:23/5 19:56	07:58 17:19-17:40/21 18:47 08:53-09:04/11	07:53 16:14-16:17/3 16:49 15:46-16:08/22	08:36 11:36-11:44/8 16:26
15	05:34 06:05-06:38/33 21:50	06:20 07:11-07:27/16 21:02	07:10 19:18-19:22/4 19:54 18:49-18:53/4	08:00 17:16-17:40/24 18:45 08:51-09:06/15	07:55 15:48-16:07/19 16:47	08:37 11:36-11:44/8 16:26
16	05:35 06:18-06:39/21 21:49 06:06-06:17/11	06:21 07:12-07:28/16 21:00	07:11 19:18-19:22/4 19:51 18:47-18:53/6	08:01 17:15-17:41/26 18:43 08:49-09:07/18	07:56 15:50-16:06/16 16:46	08:38 11:37-11:45/8 16:26
17	05:36 06:18-06:41/23 21:48 06:09-06:16/7	06:23 07:10-07:20/10 20:58	07:13 19:17-19:20/3 19:49 18:44-18:52/8	08:03 17:14-17:42/28 18:41 08:48-09:08/20	07:58 15:51-16:03/12 16:44	08:39 11:37-11:45/8 16:26
18	05:38 06:18-06:42/24 21:47 06:54-06:59/5	06:24 07:10-07:17/7 20:56	07:15 19:16-19:18/2 19:47 18:43-18:53/10	08:05 17:14-17:43/29 18:38 08:47-09:09/22	08:00 15:55-16:00/5 16:43	08:40 11:37-11:44/7 16:26
19	05:39 06:18-06:43/25 21:46 06:51-07:01/10	06:26 07:09-07:15/6 20:54	07:16 19:14-19:15/1 19:44 18:41-18:53/12	08:07 17:13-17:43/30 18:36 08:46-09:09/23	08:02 16:42	08:40 11:37-11:45/8 16:27
20	05:40 06:18-06:44/26 21:45 06:50-07:03/13	06:28 07:08-07:14/6 20:52	07:18 18:40-18:55/15 19:42	08:08 17:13-17:43/30 18:34 08:46-09:09/23	08:03 16:41	08:41 11:38-11:46/8 16:27
21	05:42 06:17-06:44/27 21:44 06:48-07:04/16	06:29 19:41-19:46/5 20:50 07:06-07:13/7	07:20 18:40-18:57/17 19:40	08:10 17:12-17:43/31 18:32 08:46-09:09/23	08:05 16:39	08:42 11:38-11:46/8 16:27
22	05:43 06:18-06:46/28 21:42 06:48-07:06/18	06:31 19:38-19:50/12 07:35-07:39/4 20:48 07:03-07:12/9	07:21 18:39-18:59/20 19:37	08:12 17:11-17:43/32 18:30 08:46-09:09/23	08:07 16:38	08:42 11:39-11:46/7 16:28
23	05:44 06:18-06:46/28 21:41 06:47-07:07/20	06:32 19:35-19:51/16 07:37-07:42/5 20:46 06:59-07:11/12	07:23 18:39-19:02/23 19:35	08:14 17:12-17:42/30 18:28 08:45-09:08/23	08:08 16:37	08:43 11:39-11:47/8 16:28
24	05:46 06:18-07:07/49 21:40	06:34 19:33-19:52/19 07:39-07:44/5 20:43 07:01-07:11/10	07:24 18:38-19:01/23 19:33	08:15 17:11-17:42/31 08:46-09:08/22 18:26 16:53-17:01/8	08:10 16:36	08:43 11:40-11:48/8 16:29
25	05:47 06:19-07:09/50 21:38	06:36 19:42-19:53/11 07:04-07:10/6 20:41 19:32-19:33/1 07:39-07:45/6	07:26 18:39-19:00/21 19:30	07:17 16:10-16:42/32 07:47-08:07/20 17:24 15:49-16:05/16	08:12 16:35	08:43 11:40-11:48/8 16:29
26	05:49 06:19-07:09/50 21:37	06:37 19:45-19:54/9 07:40-07:46/6 20:39 07:06-07:10/4	07:28 18:40-18:59/19 19:28	07:19 16:10-16:41/31 07:48-08:06/18 17:22 15:47-16:07/20	08:13 16:34	08:44 11:41-11:49/8 16:30
27	05:50 06:19-07:09/50 21:36	06:39 19:46-19:53/7 07:06-07:09/3 20:37 07:40-07:46/6	07:29 18:40-18:57/17 19:26	07:21 16:10-16:40/30 07:49-08:05/16 17:20 15:45-16:08/23	08:15 16:33	08:44 11:41-11:49/8 16:31
28	05:51 06:21-07:10/49 21:34	06:41 19:47-19:54/7 07:41-07:47/6 20:35 07:08-07:10/2	07:31 18:41-18:55/14 19:23	07:23 16:10-16:40/30 07:51-08:03/12 17:18 15:44-16:09/25	08:16 16:32	08:44 11:42-11:50/8 16:32
29	05:53 06:22-07:10/48 21:33	06:42 19:47-19:53/6 07:41-07:47/6 20:32 07:09-07:11/2	07:33 18:44-18:53/9 19:21	07:24 15:43-16:38/55 17:16 07:54-08:00/6	08:18 16:31	08:44 11:43-11:51/8 16:33
30	05:54 06:23-07:10/47 21:31	06:44 19:48-19:54/6 07:40-07:47/7 20:30 19:23-19:25/2 07:10-07:11/1	07:34 19:19	07:26 15:42-16:37/55 17:14	08:19 16:31	08:45 11:44-11:52/8 16:33
31	05:56 06:25-07:11/46 21:29	06:45 19:48-19:54/6 07:40-07:47/7 20:28 19:21-19:24/3 07:12-07:13/1	 19:19	07:28 15:42-16:36/54 17:12	 16:34	08:45 11:45-11:54/9 16:34
Potential sun hours	502	454	381	332	266	244
Sum of minutes with flicker	1186	620	455	1014	663	239

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

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



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 4 - WT4

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January	February	March	April	May	June
1	08:45 16:36	08:18 17:23	07:24 18:15	07:14 18:44-19:31/47 20:09	06:09 19:25-19:26/1 21:00	05:24 21:46
2	08:44 16:37	08:16 17:25	07:22 18:17	07:12 18:47-19:31/44 20:11	06:07 21:01	05:23 21:47
3	08:44 16:38	08:15 17:27	07:20 18:19	07:09 18:49-19:32/43 20:12	06:05 21:03	05:22 21:48
4	08:44 16:39	08:13 17:29	07:18 18:20	07:07 18:49-19:37/48 20:14	06:03 21:05	05:22 21:49
5	08:44 16:40	08:11 17:31	07:16 18:22	07:05 18:48-19:40/52 20:16	06:02 21:06	05:21 21:50
6	08:44 16:41	08:10 17:33	07:13 18:24	07:02 18:48-19:42/54 20:17	06:00 21:08	05:20 21:51
7	08:43 15:57-16:03/6 16:43	08:08 17:35	07:11 18:26	07:00 18:49-19:44/55 20:19	05:58 21:10	05:20 21:52
8	08:43 15:55-16:05/10 16:44	08:06 17:36	07:09 18:28	06:58 18:49-19:46/57 20:21	05:56 21:11	05:19 21:53
9	08:42 15:53-16:06/13 16:45	08:04 17:38	07:07 18:29	06:56 18:49-19:48/59 20:23	05:55 21:13	05:19 21:53
10	08:42 15:53-16:08/15 16:47	08:03 17:40	07:04 18:31	06:53 18:50-19:49/59 20:24	05:53 21:15	05:18 21:54
11	08:41 15:53-16:07/14 16:48	08:01 17:42	07:02 18:33	06:51 18:51-19:51/60 20:26	05:51 21:16	05:18 21:55
12	08:40 15:52-16:05/13 16:50	07:59 17:44	07:00 18:35	06:49 18:52-19:52/60 20:28	05:49 21:18	05:17 21:56
13	08:40 15:52-16:04/12 16:51	07:57 17:46	06:58 18:36	06:47 18:53-19:53/60 20:29	05:48 21:19	05:17 21:56
14	08:39 15:51-16:04/13 16:53	07:55 08:20-08:26/6 17:48	06:55 17:51-18:04/13 18:38	06:45 19:52-19:53/1 20:31 18:54-19:40/46	05:46 21:21	05:17 21:57
15	08:38 15:51-16:03/12 16:54	07:53 08:18-08:28/10 17:49	06:53 17:48-18:07/19 18:40	06:42 18:57-19:37/40 20:33	05:45 21:22	05:17 21:57
16	08:37 15:51-16:03/12 16:56	07:51 08:16-08:30/14 17:51	06:51 17:46-18:08/22 18:42	06:40 19:01-19:34/33 20:34	05:43 21:24	05:17 21:58
17	08:37 15:51-15:59/8 16:57	07:49 08:14-08:31/17 17:53	06:49 17:44-18:09/25 18:43	06:38 19:06-19:33/27 20:36	05:42 21:26	05:17 21:58
18	08:36 15:51-15:58/7 16:59	07:47 08:13-08:32/19 17:55	06:46 17:43-18:10/27 18:45	06:36 19:12-19:31/19 20:38	05:40 21:27	05:17 21:59
19	08:35 15:51-15:56/5 17:01	07:45 08:12-08:32/20 17:57	06:44 17:42-18:11/29 18:47	06:34 19:13-19:30/17 20:40	05:39 21:28	05:17 21:59
20	08:34 15:51-15:56/5 17:02	07:43 08:12-08:33/21 17:59	06:42 17:41-18:11/30 18:48	06:32 19:13-19:29/16 20:41	05:37 21:30	05:17 22:00
21	08:32 15:50-15:54/4 17:04	07:41 08:11-08:32/21 18:00	06:39 17:40-18:11/31 18:50	06:29 19:14-19:28/14 20:43	05:36 21:31	05:17 22:00
22	08:31 15:51-15:53/2 17:06	07:39 08:11-08:32/21 18:02	06:37 17:40-18:12/32 18:52	06:27 19:14-19:28/14 20:45	05:35 21:33	05:17 22:00
23	08:30 17:07	07:37 08:11-08:31/20 18:04	06:35 17:39-18:11/32 18:54	06:25 19:15-19:27/12 20:46	05:33 21:34	05:17 22:00
24	08:29 17:09	07:35 08:12-08:31/19 18:06	06:32 17:39-18:17/38 18:55	06:23 19:17-19:26/9 20:48	05:32 21:36	05:18 22:00
25	08:28 17:11	07:33 08:13-08:30/17 18:08	06:30 17:39-18:20/41 18:57	06:21 19:18-19:26/8 20:50	05:31 21:37	05:18 22:00
26	08:26 17:13	07:31 08:15-08:28/13 18:10	06:28 17:38-18:21/43 18:59	06:19 19:20-19:26/6 20:51	05:30 21:38	05:18 22:00
27	08:25 17:14	07:29 08:16-08:25/9 18:11	06:25 17:39-18:25/46 19:00	06:17 19:22-19:26/4 20:53	05:29 21:40	05:19 22:00
28	08:24 17:16	07:27 18:13	06:23 17:40-18:27/47 19:02	06:15 19:22-19:25/3 20:55	05:28 21:41	05:19 22:00
29	08:22 17:18		07:21 18:40-19:28/48 20:04	06:13 19:23-19:25/2 20:56	05:27 21:42	05:20 22:00
30	08:21 17:20		07:18 18:41-19:30/49 20:06	06:11 19:24-19:26/2 20:58	05:26 21:43	05:20 22:00
31	08:19 17:22		07:16 18:43-19:31/48 20:07		05:25 21:44	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	151	227	620	971	1	0

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

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



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 4 - WT4

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 22:00	05:57 21:28	06:47 20:26	07:36 19:16	07:30 17:10	08:21 16:30
2	05:22 21:59	05:59 21:26	06:49 20:24	07:38 19:14	07:32 17:08	08:22 16:29
3	05:22 21:59	06:00 21:24	06:50 20:21	07:39 19:12	07:33 17:07	08:23 16:29
4	05:23 21:58	06:02 21:23	06:52 20:19	07:41 19:09	07:35 17:05	08:25 16:28
5	05:24 21:58	06:04 21:21	06:54 20:17	07:43 19:07	07:37 17:03	08:26 16:28
6	05:25 21:57	06:05 21:19	06:55 20:14	07:44 19:05	07:39 17:01	08:27 16:27
7	05:26 21:57	06:07 21:17	06:57 20:12	07:46 19:03	07:40 17:00	08:29 16:27
8	05:27 21:56	06:08 21:16	06:58 20:10	07:48 19:00	07:42 16:58	08:30 16:26
9	05:28 21:56	06:10 21:14	07:00 20:08	07:49 18:58	07:44 16:56	08:31 16:26
10	05:29 21:55	06:11 21:12	07:02 20:05	07:51 18:56	07:46 16:55	08:32 16:26
11	05:30 21:54	06:13 21:10	07:03 20:03	07:53 18:54	07:48 16:53	08:33 16:26
12	05:31 21:53	06:15 21:08	07:05 20:01	07:55 18:51	07:49 16:52	08:34 16:26
13	05:32 21:52	06:16 21:06	07:07 19:58	07:56 18:49	07:51 16:50	08:35 16:26
14	05:33 21:51	06:18 21:04	07:08 19:56	07:58 18:47	07:53 16:49	08:36 16:26
15	05:34 21:50	06:19 21:02	07:10 19:54	08:00 18:45	08:48-08:59/11 16:47	08:37 16:26
16	05:35 21:49	06:21 21:00	07:11 19:51	08:01 18:43	08:45-09:00/15 16:46	08:38 16:26
17	05:36 21:48	06:23 20:58	07:13 19:49	08:03 18:41	08:44-09:01/17 16:44	08:39 16:26
18	05:37 21:47	06:24 20:56	07:15 19:47	08:05 18:38	08:43-09:02/19 16:43	08:40 16:26
19	05:39 21:46	06:26 20:54	07:16 19:44	08:07 18:36	08:43-09:03/20 16:42	08:40 16:26
20	05:40 21:45	06:28 20:52	07:18 19:42	08:08 18:34	08:42-09:03/21 16:41	08:41 16:27
21	05:42 21:44	06:29 20:50	07:20 19:40	08:10 18:32	08:42-09:03/21 16:39	08:42 16:27
22	05:43 21:42	06:31 20:48	07:21 19:37	08:12 18:30	08:42-09:03/21 16:38	08:42 16:28
23	05:44 21:41	06:32 20:46	07:23 19:35	08:14 18:28	08:42-09:02/20 16:37	08:43 16:28
24	05:46 21:40	06:34 20:43	07:24 19:33	08:15 18:26	08:42-09:01/19 16:36	08:43 16:29
25	05:47 21:38	06:36 20:41	07:26 19:30	08:17 17:24	07:44-08:00/16 16:35	08:43 16:29
26	05:48 21:37	06:37 20:39	07:28 19:28	08:19 17:22	07:46-07:59/13 16:34	08:44 16:30
27	05:50 21:36	06:39 20:37	07:29 19:26	08:21 17:20	07:48-07:57/9 16:33	08:44 16:31
28	05:51 21:34	06:41 20:35	07:31 19:23	08:23 17:18	07:50-07:54/4 16:32	08:44 16:32
29	05:53 21:33	06:42 20:32	07:33 19:21	08:24 17:16	08:18 16:31	08:44 16:33
30	05:54 21:31	06:44 20:30	07:34 19:19	08:26 17:14	08:19 16:31	08:45 16:33
31	05:56 21:29	06:45 20:28		07:28 17:12		08:45 16:34
Potential sun hours	502	454	381	331	266	244
Sum of minutes with flicker	0	400	1214	230	93	112

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

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



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 5 - WT5

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	January	February	March	April	May	June
1	08:45 15:13-15:33/20 10:19-10:25/6 16:36 11:06-11:30/24 09:35-09:37/2	08:18 10:19-10:20/1 09:04-09:09/5 17:23 09:37-09:44/7	07:24 18:15	07:14 20:09	06:09 21:00	05:24 21:46
2	08:44 15:13-15:34/21 10:20-10:25/5 16:37 11:06-11:30/24 09:35-09:37/2	08:16 10:17-10:19/2 09:03-09:09/6 17:25 09:37-09:45/8	07:22 18:17	07:12 20:11	06:07 21:01	05:23 21:47
3	08:44 15:13-15:33/20 10:20-10:25/5 16:38 11:06-11:29/23 09:34-09:36/2	08:15 10:16-10:19/3 09:03-09:10/7 17:27 09:37-09:46/9	07:20 18:19	07:09 20:12	06:05 21:03	05:22 21:48
4	08:44 15:14-15:34/20 10:21-10:26/5 16:39 11:06-11:30/24 09:34-09:37/3	08:13 10:14-10:17/3 09:07-09:10/3 17:29 09:36-09:48/12	07:18 18:20	07:07 20:14	06:03 21:05	05:22 21:49
5	08:44 15:14-15:35/21 10:22-10:28/6 16:40 11:06-11:30/24 09:34-09:37/3	08:11 10:11-10:16/5 09:09-09:11/2 17:31 09:35-09:49/14	07:16 18:22	07:05 20:16	06:02 21:06	05:21 21:50
6	08:44 15:14-15:35/21 10:22-10:28/6 16:41 11:06-11:29/23 09:34-09:37/3	08:10 10:09-10:14/5 09:11-09:12/1 17:33 09:34-09:51/17	07:13 18:24	07:02 20:17	06:00 21:08	05:20 21:51
7	08:43 15:15-15:35/20 10:23-10:29/6 16:43 11:06-11:29/23 09:34-09:37/3	08:08 10:05-10:12/7 17:35 09:33-09:54/21	07:11 18:26	07:00 20:19	05:58 21:10	05:20 21:52
8	08:43 15:15-15:35/20 10:23-10:29/6 16:44 11:06-11:28/22 09:33-09:37/4	08:06 09:32-10:10/38 17:36	07:09 18:27	06:58 20:21	05:56 21:11	05:19 21:53
9	08:42 15:15-15:35/20 10:23-10:30/7 16:45 11:05-11:26/21 09:33-09:36/3	08:04 09:30-10:00/30 17:38 09:16-09:17/1	07:07 18:29	06:56 20:23	05:54 21:13	05:19 21:53
10	08:42 15:15-15:36/21 11:05-11:13/8 09:33-09:37/4 16:47 11:14-11:25/11 10:25-10:32/7	08:03 09:25-09:55/30 17:40 09:17-09:22/5	07:04 18:31	06:53 20:24	05:53 21:15	05:18 21:54
11	08:41 15:15-15:36/21 11:04-11:12/8 09:33-09:37/4 16:48 11:17-11:22/5 10:25-10:32/7	08:01 09:17-09:54/37 17:42	07:02 18:33	06:51 20:26	05:51 21:16	05:18 21:55
12	08:40 15:15-15:36/21 10:26-10:33/7 16:50 11:03-11:11/8 09:33-09:37/4	07:59 09:18-09:53/35 17:44	07:00 18:35	06:49 20:28	05:49 21:18	05:17 21:56
13	08:40 15:15-15:36/21 10:27-10:34/7 09:17-09:21/4 16:51 11:02-11:10/8 09:32-09:37/5	07:57 09:18-09:52/34 17:46	06:58 18:36	06:47 20:29	05:48 21:19	05:17 21:56
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15	08:38 15:15-15:36/21 10:28-10:37/9 09:22-09:26/4 16:54 10:58-11:06/8 09:32-09:37/5 09:13-09:15/2	07:53 09:19-09:50/31 17:49	06:53 18:40	06:42 20:33	05:45 21:22	05:17 21:57
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17	08:36 15:14-15:35/21 10:30-10:41/11 09:11-09:12/1 16:57 10:55-11:04/9 09:26-09:37/11	07:49 09:19-09:46/27 17:53	06:48 18:43	06:38 20:36	05:42 21:25	05:17 21:58
18	08:36 15:14-15:35/21 10:32-10:45/13 16:59 10:52-11:03/11 09:28-09:37/9	07:47 09:19-09:43/24 17:55	06:46 18:45	06:36 20:38	05:40 21:27	05:17 21:59
19	08:35 15:15-15:34/19 09:30-09:38/8 17:01 10:33-11:02/29	07:45 09:19-09:36/17 17:57	06:44 18:47	06:34 20:40	05:39 21:28	05:17 21:59
20	08:34 15:17-15:34/17 09:31-09:38/7 17:02 10:35-10:59/24 09:09-09:10/1	07:43 09:19-09:35/16 17:59	06:42 18:48	06:32 20:41	05:37 21:30	05:17 06:20-06:22/2 22:00
21	08:32 15:18-15:32/14 09:31-09:38/7 17:04 10:36-10:55/19 09:07-09:08/1	07:41 09:17-09:32/15 18:00	06:39 18:50	06:29 20:43	05:36 21:31	05:17 06:19-06:22/3 22:00
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23	08:30 10:43-10:50/7 09:06-09:08/2 17:07 09:34-09:39/5	07:37 09:16-09:27/11 18:04	06:35 18:54	06:25 20:46	05:33 21:34	05:17 22:00
24	08:29 09:34-09:39/5 17:09 09:05-09:07/2	07:35 18:06	06:32 18:55	06:23 20:48	05:32 21:36	05:18 22:00
25	08:28 09:35-09:39/4 17:11 09:05-09:08/3	07:33 18:08	06:30 18:57	06:21 20:50	05:31 21:37	05:18 22:00
26	08:26 09:36-09:39/3 17:13 09:05-09:08/3	07:31 18:10	06:28 18:59	06:19 20:51	05:30 21:38	05:18 22:00
27	08:25 09:36-09:40/4 17:14 09:04-09:07/3	07:29 18:11	06:25 19:00	06:17 20:53	05:29 21:40	05:19 22:00
28	08:24 09:36-09:40/4 17:16 09:03-09:07/4	07:27 18:13	06:23 19:02	06:15 20:55	05:28 21:41	05:19 22:00
29	08:22 09:37-09:42/5 17:18 09:04-09:08/4		07:21 20:04	06:13 20:56	05:27 21:42	05:20 22:00
30	08:21 09:37-09:42/5 17:20 09:04-09:08/4		07:18 20:06	06:11 20:58	05:26 21:43	05:20 22:00
31	08:19 09:37-09:43/6 17:22 09:04-09:08/4		07:16 20:07		05:25 21:44	
Potential sun hours	259	278	367	416	485	499
Sum of minutes with flicker	1161	563	0	0	0	7

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

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

Project:

WP A15-Lingewaard

Licensed user:

Solidwinds

A: Toernooiveld 200

NL-6525 EC Nijmegen

+31 (0)6 832 17 832

Dominique Deen / dominique.deen@solidwinds.com

Calculated:

13-12-2017 11:35/3.1.617



SHADOW - Calendar per WTG

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 5 - WT5

Assumptions for shadow calculations

Flicker curtailment applied to this turbine

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,80	2,50	4,10	5,50	6,70	7,20	6,50	5,90	4,80	3,20	1,80	1,40

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
393	430	818	642	394	394	717	1.321	1.489	903	589	370	8.459

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

	July	August	September	October	November	December
1	05:21 22:00	05:57 21:28	06:47 20:26	07:36 19:16	07:30 08:56-09:24/28 17:10 08:46-08:50/4	08:21 14:57-15:18/21 10:46-10:54/8 09:15-09:19/4 16:30 11:00-11:03/3 10:07-10:14/7
2	05:22 21:59	05:59 21:26	06:49 20:23	07:38 19:14	07:31 09:00-09:34/34 17:08 08:44-08:47/3	08:22 14:57-15:18/21 10:47-10:55/8 09:15-09:19/4 16:29 10:56-11:07/11 10:07-10:14/7
3	05:22 21:59	06:00 21:24	06:50 20:21	07:39 19:12	07:33 09:01-09:39/38 17:07 08:43-08:44/1	08:23 14:59-15:19/20 10:08-10:14/6 16:29 10:49-11:10/21 09:17-09:20/3
4	05:23 21:58	06:02 21:23	06:52 20:19	07:41 19:09	07:35 09:36-09:42/6 17:05 09:03-09:23/20	08:25 14:59-15:19/20 10:07-10:14/7 16:28 10:50-11:12/22 09:17-09:21/4
5	05:24 21:58	06:04 21:21	06:54 20:17	07:43 19:07	07:37 09:39-09:44/5 08:41-08:42/1 17:03 09:04-09:20/16	08:26 15:00-15:21/21 10:08-10:14/6 16:28 10:51-11:14/23 09:19-09:22/3
6	05:25 21:57	06:05 21:19	06:55 20:14	07:44 19:05	07:39 09:41-09:46/5 08:39-08:41/2 17:01 09:05-09:19/14	08:27 15:00-15:21/21 10:08-10:14/6 16:27 10:52-11:15/23 09:20-09:23/3
7	05:26 21:57	06:07 21:17	06:57 20:12	07:46 19:03	07:40 09:44-09:47/3 08:36-08:40/4 17:00 09:06-09:17/11	08:29 15:00-15:21/21 10:08-10:14/6 16:27 10:53-11:16/23 09:20-09:23/3
8	05:27 21:56	06:08 21:16	06:58 20:10	07:48 19:00	07:42 09:46-09:48/2 08:33-08:40/7 16:58 09:07-09:16/9	08:30 15:02-15:22/20 10:09-10:15/6 16:26 10:54-11:18/24 09:22-09:25/3
9	05:27 21:56	06:10 21:14	07:00 20:08	07:49 18:58	07:44 09:48-09:49/1 08:34-08:39/5 16:56 09:07-09:15/8	08:31 15:02-15:22/20 10:09-10:15/6 16:26 10:55-11:18/23 09:23-09:25/2
10	05:28 21:55	06:11 21:12	07:02 20:05	07:51 18:56	07:46 09:49-09:50/1 08:35-08:39/4 16:55 09:08-09:15/7	08:32 15:02-15:23/21 10:09-10:15/6 16:26 10:55-11:19/24 09:24-09:26/2
11	05:30 21:54	06:13 21:10	07:03 20:03	07:53 18:54	07:48 09:08-09:14/6 16:53 08:35-08:39/4	08:33 15:03-15:23/20 10:09-10:15/6 16:26 10:56-11:20/24 09:25-09:27/2
12	05:31 21:53	06:15 21:08	07:05 20:01	07:55 18:51	07:49 09:09-09:14/5 16:52 08:35-08:39/4	08:34 15:03-15:23/20 10:56-11:21/25 09:26-09:27/1 16:26 11:28-11:32/4 10:09-10:15/6
13	05:32 21:52	06:16 21:06	07:07 19:58	07:56 18:49	07:51 09:09-09:13/4 16:50 08:36-08:40/4	08:35 15:04-15:24/20 10:57-11:22/25 09:27-09:28/1 16:26 11:26-11:34/8 10:10-10:15/5
14	05:33 21:51	06:18 21:04	07:08 19:56	07:58 18:47	07:53 09:09-09:13/4 16:49 08:36-08:40/4	08:36 15:04-15:24/20 10:58-11:22/24 09:28-09:29/1 16:26 11:26-11:36/10 10:10-10:16/6
15	05:34 21:50	06:19 21:02	07:10 19:54	08:00 18:45	07:55 09:09-09:13/4 16:47 08:37-08:40/3	08:37 15:05-15:25/20 10:58-11:23/25 09:29-09:30/1 16:26 11:25-11:38/13 10:11-10:16/5
16	05:35 21:49	06:21 21:00	07:11 19:51	08:01 18:43	07:56 09:09-09:13/4 16:46 08:38-08:41/3	08:38 15:05-15:25/20 10:59-11:24/25 16:26 11:25-11:39/14 10:11-10:17/6
17	05:36 21:48	06:23 20:58	07:13 19:49	08:03 18:40	07:58 09:08-09:12/4 16:44 08:38-08:41/3	08:39 15:06-15:26/20 10:12-10:17/5 16:26 11:00-11:40/40
18	05:38 21:47	06:24 20:56	07:15 19:47	08:05 09:48-09:54/6 18:38	08:00 09:08-09:13/5 16:43 08:39-08:41/2	08:40 15:06-15:26/20 10:12-10:17/5 16:26 11:00-11:41/41
19	05:39 21:46	06:26 20:54	07:16 19:44	08:07 09:47-09:59/12 18:36	08:02 10:17-10:24/7 08:40-08:42/2 16:42 09:08-09:13/5	08:40 15:07-15:27/20 10:12-10:18/6 16:26 11:01-11:42/41
20	05:40 21:45	06:28 20:52	07:18 19:42	08:08 09:48-10:02/14 18:34	08:03 14:56-15:05/9 09:08-09:13/5 16:41 10:14-10:28/14 08:41-08:43/2	08:41 15:07-15:27/20 10:13-10:18/5 16:27 11:02-11:43/41
21	05:42 21:44	06:29 20:50	07:20 19:40	08:10 09:49-10:04/15 18:32	08:05 14:54-15:08/14 09:07-09:14/7 16:39 10:12-10:31/19 08:43-08:44/1	08:42 15:07-15:27/20 10:13-10:18/5 16:27 11:02-11:43/41
22	05:43 21:42	06:31 20:48	07:21 19:37	08:12 09:48-10:05/17 18:30	08:07 14:53-15:10/17 09:07-09:14/7 16:38 10:11-10:35/24 08:45-08:46/1	08:42 15:08-15:28/20 10:14-10:19/5 16:28 11:03-11:44/41
23	05:44 21:41	06:32 20:46	07:23 19:35	08:14 09:48-10:08/20 18:28	08:08 14:51-15:10/19 09:07-09:14/7 16:37 10:09-10:38/29	08:43 15:08-15:28/20 10:14-10:19/5 16:28 11:03-11:44/41
24	05:46 21:40	06:34 20:43	07:24 19:33	08:15 09:49-10:13/24 18:26	08:10 14:51-15:12/21 10:09-10:22/13 16:36 10:29-10:40/11 09:05-09:14/9	08:43 15:08-15:28/20 10:15-10:21/6 16:29 11:04-11:44/40
25	05:47 21:38	06:36 20:41	07:26 19:30	07:17 08:49-09:16/27 17:24	08:11 14:52-15:13/21 10:09-10:19/10 08:49-08:50/1 16:35 10:32-10:42/10 09:04-09:15/11	08:43 15:10-15:30/20 10:16-10:21/5 16:29 11:04-11:45/41
26	05:48 21:37	06:37 20:39	07:28 19:28	07:19 08:49-09:18/29 17:22	08:13 14:54-15:15/21 10:08-10:18/10 09:03-09:07/4 16:34 10:35-10:44/9 09:11-09:16/5 08:51-08:52/1	08:44 15:10-15:30/20 10:16-10:21/5 16:30 11:04-11:45/41
27	05:50 21:36	06:39 20:37	07:29 19:26	07:21 08:48-09:20/32 17:20	08:15 14:54-15:15/21 10:07-10:16/9 09:01-09:05/4 16:33 10:37-10:45/8 09:11-09:16/5 08:52-08:54/2	08:44 15:10-15:30/20 11:04-11:29/25 16:31 11:30-11:44/14 10:16-10:21/5
28	05:51 21:34	06:41 20:35	07:31 19:23	07:23 08:48-09:21/33 17:18	08:16 14:55-15:16/21 10:07-10:16/9 08:54-09:04/10 16:32 10:39-10:47/8 09:12-09:17/5	08:44 15:10-15:31/21 11:04-11:29/25 16:32 11:31-11:44/13 10:17-10:22/5
29	05:53 21:33	06:42 20:32	07:33 19:21	07:24 08:48-09:22/34 17:16	08:18 14:56-15:17/21 10:08-10:15/7 08:57-09:03/6 16:31 10:43-10:51/8 09:13-09:18/5	08:44 15:11-15:31/20 11:05-11:29/24 09:35-09:36/1 16:33 11:32-11:44/12 10:17-10:22/5
30	05:54 21:31	06:44 20:30	07:34 19:19	07:26 08:47-09:23/36 17:14	08:19 14:56-15:17/21 10:07-10:14/7 16:31 10:44-10:52/8 09:14-09:18/4	08:44 15:11-15:32/21 11:05-11:29/24 09:35-09:36/1 16:33 11:34-11:43/9 10:18-10:23/5
31	05:56 21:29	06:45 20:28		07:28 08:47-09:24/37 17:12		08:45 15:12-15:32/20 11:05-11:30/25 09:35-09:36/1 16:34 11:36-11:42/6 10:18-10:24/6
Potential sun hours	502	454	381	331	266	244
Sum of minutes with flicker	0	0	0	336	837	1838

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

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 1 - WT1

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 1 - WT1

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 2 - WT2

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 2 - WT2

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 3 - WT3

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 3 - WT3

Flicker curtailment by stopping specific turbines

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

Project:

WP A15-Lingewaard

Licensed user:

Solidwinds

A: Toernooiveld 200

NL-6525 EC Nijmegen

+31 (0)6 832 17 832

Dominique Deen / dominique.deen@solidwinds.com

Calculated:

13-12-2017 11:35/3.1.617



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 4 - WT4

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 4 - WT4

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 5 - WT5

Flicker curtailment by stopping specific turbines

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



SHADOW - Flicker curtailment calendar

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)WTG: 5 - WT5

Flicker curtailment by stopping specific turbines

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

WP A15-Lingewaard

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Calculated:

13-12-2017 11:35/3.1.617



SHADOW - Flicker curtailment protection

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)



SHADOW - Map

Calculation: SHADOW calculation (5 x V150 @ 166m, +LT CORR +LT MITIGATION)

