

Project: **Taaleritehdas_Posio**
 Description: **Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa**

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 12.12.2012 9:17 / 1

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 Calculated:
 12.12.2012 3:42/2.8.563

SHADOW - Main Result

Calculation: Posio Murtotuuli

Assumptions for shadow calculations

Maximum distance for influence 3 000 m
 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
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

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

Tuuliatlas ID 48895 125 m

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1 472	1 235	617	489	483	8 422

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

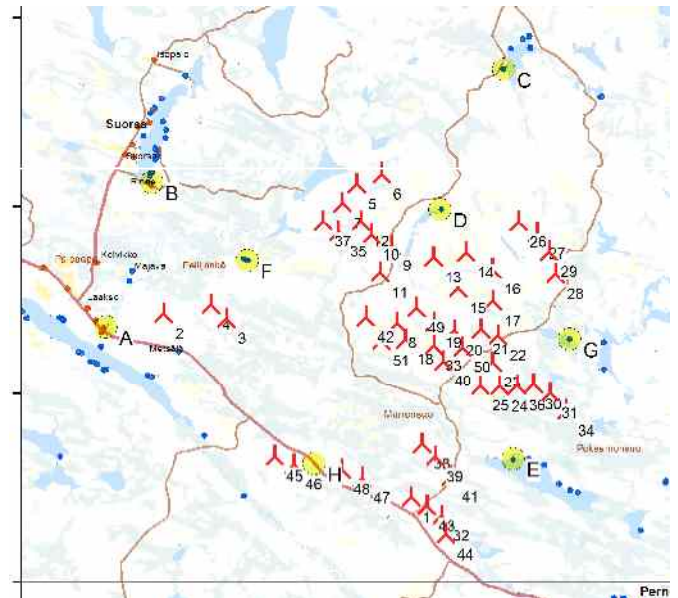
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Taaleritehdas Posio korkeuskäyrät (säde 10km)

Obstacles not used in calculation

Eye height: 1.5 m

Grid resolution: 10.0 m



Scale 1:200 000
 New WTG
 Shadow receptor

WTGs

Finish TM ETRS-TM35FIN-ETRS89

East North Z Row data/Description

WTG type

Valid Manufact. Type-generator Power, Rotor Hub RPM

	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
			[m]								
1	520 966	7 344 169	283.7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
2	514 389	7 349 066	247.1	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
3	516 060	7 348 929	248.2	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
4	515 643	7 349 295	232.8	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
5	519 520	7 352 508	293.1	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
6	520 184	7 352 774	286.3	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
7	519 134	7 352 007	290.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
8	520 585	7 348 809	314.6	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
9	520 443	7 350 873	300.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
10	519 906	7 351 164	282.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
11	520 142	7 350 150	297.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
12	519 636	7 351 520	282.9	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
13	521 564	7 350 557	342.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
14	522 431	7 350 685	347.9	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
15	522 219	7 349 735	345.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
16	523 132	7 350 243	335.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
17	523 150	7 349 401	332.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
18	520 817	7 348 376	313.6	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
19	521 574	7 348 817	347.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
20	522 122	7 348 608	354.4	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
21	522 831	7 348 647	345.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
22	523 288	7 348 473	342.1	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
23	523 139	7 347 752	352.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
24	523 328	7 347 114	329.9	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
25	522 822	7 347 129	332.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
26	523 829	7 351 504	337.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
27	524 331	7 351 195	343.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
28	524 810	7 350 114	352.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
29	524 640	7 350 716	346.7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
30	524 226	7 347 166	314.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
31	524 672	7 346 940	311.7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8
32	521 773	7 343 674	290.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes		NORDEX	N117-2 400	2 400	117.0	120.0	11.8

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SHADOW - Main Result

Calculation: Posio Murtotuuli

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Finish TM ETRS-TM35FIN-ETRS89					WTG type							
East		North		Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	RPM
[m]									[kW]	[m]	[m]	[RPM]
33	521 574	7 348 199	341.6	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
34	525 106	7 346 477	300.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
35	519 033	7 351 249	270.7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
36	523 800	7 347 141	312.1	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
37	518 624	7 351 520	261.7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
38	521 258	7 345 594	280.8	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
39	521 605	7 345 246	290.1	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
40	521 829	7 347 782	336.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
41	522 022	7 344 724	287.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
42	519 766	7 348 971	275.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
43	521 391	7 343 941	292.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
44	521 895	7 343 178	282.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
45	517 345	7 345 267	230.6	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
46	517 848	7 345 049	227.9	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
47	519 663	7 344 691	245.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
48	519 127	7 344 920	265.7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
49	521 107	7 349 214	332.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
50	522 339	7 348 160	362.2	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	
51	520 176	7 348 330	302.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (...	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8	

Shadow receptor-Input

Finish TM ETRS-TM35FIN-ETRS89										
No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
				[m]	[m]	[m]	[m]	[°]	[°]	
A	Kangas	512 846	7 348 701	166.2	1.0	1.0	2.0	0.0	0.0	"Green house mode"
B	Suorsa	514 064	7 352 557	189.3	1.0	1.0	2.0	0.0	0.0	"Green house mode"
C	Ala-Outojärvi	523 438	7 355 537	230.0	1.0	1.0	2.0	0.0	0.0	"Green house mode"
D	Lemmonlammit	521 735	7 351 840	262.9	1.0	1.0	2.0	0.0	0.0	"Green house mode"
E	Poksamo	523 691	7 345 195	268.1	1.0	1.0	2.0	0.0	0.0	"Green house mode"
F	Peilijänkä	516 613	7 350 474	175.0	1.0	1.0	2.0	0.0	0.0	"Green house mode"
G	Pyytölampi	525 191	7 348 378	298.4	1.0	1.0	2.0	0.0	0.0	"Green house mode"
H	Tie 81	518 387	7 345 071	228.9	1.0	1.0	2.0	0.0	0.0	"Green house mode"

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case			Shadow, expected values	
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
A	Kangas	7:04	38	0:18	1:36	
B	Suorsa	0:00	0	0:00	0:00	
C	Ala-Outojärvi	0:00	0	0:00	0:00	
D	Lemmonlammit	41:12	154	0:46	6:46	
E	Poksamo	17:54	125	0:16	3:43	
F	Peilijänkä	21:03	101	0:21	3:36	
G	Pyytölampi	37:27	169	0:27	5:37	
H	Tie 81	87:07	117	1:39	18:14	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (1)	1:41	0:16
2	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (2)	7:29	1:34
3	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (3)	5:52	0:40
4	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (4)	7:18	1:10
5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (5)	2:02	0:26

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Project: **Taaleritehdas_Posio** Description: **Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa**

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SHADOW - Main Result

Calculation: Posio Murtotuuli

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No.	Name	Worst case [h/year]	Expected [h/year]
6	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (6)	5:03	1:04
7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (7)	3:03	0:40
8	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (8)	0:00	0:00
9	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (9)	4:58	0:45
10	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (10)	2:39	0:27
11	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (11)	2:08	0:18
12	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (12)	2:04	0:22
13	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (13)	9:01	1:08
14	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (14)	7:25	1:02
15	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (15)	0:00	0:00
16	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (16)	1:42	0:22
17	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (17)	2:26	0:32
18	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (18)	0:00	0:00
19	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (19)	0:00	0:00
20	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (20)	0:00	0:00
21	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (21)	1:58	0:24
22	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (22)	3:29	0:42
23	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (23)	2:37	0:29
24	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (24)	2:06	0:18
25	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (25)	1:06	0:11
26	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (26)	2:39	0:29
27	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (27)	1:41	0:18
28	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (28)	0:00	0:00
29	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (29)	0:00	0:00
30	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (30)	5:54	0:48
31	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (31)	8:09	0:52
32	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (32)	1:19	0:11
33	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (33)	0:00	0:00
34	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (34)	10:41	1:54
35	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (35)	2:43	0:36
36	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (36)	3:21	0:29
37	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (37)	3:13	0:45
38	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (38)	2:05	0:25
39	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (39)	2:17	0:27
40	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (40)	0:00	0:00
41	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (41)	3:47	0:42
42	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (42)	0:00	0:00
43	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (43)	1:00	0:09
44	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (44)	0:47	0:06
45	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (45)	12:04	2:40
46	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (46)	45:09	9:51
47	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (47)	6:45	1:09
48	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (48)	20:55	4:09
49	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (49)	0:00	0:00
50	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (50)	1:09	0:12
51	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (51)	0:00	0:00

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		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** A - Kangas**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10:47	09:13	07:29	06:29	04:30	02:14		03:50	05:42	06:29 (4)	07:19	08:05	10:00
2	13:42	15:38	17:21	20:04	21:50	00:03		22:43	20:39	06:39 (4)	18:42	15:44	14:00
3	10:46	09:10	07:25	06:25	04:26	02:09		03:54	05:45	06:29 (4)	07:22	08:09	10:04
4	13:45	15:41	17:24	20:08	21:53	00:09		22:39	20:35	06:38 (4)	18:38	15:40	13:57
5	10:44	09:06	07:21	06:21	04:22	02:04		03:58	05:49	06:31 (4)	07:26	08:12	10:07
6	13:48	15:45	17:28	20:11	21:57	00:14		22:35	20:31	06:38 (4)	18:34	15:36	13:54
7	10:41	09:02	07:17	06:17	04:18	01:59		04:01	05:52	06:34 (4)	07:29	08:16	10:11
8	13:51	15:49	17:31	20:14	22:01	00:20		22:30	20:27	06:36 (4)	18:30	15:33	13:51
9	10:39	08:59	07:13	06:13	04:14	01:53	01:39	04:05	05:55		07:32	08:20	10:14
10	13:54	15:53	17:34	20:18	22:05	00:27	00:53	22:26	20:23		18:26	15:29	13:49
11	10:37	08:55	07:10	06:09	04:10	01:46	01:48	04:09	05:59		07:35	08:24	10:18
12	13:58	15:57	17:38	20:21	22:09	00:33	00:44	22:22	20:19		18:23	15:25	13:46
13	10:34	08:51	07:06	06:05	04:06	01:39	01:56	04:13	06:02		07:39	08:27	10:21
14	14:01	16:01	17:41	20:25	22:13	00:41	00:37	22:18	20:15		18:19	15:22	13:43
15	10:32	08:48	07:02	06:01	04:02	01:29	02:02	04:17	06:05		07:42	08:31	10:25
16	14:04	16:05	17:45	20:28	22:17	00:51	00:31	22:14	20:11		18:15	15:18	13:41
17	10:29	08:44	06:58	05:57	06:33 (4)	03:58	01:51	02:08	04:21		07:45	08:35	10:28
18	14:08	16:08	17:48	20:31	22:21	00:32	00:25	22:10	20:07		18:11	15:14	13:39
19	10:26	08:40	06:54	05:53	06:30 (4)	03:54	02:14	04:25	06:12		07:48	08:39	10:31
20	14:12	16:12	17:51	20:35	22:25	00:39	00:20	22:06	20:04		18:07	15:11	13:36
21	10:23	08:37	06:50	05:50	06:29 (4)	03:50	02:19	04:28	06:15		07:52	08:42	10:34
22	14:15	16:16	17:55	20:38	22:29	00:39	00:15	22:02	20:00		18:03	15:07	13:34
23	10:21	08:33	06:46	05:46	06:30 (4)	03:46	02:25	04:32	06:18		07:55	08:46	10:37
24	14:19	16:20	17:58	20:42	22:33	00:39	00:10	21:58	19:56		18:00	15:04	13:33
25	10:18	08:29	06:43	05:42	06:31 (4)	03:42	02:30	04:36	06:21		07:58	08:50	10:39
26	14:23	16:23	18:01	20:45	22:37	00:37	00:05	21:54	19:52		17:56	15:00	13:31
27	10:14	08:25	06:39	05:38	06:33 (4)	03:38	02:35	04:39	06:25		08:02	08:54	10:42
28	14:27	16:27	18:05	20:48	22:41	00:34	00:00	21:50	19:48		17:52	14:56	13:29
29	10:11	08:22	06:35	05:34	06:32 (2)	03:34	02:40	04:43	06:28		08:05	08:58	10:44
30	14:30	16:31	18:08	20:52	22:45	00:37	23:55	21:46	19:44		17:48	14:53	13:28
31	10:08	08:18	06:31	05:30	06:29 (2)	03:29	02:45	04:47	06:31		08:09	09:02	10:46
32	14:34	16:34	18:11	20:55	22:49	00:39	23:51	21:42	19:40	06:36 (2)	17:44	14:49	13:27
33	10:05	08:14	06:27	05:26	06:27 (2)	03:25	02:49	04:50	06:33 (2)	06:41 (2)	17:40	14:46	13:26
34	14:38	16:38	18:15	20:59	22:54	00:40	23:46	21:38	19:36	06:43 (2)	17:37	14:42	13:25
35	10:02	08:10	06:23	05:22	06:26 (2)	03:21	02:54	04:54	06:31 (2)	06:45 (2)	17:33	14:42	13:25
36	14:42	16:42	18:18	21:02	22:58	00:42	23:42	21:34	19:32	06:45 (2)	17:29	14:39	13:25
37	09:59	08:07	06:19	05:18	06:25 (2)	03:17	02:58	04:57	06:30 (2)	06:46 (2)	17:25	14:35	13:25
38	14:46	16:45	18:21	21:06	23:02	00:42	23:37	21:30	19:28	06:45 (2)	17:21	14:32	13:25
39	09:55	08:03	06:15	05:14	06:24 (2)	03:13	03:03	05:01	06:30 (2)	06:46 (2)	17:17	14:29	13:25
40	14:50	16:49	18:25	21:09	23:07	00:41	23:33	21:26	19:25	06:46 (2)	17:13	14:25	13:26
41	09:52	07:59	06:12	05:10	06:24 (2)	03:08	03:03	05:05	06:29 (2)	06:45 (2)	17:09	14:22	13:26
42	14:54	16:53	18:28	21:13	23:11	00:42	23:29	21:22	19:21	06:46 (2)	17:05	14:19	13:27
43	09:48	07:55	06:08	05:06	06:24 (2)	03:04	03:07	05:08	06:29 (2)	06:45 (2)	17:01	14:15	13:29
44	14:58	16:56	18:31	21:17	23:15	00:41	23:24	21:18	19:17	06:31 (2)	17:01	14:15	13:29
45	09:45	07:52	06:04	05:02	06:24 (2)	03:00	03:12	05:12	06:29 (2)	06:45 (2)	16:57	14:11	13:30
46	15:02	17:00	18:35	21:20	23:20	00:40	23:20	21:14	19:13	06:34 (2)	16:53	14:08	13:32
47	09:42	07:48	06:00	04:58	06:25 (2)	02:51	03:16	05:15	06:29 (2)	06:45 (2)	16:49	14:05	13:33
48	15:06	17:03	18:38	21:24	23:24	00:40	23:16	21:10	19:09	06:37 (2)	16:45	14:02	13:34
49	09:38	07:44	05:56	04:54	06:25 (2)	02:47	03:20	05:18	06:29 (2)	06:45 (2)	16:41	14:00	13:36
50	15:10	17:07	18:41	21:27	23:29	00:38	23:12	21:06	19:05	06:30 (2)	16:37	13:59	13:39
51	09:35	07:40	05:52	04:50	06:27 (2)	02:42	03:25	05:22	06:30 (2)	06:45 (2)	16:33	13:55	13:40
52	15:14	17:10	18:44	21:31	23:34	00:37	23:08	21:03	19:01	06:31 (2)	16:29	13:51	13:41
53	09:31	07:36	05:48	04:46	06:29 (2)	02:38	03:29	05:25	06:31 (2)	06:45 (2)	16:25	13:47	13:42
54	15:18	17:14	18:48	21:35	23:38	00:33	23:03	20:59	18:57	06:34 (2)	16:21	13:43	13:43
55	09:28	07:33	05:44	04:42	06:33 (2)	02:33	03:33	05:29	06:34 (2)	06:45 (2)	16:17	13:39	13:44
56	15:22	17:17	18:51	21:38	23:43	00:33	22:59	20:55	18:53	06:37 (2)	16:13	13:35	13:45
57	09:24	07:29	05:40	04:38	06:30 (2)	02:29	03:37	05:32	06:37		16:09	13:31	13:46
58	15:26	17:21	18:54	21:42	23:48	00:33	22:55	20:51	18:50		16:05	13:27	13:47
59	09:21	07:26	05:37	04:34	06:29 (2)	02:24	03:41	05:35	06:31 (4)		16:01	13:23	13:48
60	15:30	17:25	18:58	21:46	23:53	00:33	22:51	20:47	18:46	06:37 (4)	15:57	13:19	13:49
61	09:17	07:22	05:33	04:31	06:28 (2)	02:22	03:45	05:39	06:30 (4)		15:53	13:15	13:50
62	15:34	17:29	19:01	21:49	23:58	00:33	22:47	20:43	18:42	06:39 (4)	15:49	13:11	13:51
Potential sun hours	139	226	362	461	601	707	661	525	396	297	176	91	
Total, worst case				213				183	28				
Sun reduction				0.44				0.35	0.28				
Oper. time red.				0.96				0.96	0.96				
Wind dir. red.				0.60				0.60	0.61				
Total reduction				0.26				0.20	0.16				
Total, real				55				37	5				

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

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

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

Printed/Page

12.12.2012 9:17 / 5

Licensed user:

Pöyry Finland Oy

P.O. Box 93

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Atte Lohman / atte.lohman@poyry.com

Calculated:

12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** B - Suorsa**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:48	09:14	07:29	06:29	04:30	02:13		03:49	05:42	07:19	08:05	10:00
	13:41	15:37	17:20	20:04	21:50	00:05		22:43	20:39	18:42	15:44	13:59
2	10:46	09:10	07:25	06:25	04:26	02:08		03:53	05:45	07:22	08:09	10:04
	13:44	15:41	17:24	20:08	21:54	00:10		22:39	20:35	18:38	15:40	13:56
3	10:44	09:06	07:21	06:21	04:22	02:02		03:57	05:49	07:25	08:12	10:08
	13:47	15:45	17:27	20:11	21:58	00:16		22:35	20:31	18:34	15:36	13:53
4	10:42	09:03	07:17	06:17	04:18	01:57		04:01	05:52	07:29	08:16	10:11
	13:50	15:49	17:31	20:14	22:01	00:22		22:31	20:27	18:30	15:32	13:50
5	10:40	08:59	07:13	06:13	04:14	01:50		04:05	05:55	07:32	08:20	10:15
	13:53	15:53	17:34	20:18	22:05	00:28		22:27	20:23	18:26	15:29	13:48
6	10:38	08:55	07:10	06:09	04:10	01:44	01:45	04:09	05:58	07:35	08:24	10:19
	13:57	15:57	17:38	20:21	22:09	00:36	00:47	22:23	20:19	18:22	15:25	13:45
7	10:35	08:52	07:06	06:05	04:06	01:35	01:53	04:13	06:02	07:39	08:27	10:22
	14:00	16:00	17:41	20:25	22:13	00:44	00:39	22:19	20:15	18:19	15:21	13:42
8	10:32	08:48	07:02	06:01	04:02	01:24	02:00	04:17	06:05	07:42	08:31	10:25
	14:04	16:04	17:44	20:28	22:17	00:56	00:33	22:15	20:11	18:15	15:18	13:40
9	10:30	08:44	06:58	05:57	03:58	00:45	02:06	04:20	06:08	07:45	08:35	10:28
	14:07	16:08	17:48	20:31	22:21	02:26	00:27	22:11	20:07	18:11	15:14	13:38
10	10:27	08:41	06:54	05:53	03:53		02:12	04:24	06:11	07:48	08:39	10:32
	14:11	16:12	17:51	20:35	22:25		00:21	22:06	20:04	18:07	15:10	13:36
11	10:24	08:37	06:50	05:49	03:49		02:18	04:28	06:15	07:52	08:43	10:35
	14:14	16:16	17:55	20:38	22:29		00:16	22:02	20:00	18:03	15:07	13:33
12	10:21	08:33	06:46	05:45	03:45		02:23	04:32	06:18	07:55	08:47	10:37
	14:18	16:19	17:58	20:42	22:33		00:11	21:58	19:56	17:59	15:03	13:32
13	10:18	08:29	06:43	05:41	03:41		02:29	04:35	06:21	07:58	08:50	10:40
	14:22	16:23	18:01	20:45	22:37		00:06	21:54	19:52	17:56	15:00	13:30
14	10:15	08:26	06:39	05:37	03:37		02:34	04:39	06:24	08:02	08:54	10:43
	14:26	16:27	18:05	20:48	22:41		00:01	21:50	19:48	17:52	14:56	13:28
15	10:12	08:22	06:35	05:34	03:33		02:39	04:43	06:28	08:05	08:58	10:45
	14:30	16:30	18:08	20:52	22:46		23:56	21:46	19:44	17:48	14:52	13:27
16	10:09	08:18	06:31	05:30	03:29		02:43	04:46	06:31	08:09	09:02	10:47
	14:34	16:34	18:11	20:55	22:50		23:52	21:42	19:40	17:44	14:49	13:26
17	10:05	08:14	06:27	05:26	03:25		02:48	04:50	06:34	08:12	09:06	10:49
	14:38	16:38	18:15	20:59	22:54		23:47	21:38	19:36	17:40	14:45	13:25
18	10:02	08:11	06:23	05:22	03:20		02:53	04:54	06:37	08:15	09:10	10:51
	14:42	16:41	18:18	21:02	22:58		23:43	21:34	19:32	17:36	14:42	13:24
19	09:59	08:07	06:19	05:18	03:16		02:58	04:57	06:40	08:19	09:14	10:52
	14:45	16:45	18:21	21:06	23:03		23:38	21:30	19:28	17:33	14:38	13:24
20	09:56	08:03	06:15	05:14	03:12		03:02	05:01	06:44	08:22	09:18	10:53
	14:49	16:49	18:25	21:10	23:07		23:34	21:26	19:24	17:29	14:35	13:23
21	09:52	07:59	06:11	05:10	03:08		03:02	05:04	06:47	08:26	09:22	10:54
	14:53	16:52	18:28	21:13	23:12		23:29	21:22	19:21	17:25	14:31	13:23
22	09:49	07:55	06:08	05:06	03:03		03:07	05:08	06:50	08:29	09:26	10:55
	14:57	16:56	18:31	21:17	23:16		23:25	21:18	19:17	17:21	14:28	13:24
23	09:45	07:52	06:04	05:02	02:55		03:11	05:11	06:53	08:33	09:30	10:56
	15:01	16:59	18:34	21:20	23:20		23:21	21:15	19:13	17:17	14:25	13:24
24	09:42	07:48	06:00	04:58	02:50		03:15	05:15	06:56	08:36	09:33	10:56
	15:05	17:03	18:38	21:24	23:25		23:16	21:11	19:09	17:14	14:21	13:25
25	09:38	07:44	05:56	04:54	02:46		03:20	05:18	07:00	07:40	09:37	10:56
	15:09	17:06	18:41	21:28	23:30		23:12	21:07	19:05	16:10	14:18	13:26
26	09:35	07:40	05:52	04:50	02:42		03:24	05:22	07:03	07:43	09:41	10:55
	15:13	17:10	18:44	21:31	23:34		23:08	21:03	19:01	16:06	14:15	13:28
27	09:31	07:36	05:48	04:46	02:37		03:28	05:25	07:06	07:47	09:45	10:55
	15:17	17:14	18:48	21:35	23:39		23:04	20:59	18:57	16:02	14:12	13:29
28	09:28	07:33	05:44	04:42	02:32		03:32	05:28	07:09	07:51	09:49	10:54
	15:21	17:17	18:51	21:39	23:44		23:00	20:55	18:53	15:59	14:08	13:31
29	09:24		06:40	04:38	02:28		03:37	05:32	07:13	07:54	09:53	10:53
	15:25		19:54	21:42	23:49		22:55	20:51	18:49	15:55	14:05	13:33
30	09:21		06:36	04:34	02:23		03:41	05:35	07:16	07:58	09:57	10:52
	15:29		19:58	21:46	23:54		22:51	20:47	18:46	15:51	14:02	13:35
31	09:17		06:32		02:18		03:45	05:39		08:01		10:50
	15:33		20:01		23:59		22:47	20:43		15:47		13:38
Potential sun hours	139	226	362	461	602	686	662	526	397	297	175	90
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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12.12.2012 9:17 / 6

Licensed user:

Pöyry Finland Oy

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FI-02151 Espoo

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Atte Lohman / atte.lohman@poyry.com

Calculated:

12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** C - Ala-Outojärvi**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:48	09:13	07:28	06:28	04:29	02:11		03:48	05:41	07:18	08:04	10:00
	13:40	15:36	17:20	20:04	21:49	00:05		22:43	20:38	18:41	15:43	13:58
2	10:46	09:09	07:24	06:24	04:25	02:06		03:52	05:44	07:21	08:08	10:04
	13:42	15:40	17:23	20:07	21:53	00:10		22:38	20:34	18:37	15:39	13:55
3	10:44	09:06	07:20	06:20	04:21	02:00		03:56	05:48	07:25	08:12	10:08
	13:45	15:44	17:26	20:10	21:57	00:16		22:34	20:30	18:33	15:35	13:52
4	10:42	09:02	07:16	06:16	04:17	01:54		04:00	05:51	07:28	08:16	10:11
	13:49	15:48	17:30	20:14	22:01	00:22		22:30	20:26	18:29	15:31	13:49
5	10:40	08:58	07:13	06:12	04:13	01:48		04:04	05:54	07:31	08:19	10:15
	13:52	15:52	17:33	20:17	22:05	00:29		22:26	20:22	18:25	15:28	13:46
6	10:37	08:55	07:09	06:08	04:09	01:41	01:42	04:08	05:57	07:34	08:23	10:18
	13:55	15:55	17:37	20:20	22:09	00:37	00:48	22:22	20:18	18:22	15:24	13:44
7	10:35	08:51	07:05	06:04	04:05	01:32	01:51	04:12	06:01	07:38	08:27	10:22
	13:59	15:59	17:40	20:24	22:13	00:46	00:40	22:18	20:15	18:18	15:20	13:41
8	10:32	08:47	07:01	06:00	04:00	01:17	01:58	04:15	06:04	07:41	08:31	10:25
	14:02	16:03	17:44	20:27	22:17	01:02	00:33	22:14	20:11	18:14	15:17	13:39
9	10:29	08:44	06:57	05:56	03:56	00:24	02:04	04:19	06:07	07:44	08:34	10:28
	14:06	16:07	17:47	20:31	22:21	01:40	00:27	22:10	20:07	18:10	15:13	13:36
10	10:27	08:40	06:53	05:52	03:52		02:10	04:23	06:11	07:48	08:38	10:31
	14:09	16:11	17:50	20:34	22:25		00:22	22:06	20:03	18:06	15:09	13:34
11	10:24	08:36	06:49	05:48	03:48		02:16	04:27	06:14	07:51	08:42	10:34
	14:13	16:15	17:54	20:37	22:29		00:16	22:02	19:59	18:02	15:06	13:32
12	10:21	08:32	06:46	05:44	03:44		02:22	04:31	06:17	07:54	08:46	10:37
	14:17	16:18	17:57	20:41	22:33		00:11	21:58	19:55	17:58	15:02	13:30
13	10:18	08:29	06:42	05:40	03:40		02:27	04:34	06:20	07:58	08:50	10:40
	14:21	16:22	18:00	20:44	22:37		00:06	21:54	19:51	17:55	14:58	13:28
14	10:15	08:25	06:38	05:37	03:36		02:32	04:38	06:24	08:01	08:54	10:43
	14:25	16:26	18:04	20:48	22:41		00:01	21:50	19:47	17:51	14:55	13:27
15	10:11	08:21	06:34	05:33	03:32		02:37	04:42	06:27	08:04	08:58	10:45
	14:28	16:29	18:07	20:51	22:45		23:56	21:46	19:43	17:47	14:51	13:25
16	10:08	08:17	06:30	05:29	03:28		02:42	04:45	06:30	08:08	09:02	10:47
	14:32	16:33	18:10	20:55	22:49		23:52	21:42	19:39	17:43	14:48	13:24
17	10:05	08:14	06:26	05:25	03:23		02:47	04:49	06:33	08:11	09:05	10:49
	14:36	16:37	18:14	20:58	22:54		23:47	21:38	19:35	17:39	14:44	13:23
18	10:02	08:10	06:22	05:21	03:19		02:51	04:52	06:36	08:15	09:09	10:51
	14:40	16:40	18:17	21:02	22:58		23:42	21:34	19:31	17:35	14:41	13:22
19	09:58	08:06	06:18	05:17	03:15		02:56	04:56	06:40	08:18	09:13	10:52
	14:44	16:44	18:20	21:05	23:02		23:38	21:30	19:28	17:32	14:37	13:22
20	09:55	08:02	06:15	05:13	03:11		03:01	05:00	06:43	08:22	09:17	10:53
	14:48	16:48	18:24	21:09	23:07		23:33	21:26	19:24	17:28	14:34	13:22
21	09:52	07:58	06:11	05:09	03:06		03:01	05:03	06:46	08:25	09:21	10:54
	14:52	16:51	18:27	21:12	23:11		23:29	21:22	19:20	17:24	14:30	13:22
22	09:48	07:55	06:07	05:05	03:02		03:05	05:07	06:49	08:29	09:25	10:55
	14:56	16:55	18:30	21:16	23:16		23:25	21:18	19:16	17:20	14:27	13:22
23	09:45	07:51	06:03	05:01	02:53		03:10	05:10	06:52	08:32	09:29	10:56
	15:00	16:58	18:34	21:20	23:20		23:20	21:14	19:12	17:16	14:23	13:23
24	09:41	07:47	05:59	04:57	02:49		03:14	05:14	06:56	08:36	09:33	10:56
	15:04	17:02	18:37	21:23	23:25		23:16	21:10	19:08	17:13	14:20	13:23
25	09:38	07:43	05:55	04:53	02:45		03:18	05:17	06:59	07:39	09:37	10:56
	15:08	17:06	18:40	21:27	23:29		23:12	21:06	19:04	16:09	14:17	13:25
26	09:34	07:39	05:51	04:49	02:40		03:23	05:21	07:02	07:43	09:41	10:55
	15:12	17:09	18:44	21:31	23:34		23:08	21:02	19:00	16:05	14:13	13:26
27	09:31	07:36	05:47	04:45	02:35		03:27	05:24	07:05	07:46	09:45	10:55
	15:16	17:13	18:47	21:34	23:39		23:03	20:58	18:56	16:01	14:10	13:28
28	09:27	07:32	05:43	04:41	02:31		03:31	05:27	07:08	07:50	09:49	10:54
	15:20	17:16	18:50	21:38	23:44		22:59	20:54	18:53	15:58	14:07	13:29
29	09:24		06:39	04:37	02:26		03:35	05:31	07:12	07:53	09:52	10:53
	15:24		19:54	21:42	23:49		22:55	20:50	18:49	15:54	14:04	13:31
30	09:20		06:36	04:33	02:21		03:40	05:34	07:15	07:57	09:56	10:52
	15:28		19:57	21:46	23:54		22:51	20:46	18:45	15:50	14:01	13:34
31	09:17		06:32		02:16		03:44	05:38		08:01		10:50
	15:32		20:00		23:59		22:47	20:42		15:46		13:36
Potential sun hours	138	226	362	462	602	687	663	526	397	297	175	90
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 7
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** D - Lemmonlammit**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June
1	10:47	09:13	12:51 (13)	07:28	15:52 (9)	06:28
	13:41	15:36	9 13:00 (13)	17:20	16:07 (9)	20:04
2	10:46	09:09	12:49 (13)	07:24	15:52 (9)	06:24
	13:43	15:40	13 13:02 (13)	17:23	16:05 (9)	20:07
3	10:44	09:06	12:48 (13)	07:20	15:54 (9)	06:20
	13:46	15:44	16 13:04 (13)	17:27	9 16:03 (9)	20:10
4	10:41	09:02	12:47 (13)	07:16	16:16	20:20
	13:50	15:48	18 13:05 (13)	17:30	20:14	20:14
5	10:39	08:58	12:46 (13)	07:13	16:12	20:12
	13:53	15:52	20 13:06 (13)	17:34	20:17	22:05
6	10:37	08:55	12:46 (13)	07:09	16:08	20:09
	13:56	15:56	20 13:06 (13)	17:37	20:20	22:08
7	10:34	08:51	12:46 (13)	07:05	16:57 (10)	06:04
	14:00	16:00	21 13:07 (13)	17:40	4 17:01 (10)	20:24
8	10:32	08:47	12:46 (13)	07:01	16:56 (10)	06:00
	14:03	16:04	21 13:07 (13)	17:44	8 17:04 (10)	20:27
9	10:29	08:44	12:46 (13)	06:57	16:55 (10)	05:57
	14:07	16:07	22 13:08 (13)	17:47	13 17:08 (10)	20:31
10	10:26	08:40	12:46 (13)	06:53	16:54 (10)	05:53
	14:10	16:11	21 13:07 (13)	17:51	14 17:08 (10)	20:34
11	10:23	08:36	10:15 (14)	06:50	16:54 (10)	05:49
	14:14	16:15	34 15:24 (11)	17:54	14 17:08 (10)	20:37
12	10:20	08:32	10:13 (14)	06:46	16:55 (10)	05:45
	14:18	16:19	43 15:29 (11)	17:57	12 17:07 (10)	20:41
13	10:17	08:29	10:12 (14)	06:42	07:17 (27)	05:41
	14:21	16:22	46 15:31 (11)	18:01	16 17:06 (10)	20:44
14	10:14	08:25	10:11 (14)	06:38	07:15 (27)	05:37
	14:25	16:26	44 15:30 (11)	18:04	13 17:03 (10)	20:48
15	10:11	08:21	10:11 (14)	06:34	07:14 (27)	05:33
	14:29	16:30	42 15:30 (11)	18:07	12 17:29 (35)	20:51
16	10:08	08:17	10:10 (14)	06:30	07:13 (27)	05:29
	14:33	16:34	33 15:29 (11)	18:11	15 17:32 (35)	20:55
17	10:05	08:14	10:10 (14)	06:26	07:13 (27)	05:25
	14:37	16:37	25 15:27 (11)	18:14	16 17:34 (35)	20:58
18	10:01	08:10	10:10 (14)	06:22	07:14 (27)	05:21
	14:41	16:41	20 10:30 (14)	18:17	9 17:39 (12)	21:02
19	09:58	08:06	10:09 (14)	06:19	06:59 (26)	05:17
	14:45	16:44	20 10:29 (14)	18:21	10 17:42 (12)	21:05
20	09:55	08:02	10:10 (14)	06:15	06:56 (26)	05:13
	14:49	16:48	19 10:29 (14)	18:24	20 17:46 (12)	21:09
21	09:51	07:58	10:11 (14)	06:11	06:55 (26)	05:09
	14:53	16:52	23 16:03 (9)	18:27	23 17:47 (12)	21:12
22	09:48	07:55	10:12 (14)	06:07	06:54 (26)	05:05
	14:57	16:55	26 16:06 (9)	18:30	24 17:47 (12)	21:16
23	09:45	07:51	10:14 (14)	06:03	06:53 (26)	05:01
	15:01	16:59	24 16:07 (9)	18:34	24 17:46 (12)	21:20
24	09:41	07:47	10:18 (14)	05:59	06:54 (26)	04:57
	15:05	17:02	17 16:07 (9)	18:37	20 17:45 (12)	21:23
25	09:38	07:43	15:51 (9)	05:55	06:54 (26)	04:53
	15:09	17:06	17 16:08 (9)	18:40	11 07:05 (26)	21:27
26	09:34	07:39	15:51 (9)	05:51	06:56 (26)	04:49
	15:13	17:09	17 16:08 (9)	18:44	7 07:03 (26)	21:30
27	09:31	07:36	15:51 (9)	05:47	04:45	21:34
	15:17	17:13	17 16:08 (9)	18:47	21:34	23:38
28	09:27	07:32	15:52 (9)	05:44	04:41	21:32
	15:21	17:16	16 16:08 (9)	18:50	21:38	23:43
29	09:24			06:40	04:37	21:27
	15:25			19:54	21:42	23:48
30	09:20			06:36	04:33	21:23
	15:29			19:57	21:45	23:53
31	09:16			06:32	19:19 (7)	21:18
	15:33			20:00	2 19:21 (7)	23:58
Potential sun hours	139	226	362	461	602	706
Total, worst case		664	324	95	148	
Sun reduction		0.25	0.36	0.44	0.39	
Oper. time red.		0.96	0.96	0.96	0.96	
Wind dir. red.		0.66	0.60	0.58	0.59	
Total reduction		0.16	0.22	0.25	0.23	
Total, real		108	70	23	34	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 8
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** D - Lemmonlammit**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	July	August	September		October		November		December					
1		03:48	21:04 (6)	05:41		07:18	17:35 (10)	08:04	12:15 (13)	10:00				
2		22:42	5	21:09 (6)	20:38	18:41	11	17:46 (10)	15:43	21	12:36 (13)	13:59		
		03:52		21:03 (6)	05:45	07:22		17:33 (10)	08:08		12:16 (13)	10:03		
3		22:38	9	21:12 (6)	20:34	18:37	13	17:46 (10)	15:39	21	12:37 (13)	13:56		
		03:56		21:01 (6)	05:48	07:25		17:32 (10)	08:12		12:15 (13)	10:07		
4		22:34	12	21:13 (6)	20:30	18:33	14	17:46 (10)	15:35	21	12:36 (13)	13:53		
		04:00		21:00 (6)	05:51	07:28		17:32 (10)	08:15		12:15 (13)	10:11		
5		22:30	14	21:14 (6)	20:26	18:29	14	17:46 (10)	15:32	21	12:36 (13)	13:50		
		04:04		21:00 (6)	05:54	07:31		17:32 (10)	08:19		12:16 (13)	10:14		
6	01:45	22:26	14	21:14 (6)	20:22	18:26	11	17:43 (10)	15:28	20	12:36 (13)	13:47		
		04:08		20:59 (6)	05:58	07:35		17:33 (10)	08:23		12:17 (13)	10:18		
7	00:46	22:22	15	21:14 (6)	20:19	18:22	6	17:39 (10)	15:24	19	12:36 (13)	13:44		
	01:53	04:12		20:59 (6)	06:01	07:38		17:34 (10)	08:27		12:18 (13)	10:21		
8	00:38	22:18	15	21:14 (6)	20:15	18:18	2	17:35 (10)	15:21	17	12:35 (13)	13:42		
	02:00	04:16		20:58 (6)	06:04	19:15 (7)		07:41	08:31		12:19 (13)	10:24		
9	00:32	22:14	16	21:14 (6)	20:11	5	19:20 (7)	18:14	15:17	15	12:34 (13)	13:40		
	02:06	04:20		20:58 (6)	06:08	19:13 (7)		07:44	08:34		12:20 (13)	10:28		
10	00:26	22:10	15	21:13 (6)	20:07	8	19:21 (7)	18:10	15:13	13	12:33 (13)	13:37		
	02:12	04:23		20:59 (6)	06:11	19:12 (7)		07:48	08:38		12:22 (13)	10:31		
11	00:20	22:06	14	21:13 (6)	20:03	10	19:22 (7)	18:06	5	16:36 (9)	15:10	9	12:31 (13)	13:35
	02:18	04:27		21:00 (6)	06:14	19:12 (7)		07:51	16:27 (9)		08:42	10:34		
12	00:15	22:02	12	21:12 (6)	19:59	6	19:18 (7)	18:03	11	16:38 (9)	15:06	13:33		
	02:23	04:31		21:01 (6)	06:17	19:11 (7)		07:54	16:26 (9)		08:46	10:37		
13	00:10	21:58	7	21:08 (6)	19:55	3	19:14 (7)	17:59	14	16:40 (9)	15:03	13:31		
	02:28	04:35		21:02 (6)	06:21	07:58		16:24 (9)	08:50		10:39			
14	00:05	21:54	3	21:05 (6)	19:51	17:55	16	16:40 (9)	14:59		13:29			
	02:33	04:38			06:24	08:01		16:24 (9)	08:54		10:42			
15	00:00	21:50			19:47	17:51	16	16:40 (9)	14:55		13:28			
	02:38	04:42			06:27	08:04		16:24 (9)	08:57		10:44			
16	23:55	21:46			19:43	17:47	16	16:40 (9)	14:52		13:26			
	02:43	04:46			06:30	08:08		16:24 (9)	09:01		10:46			
17	23:51	21:42			19:39	17:43	16	16:40 (9)	14:48		13:25			
	02:48	04:49			06:33	07:44 (26)	08:11		16:23 (9)	09:05	10:48			
18	23:46	21:38			19:35	6	07:50 (26)	17:40	16	16:39 (9)	14:45	13:24		
	02:52	04:53			06:37	07:43 (26)	08:15		10:47 (14)	09:09	10:50			
19	23:42	21:34			19:32	10	07:53 (26)	17:36	22	16:39 (9)	14:41	13:24		
	02:57	04:56			06:40	07:41 (26)	08:18		10:44 (14)	09:13	10:51			
20	23:37	21:30			19:28	18	18:31 (12)	17:32	25	16:37 (9)	14:38	13:23		
	03:02	05:00			06:43	07:40 (26)	08:22		10:43 (14)	09:17	10:53			
21	23:33	21:26			19:24	23	18:32 (12)	17:28	25	16:36 (9)	14:34	13:23		
	03:02	05:04			06:46	07:40 (26)	08:25		10:41 (14)	09:21	10:54			
22	23:29	21:22			19:20	24	18:33 (12)	17:24	20	16:32 (9)	14:31	13:23		
	03:06	05:07			06:49	07:40 (26)	08:29		10:41 (14)	09:25	10:54			
23	23:24	21:18			19:16	23	18:32 (12)	17:21	19	11:00 (14)	14:27	13:23		
	03:10	05:11		20:07 (5)	06:53	07:40 (26)	08:32		10:40 (14)	09:29	10:55			
24	23:20	21:14	7	20:14 (5)	19:12	22	18:31 (12)	17:17	20	11:00 (14)	14:24	13:24		
	03:15	05:14		20:05 (5)	06:56	07:42 (26)	08:36		10:40 (14)	09:33	10:55			
25	23:16	21:10	10	20:15 (5)	19:08	13	18:27 (12)	17:13	20	11:00 (14)	14:21	13:25		
	03:19	05:17		20:04 (5)	06:59	07:58 (27)	07:39		09:40 (14)	09:37	10:55			
26	23:11	21:06	11	20:15 (5)	19:04	9	18:23 (12)	16:09	27	14:58 (11)	14:17	13:26		
	03:23	05:21		20:03 (5)	07:02	07:56 (27)	07:43		09:40 (14)	09:40	10:55			
27	23:07	21:02	12	20:15 (5)	19:00	13	18:15 (35)	16:05	36	14:59 (11)	14:14	13:27		
	03:28	05:24		20:03 (5)	07:05	07:55 (27)	07:46		09:40 (14)	09:44	10:54			
28	23:03	20:58	11	20:14 (5)	18:57	16	18:15 (35)	16:02	42	14:59 (11)	14:11	13:29		
	03:32	05:28		20:03 (5)	07:09	07:55 (27)	07:50		09:41 (14)	09:48	10:53			
29	22:59	20:54	7	20:10 (5)	18:53	14	18:12 (35)	15:58	46	15:00 (11)	14:08	13:31		
	03:36	05:31		20:03 (5)	07:12	07:55 (27)	07:53		09:42 (14)	09:52	10:52			
30	22:55	20:50	3	20:06 (5)	18:49	9	08:04 (27)	15:54	45	15:00 (11)	14:05	13:33		
	03:40	05:35			07:15	07:55 (27)	07:57		09:42 (14)	09:56	10:51			
31	22:51	20:46			18:45	15	17:44 (10)	15:50	43	14:57 (11)	14:02	13:35		
	03:44	05:38					08:01		09:45 (14)		10:49			
	22:46	20:42					15:47	34	14:53 (11)		13:37			
Potential sun hours	662	525			397		297		176		91			
Total, worst case			212		247		605		177					
Sun reduction			0.35		0.28		0.20		0.10					
Oper. time red.			0.96		0.96		0.96		0.96					
Wind dir. red.			0.59		0.59		0.65		0.68					
Total reduction			0.20		0.16		0.13		0.07					
Total, real			42		40		78		12					

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 9
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** E - Poksamo**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June
1	10:46	09:12	07:28	16:29 (43)	06:28	19:08 (39)
2	13:42	15:37	17:20	16:38 (43)	20:03	19:21 (39)
3	10:44	09:08	07:24	16:29 (43)	06:24	19:09 (39)
4	13:45	15:41	17:23	16:37 (43)	20:07	19:21 (39)
5	10:42	09:05	07:20	16:32 (43)	06:20	19:09 (39)
6	13:48	15:45	17:27	16:35 (43)	20:10	19:19 (39)
7	10:40	09:01	07:16	16:16	06:16	19:11 (39)
8	13:51	15:49	17:30	20:13	19:17 (39)	22:00
9	10:37	08:58	07:12	06:12	04:14	00:18
10	13:54	15:52	17:34	20:17	22:04	00:24
11	10:35	08:54	07:09	06:08	04:10	00:17
12	13:57	15:56	17:37	20:20	22:08	00:30
13	10:33	08:50	07:05	16:59 (1)	06:04	19:38 (38)
14	14:01	16:00	17:40	17:01 (1)	20:23	19:44 (38)
15	10:30	08:47	07:01	16:59 (1)	06:00	19:38 (38)
16	14:04	16:04	17:44	17:05 (1)	20:27	19:47 (38)
17	10:27	08:43	15:14 (44)	17:01 (1)	05:57	19:38 (38)
18	14:08	16:08	15:16 (44)	17:05 (1)	20:30	19:47 (38)
19	10:25	08:39	15:14 (44)	05:53	03:53	19:39 (38)
20	14:11	16:11	15:20 (44)	20:34	22:23	19:44 (38)
21	10:22	08:35	15:15 (44)	05:49	03:49	18:03
22	14:15	16:15	15:24 (44)	20:37	22:27	
23	10:19	08:32	15:16 (44)	17:12 (41)	05:45	04:36 (34)
24	14:19	16:19	15:22 (44)	17:19 (41)	20:40	04:37 (34)
25	10:16	08:28	06:42	17:10 (41)	05:41	04:33 (34)
26	14:22	16:23	18:00	17:22 (41)	20:44	04:39 (34)
27	10:13	08:24	06:38	17:09 (41)	05:37	04:30 (34)
28	14:26	16:26	18:04	17:24 (41)	20:47	04:40 (34)
29	10:10	08:21	06:34	17:08 (41)	05:33	04:29 (34)
30	14:30	16:30	18:07	17:24 (41)	20:51	04:41 (34)
31	10:07	08:17	06:30	17:08 (41)	05:29	04:28 (34)
32	14:34	16:34	18:10	17:23 (41)	20:54	04:42 (34)
33	10:04	08:13	06:26	17:08 (41)	05:25	04:28 (34)
34	14:38	16:37	18:14	17:23 (41)	20:58	04:42 (34)
35	10:00	08:09	15:52 (32)	17:08 (41)	05:21	04:27 (34)
36	14:42	16:41	15:55 (32)	17:22 (41)	21:01	04:42 (34)
37	09:57	08:06	15:52 (32)	17:09 (41)	05:17	04:27 (34)
38	14:46	16:45	16:00 (32)	17:20 (41)	21:05	04:42 (34)
39	09:54	08:02	15:52 (32)	17:11 (41)	05:13	04:27 (34)
40	14:50	16:48	16:03 (32)	17:18 (41)	21:08	04:42 (34)
41	09:50	07:58	15:52 (32)	05:09	03:08	04:27 (34)
42	14:54	16:52	16:01 (32)	21:12	23:09	04:42 (34)
43	09:47	07:54	15:53 (32)	05:05	03:04	04:27 (34)
44	14:57	16:55	16:00 (32)	21:15	23:14	04:42 (34)
45	09:44	07:50	06:03	05:01	03:00	04:28 (34)
46	15:01	16:59	18:34	21:19	23:18	04:42 (34)
47	09:40	07:47	05:59	04:57	02:51	04:29 (34)
48	15:05	17:02	18:37	21:23	23:23	04:41 (34)
49	09:37	07:43	05:55	04:53	02:47	04:29 (34)
50	15:09	17:06	18:40	21:26	23:27	04:40 (34)
51	09:33	07:39	05:51	04:50	02:42	04:30 (34)
52	15:13	17:09	18:43	21:30	23:32	04:40 (34)
53	09:30	07:35	16:28 (43)	04:46	02:38	04:31 (34)
54	15:17	17:13	16:31 (43)	21:34	23:37	04:39 (34)
55	09:26	07:31	16:28 (43)	04:42	02:33	04:33 (34)
56	15:21	17:16	16:35 (43)	21:37	23:41	04:38 (34)
57	09:23		06:40	19:10 (39)	04:38	
58	15:25		19:53	19:15 (39)	21:41	
59	09:19		06:36	19:09 (39)	04:34	
60	15:29		19:57	19:18 (39)	21:45	
61	09:16		06:32	19:08 (39)		
62	15:33		20:00	19:21 (39)	23:56	
Potential sun hours	140	227	362	461	601	698
Total, worst case		71	173	72	193	48
Sun reduction		0.25	0.36	0.44	0.39	0.39
Oper. time red.		0.96	0.96	0.96	0.96	0.96
Wind dir. red.		0.66	0.61	0.59	0.66	0.69
Total reduction		0.16	0.21	0.25	0.25	0.26
Total, real		11	37	18	49	12

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 10
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** E - Poksamo**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	July	August	September	October	November	December
1		03:49	05:41	07:18	17:50 (41)	08:04
2		03:53	05:45	19:38 (38)	17:59 (41)	15:43
3		03:57	05:48	19:36 (38)	17:52 (41)	14:43 (44)
4		04:01	05:51	19:35 (38)	17:56 (41)	15:39
5	01:42	04:05	05:55	19:34 (38)	17:36 (1)	15:32
6	00:49	04:09	05:58	19:40 (38)	17:43 (1)	15:28
7	00:41	04:13	06:01	19:34 (38)	17:35 (1)	15:22
8	02:03	04:16	06:04	19:37 (38)	17:39 (1)	15:25
9	02:09	04:20	06:08	19:05 (39)		15:21
10	02:14	04:24	06:11	19:11 (39)		15:17
11	02:20	04:28	06:14	19:03 (39)		15:14
12	02:25	04:31	06:17	19:12 (39)		15:10
13	02:30	04:35	06:20	19:01 (39)		15:07
14	02:35	04:39	06:24	19:13 (39)		15:04
15	02:40	04:43 (34)	06:27	19:01 (39)		15:01
16	02:44	04:46 (34)	06:30	19:13 (39)		14:58
17	02:49	04:49 (34)	06:33	19:02 (39)		14:55
18	02:54	04:53 (34)	06:36	19:00 (39)		14:52
19	02:58	04:57 (34)	06:40	19:11 (39)		14:49
20	03:03	05:01 (34)	06:43	19:14 (39)		14:46
21	03:07	05:05 (34)	06:46	19:17 (39)		14:43
22	03:11	05:09 (34)	06:50	19:20 (39)		14:40
23	03:15	05:13 (34)	06:53	19:23 (39)		14:37
24	03:19	05:17 (34)	06:57	19:26 (39)		14:34
25	03:23	05:21 (34)	07:00	19:29 (39)		14:31
26	03:27	05:25 (34)	07:04	19:32 (39)		14:28
27	03:31	05:29 (34)	07:07	19:35 (39)		14:25
28	03:35	05:33 (34)	07:11	19:38 (39)		14:22
29	03:39	05:37 (34)	07:14	19:41 (39)		14:19
30	03:43	05:41 (34)	07:18	19:44 (39)		14:16
31	03:47	05:45 (34)	07:21	19:47 (39)		14:13
Potential sun hours	660	525	396	297	176	92
Total, worst case	194		203	112	8	
Sun reduction	0.39		0.28	0.20	0.10	
Oper. time red.	0.96		0.96	0.96	0.96	
Wind dir. red.	0.66		0.60	0.65	0.67	
Total reduction	0.25		0.16	0.13	0.07	
Total, real	49		33	14	1	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 11
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** F - Peilijäkä**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1 472	1 235	617	489	483	8 422

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

	January	February	March	April	May	June
1	10:47	09:13	13:40 (3)	07:28	16:14 (2)	06:28
	13:41	15:37	12 13:52 (3)	17:20	8 16:22 (2)	20:04
2	10:46	09:10	13:39 (3)	07:25	16:17 (2)	06:24
	13:44	15:41	14 13:53 (3)	17:24	3 16:20 (2)	20:07
3	10:44	09:06	13:38 (3)	07:21	06:21	04:22
	13:47	15:45	16 13:54 (3)	17:27	20:11	21:57
4	10:42	09:02	13:38 (3)	07:17	06:17	04:18
	13:50	15:49	16 13:54 (3)	17:31	20:14	22:01
5	10:39	08:59	13:39 (3)	07:13	06:13	04:14
	13:54	15:53	16 13:55 (3)	17:34	20:17	22:05
6	10:37	08:55	13:38 (3)	07:09	06:09	04:10
	13:57	15:56	17 13:55 (3)	17:37	20:21	22:09
7	10:34	08:51	13:38 (3)	07:05	06:05	04:06
	14:00	16:00	17 13:55 (3)	17:41	20:24	22:13
8	10:32	08:48	13:38 (3)	07:02	06:01	04:02
	14:04	16:04	16 13:54 (3)	17:44	20:28	22:17
9	10:29	08:44	13:40 (3)	06:58	05:57	03:58
	14:07	16:08	15 13:55 (3)	17:48	20:31	22:21
10	10:26	08:40	13:40 (3)	06:54	05:53	03:53
	14:11	16:12	13 13:53 (3)	17:51	20:34	22:25
11	10:23	08:36	13:42 (3)	06:50	05:49	03:49
	14:15	16:15	10 13:52 (3)	17:54	20:38	22:29
12	10:20	08:33	13:44 (3)	06:46	05:45	03:45
	14:18	16:19	12 15:09 (4)	17:58	20:41	22:33
13	10:17	08:29	15:01 (4)	06:42	05:41	03:41
	14:22	16:23	11 15:12 (4)	18:01	20:45	22:37
14	10:14	08:25	14:59 (4)	06:38	05:37	03:37
	14:26	16:27	14 15:13 (4)	18:04	20:48	22:41
15	10:11	08:21	14:58 (4)	06:35	05:33	03:33
	14:30	16:30	16 15:14 (4)	18:08	20:52	22:45
16	10:08	08:18	14:58 (4)	06:31	05:29	03:29
	14:34	16:34	17 15:15 (4)	18:11	20:55	22:49
17	10:05	08:14	14:57 (4)	06:27	05:25	03:25
	14:38	16:38	18 15:15 (4)	18:14	20:59	22:54
18	10:02	08:10	14:57 (4)	06:23	05:22	03:20
	14:42	16:41	18 15:15 (4)	18:18	21:02	22:58
19	09:58	08:06	14:57 (4)	06:19	05:18	03:16
	14:46	16:45	18 15:15 (4)	18:21	21:06	23:02
20	09:55	08:03	14:58 (4)	06:15	05:14	03:12
	14:50	16:49	17 15:15 (4)	18:24	21:09	23:07
21	09:52	07:59	14:58 (4)	06:11	05:10	03:08
	14:53	16:52	15 15:13 (4)	18:28	21:13	23:11
22	09:48	07:55	14:59 (4)	06:07	05:06	03:04
	14:57	16:56	13 15:12 (4)	18:31	21:16	23:15
23	09:45	07:51	15:01 (4)	06:03	05:02	02:55
	15:01	16:59	10 15:11 (4)	18:34	21:20	23:20
24	09:41	07:47	16:16 (2)	06:00	04:58	02:51
	15:05	17:03	4 16:20 (2)	18:38	21:24	23:24
25	09:38	07:44	16:15 (2)	05:56	04:54	02:46
	15:09	17:06	9 16:24 (2)	18:41	21:27	23:29
26	09:35	07:40	16:13 (2)	05:52	04:50	02:42
	15:13	17:10	10 16:23 (2)	18:44	21:31	23:34
27	09:31	07:36	16:13 (2)	05:48	04:46	02:37
	15:17	17:13	10 16:23 (2)	18:47	21:35	23:38
28	09:27	07:32	16:13 (2)	05:44	04:42	02:33
	15:21	17:17	10 16:23 (2)	18:51	21:38	23:43
29	09:24		06:40		04:38	02:28
	15:25		19:54		21:42	23:48
30	09:20		06:36		04:34	02:23
	15:29		19:57		21:46	23:53
31	09:17	13:41 (3)	06:32			02:19
	15:33	9 13:50 (3)	20:01			23:58
Potential sun hours	139	226	362	461	601	704
Total, worst case	9	384	11	97	125	
Sun reduction	0.11	0.25	0.36	0.44	0.39	
Oper. time red.	0.96	0.96	0.96	0.96	0.96	
Wind dir. red.	0.68	0.68	0.66	0.63	0.65	
Total reduction	0.07	0.16	0.23	0.27	0.25	
Total, real	1	63	3	26	31	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 12
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** F - Peilijäkä**Assumptions for shadow calculations**

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0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1 472	1 235	617	489	483	8 422

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

	July	August	September	October	November	December
1		03:49	05:42	07:19	08:05	13:10 (3)
		22:43	20:39	18:42	15:43	14 13:24 (3)
2		03:53	05:45	07:22	08:08	13:09 (3)
		22:39	20:35	18:38	15:40	15 13:24 (3)
3		03:57	05:48	07:25	08:12	13:09 (3)
		22:34	20:31	18:34	15:36	16 13:25 (3)
4		04:01	05:26 (7)	05:52	07:28	08:16
		22:30	05:29 (7)	20:27	18:30	15:32
5	01:37	04:05	05:24 (7)	05:55	07:32	08:20
	00:54	22:26	05:31 (7)	20:23	18:26	15:29
6	01:47	04:09	05:23 (7)	05:58	07:35	08:23
	00:45	22:22	05:45 (37)	20:19	18:22	15:25
7	01:54	04:13	05:23 (7)	06:02	07:38	08:27
	00:38	22:18	05:48 (37)	20:15	18:18	15:21
8	02:01	04:16	05:23 (7)	06:05	07:42	08:31
	00:32	22:14	05:49 (37)	20:11	18:15	15:18
9	02:07	04:20	05:23 (7)	06:08	07:45	08:35
	00:26	22:10	05:49 (37)	20:07	18:11	15:14
10	02:13	04:24	05:23 (7)	06:11	07:48	08:38
	00:20	22:06	05:49 (37)	20:03	18:07	15:10
11	02:18	04:28	05:24 (7)	06:15	07:52	08:42
	00:15	22:02	05:49 (37)	19:59	18:03	15:07
12	02:24	04:32	05:37 (37)	06:18	07:55	8 13:21 (3)
	00:10	21:58	05:48 (37)	19:55	17:59	16:48 (2)
13	02:29	04:35	05:37 (37)	06:21	07:58	16:54 (2)
	00:05	21:54	05:48 (37)	19:52	17:55	16:47 (2)
14	02:34	04:39	05:37 (37)	06:24	08:02	16:56 (2)
	00:00	21:50	05:46 (37)	19:48	17:52	16:45 (2)
15	02:39	04:43	05:40 (37)	06:27	08:05	16:45 (2)
	23:56	21:46	05:45 (37)	19:44	17:48	16:45 (2)
16	02:44	04:46		06:31	08:08	16:46 (2)
	23:51	21:42		19:40	17:44	16:46 (2)
17	02:48	04:50		06:34	08:12	16:47 (2)
	23:46	21:38		19:36	17:40	16:55 (2)
18	02:53	04:53		06:37	08:15	15:35 (4)
	23:42	21:34		19:32	17:36	16:51 (2)
19	02:58	04:57		06:40	08:19	15:31 (4)
	23:37	21:30		19:28	17:32	15:42 (4)
20	03:02	05:01	06:14 (35)	06:43	08:22	15:29 (4)
	23:33	21:26	06:20 (35)	19:24	17:29	15:43 (4)
21	03:02	05:04	06:12 (35)	06:47	08:25	15:28 (4)
	23:29	21:22	06:21 (35)	19:20	17:25	15:44 (4)
22	03:07	05:08	06:11 (35)	06:50	08:29	15:28 (4)
	23:24	21:18	06:22 (35)	19:16	17:21	15:45 (4)
23	03:11	05:11	06:11 (35)	06:53	08:32	15:27 (4)
	23:20	21:14	06:22 (35)	19:13	17:17	15:45 (4)
24	03:16	05:15	06:11 (35)	06:56	08:36	15:27 (4)
	23:16	21:10	06:22 (35)	19:09	17:13	15:45 (4)
25	03:20	05:18	06:12 (35)	06:59	07:39	14:27 (4)
	23:12	21:06	06:21 (35)	19:05	16:10	14:44 (4)
26	03:24	05:21	06:12 (35)	07:03	07:43	14:27 (4)
	23:07	21:02	06:20 (35)	19:01	16:06	14:44 (4)
27	03:28	05:25	06:14 (35)	07:06	07:47	14:28 (4)
	23:03	20:58	06:17 (35)	18:57	16:02	14:44 (4)
28	03:33	05:28		07:09	07:50	14:29 (4)
	22:59	20:54		18:53	15:58	14:43 (4)
29	03:37	05:32		07:12	07:54	14:30 (4)
	22:55	20:50		18:49	15:55	14:41 (4)
30	03:41	05:35		07:16	07:57	13:14 (3)
	22:51	20:46		18:45	15:51	14:38 (4)
31	03:45	05:38			08:01	13:11 (3)
	22:47	20:43			15:47	13:22 (3)
Potential sun hours	661	525	396	297	176	91
Total, worst case		226		252	159	
Sun reduction		0.35		0.20	0.10	
Oper. time red.		0.96		0.96	0.96	
Wind dir. red.		0.64		0.67	0.68	
Total reduction		0.22		0.13	0.07	
Total, real		49		33	11	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 13
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** G - Pyytölampi**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June
1	10:46	09:12	13:38 (31)	07:28	16:31 (25)	06:28
2	13:41	15:36	13:57 (31)	17:20	16:39 (25)	20:03
3	10:44	09:09	13:39 (31)	07:24	16:31 (25)	06:24
4	13:44	15:40	13:57 (31)	17:23	16:41 (25)	20:07
5	10:42	09:05	13:39 (31)	07:20	16:32 (25)	06:20
6	13:47	15:44	13:56 (31)	17:27	16:40 (25)	20:10
7	10:40	09:01	13:40 (31)	07:16	16:34 (25)	06:16
8	13:50	15:48	13:56 (31)	17:30	16:38 (25)	20:13
9	10:38	08:58	13:42 (31)	07:12	16:12	06:12
10	13:53	15:52	13:56 (31)	17:33	20:17	25
11	10:36	08:54	13:43 (31)	07:08	19:10 (22)	04:09
12	13:57	15:56	13:54 (31)	17:37	20:20	24
13	10:33	08:50	13:45 (31)	07:05	19:10 (22)	04:05
14	14:00	16:00	15:06 (30)	17:40	20:23	23
15	10:31	08:47	14:57 (30)	07:01	19:12 (22)	04:01
16	14:03	16:03	15:10 (30)	17:44	20:27	19
17	10:28	08:43	14:57 (30)	06:57	19:27 (21)	03:57
18	14:07	16:07	15:12 (30)	17:47	20:30	7
19	10:25	08:39	14:56 (30)	06:53	19:34 (21)	22:20
20	14:11	16:11	15:12 (30)	17:50	20:34	22:24
21	10:22	08:36	14:56 (30)	06:49	17:10 (23)	05:48
22	14:14	16:15	15:13 (30)	17:54	17:15 (23)	20:37
23	10:19	08:32	14:55 (30)	06:45	17:08 (23)	05:45
24	14:18	16:19	15:13 (30)	17:57	17:17 (23)	20:40
25	10:16	08:28	14:55 (30)	06:41	17:06 (23)	05:41
26	14:22	16:22	15:13 (30)	18:00	17:18 (23)	20:44
27	10:13	08:24	14:56 (30)	06:38	17:06 (23)	05:37
28	14:26	16:26	15:13 (30)	18:04	17:18 (23)	20:47
29	10:10	08:21	14:56 (30)	06:34	17:05 (23)	05:33
30	14:29	16:30	15:42 (36)	18:07	17:18 (23)	20:51
31	10:07	08:17	14:57 (30)	06:30	17:05 (23)	05:29
32	14:33	16:33	15:47 (36)	18:10	17:17 (23)	20:54
33	10:04	08:13	14:57 (30)	06:26	17:06 (23)	05:25
34	14:37	16:37	15:50 (36)	18:14	17:16 (23)	20:58
35	10:01	12:25 (34)	08:09	14:59 (30)	17:08 (23)	05:21
36	14:41	16:41	15:51 (36)	18:17	17:14 (23)	21:01
37	09:57	12:25 (34)	08:06	15:36 (36)	16:18	05:17
38	14:45	16:45	15:51 (36)	18:20	17:05 (23)	05:29
39	09:54	12:25 (34)	08:02	15:37 (36)	16:14	05:13
40	14:49	16:49	15:51 (36)	18:24	17:08 (23)	05:25
41	09:51	12:25 (34)	07:58	15:37 (36)	16:11	05:09
42	14:53	16:53	15:49 (36)	18:27	17:12	21:12
43	09:47	12:26 (34)	07:54	15:38 (36)	16:07	05:05
44	14:57	16:57	15:51 (36)	18:30	17:15	21:15
45	09:44	12:27 (34)	07:50	15:41 (36)	16:03	05:01
46	15:01	17:01	16:16 (24)	18:33	17:53 (50)	05:01
47	09:40	12:27 (34)	07:47	16:06 (24)	18:33	2
48	15:05	17:05	16:18 (24)	18:37	17:52 (50)	04:57
49	09:37	12:28 (34)	07:43	16:06 (24)	18:37	6
50	15:09	17:09	16:18 (24)	18:40	17:51 (50)	04:53
51	09:34	12:30 (34)	07:39	16:07 (24)	18:40	9
52	15:13	17:13	16:18 (24)	18:43	17:51 (50)	04:49
53	09:30	12:32 (34)	07:35	16:07 (24)	18:43	9
54	15:17	17:17	16:16 (24)	18:47	17:52 (50)	04:45
55	09:26	13:38 (31)	07:31	16:09 (24)	18:47	7
56	15:21	17:21	16:35 (25)	18:50	17:59 (50)	21:34
57	09:23	13:38 (31)	07:27	16:05	18:47	11
58	15:25	17:25	16:39	18:54	18:47	20:47
59	09:19	13:38 (31)	07:23	16:01	18:41	12
60	15:29	17:29	16:43	18:57	18:39	20:47
61	09:16	13:38 (31)	07:19	15:57	18:37	11
62	15:33	17:33	16:47	19:07	18:35	20:47
63	Potential sun hours	139	226	362	461	601
64	Total, worst case	247	442	147	216	67
65	Sun reduction	0.11	0.25	0.36	0.44	0.39
66	Oper. time red.	0.96	0.96	0.96	0.96	0.96
67	Wind dir. red.	0.68	0.67	0.62	0.59	0.59
68	Total reduction	0.07	0.17	0.22	0.26	0.23
69	Total, real	18	73	33	55	15

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 14
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** G - Pyytölampi**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	July	August	September	October	November	December
1		03:48	05:41	07:18	17:46 (23)	08:04
		22:42	20:38	18:41	17:56 (23)	15:43
2		03:52	05:44	07:21	17:48 (23)	08:08
		22:38	20:34	18:37	17:55 (23)	15:39
3		03:56	05:48	19:25 (21)	07:24	08:11
		22:33	20:30	19:32 (21)	18:33	15:35
4		04:00	05:51	19:09 (22)	07:28	08:15
		22:29	20:26	19:33 (21)	18:29	15:32
5	01:39	04:04	05:54	19:07 (22)	07:31	08:19
	00:51	22:25	20:22	19:33 (21)	18:25	15:28
6	01:47	04:08	05:58	19:06 (22)	07:34	08:22
	00:43	22:21	20:18	19:33 (21)	18:22	15:24
7	01:55	04:12	06:01	19:05 (22)	07:37	08:26
	00:36	22:17	20:14	19:32 (21)	18:18	15:21
8	02:01	04:16	06:04	19:05 (22)	07:41	08:30
	00:30	22:13	20:10	19:29 (21)	18:14	15:17
9	02:07	04:20	06:07	19:04 (22)	07:44	08:34
	00:24	22:09	20:06	19:25 (21)	18:10	15:13
10	02:13	04:24	20:49 (17)	06:11	19:05 (22)	07:47
	00:19	22:05	20:50 (17)	20:02	19:17 (22)	18:06
11	02:18	04:27	20:45 (17)	06:14	19:05 (22)	07:51
	00:13	22:01	20:53 (17)	19:59	19:15 (22)	18:02
12	02:24	04:31	20:45 (17)	06:17	19:07 (22)	07:54
	00:08	21:57	20:55 (17)	19:55	19:13 (22)	17:58
13	02:29	04:35	20:44 (17)	06:20	19:07 (22)	07:57
	00:04	21:53	20:55 (17)	19:51	17:55	17:04 (25)
14	02:34	04:38	20:43 (17)	06:23	17:55	17:10 (25)
	23:59	21:49	20:55 (17)	19:47	17:51	16:41 (24)
15	02:39	04:42	20:43 (17)	06:27	17:51	16:41 (24)
	23:54	21:45	20:55 (17)	19:43	16:39 (24)	15:57
16	02:44	04:46	20:43 (17)	06:30	17:47	16:49 (24)
	23:50	21:41	20:53 (17)	19:39	16:38 (24)	15:52
17	02:48	04:49	20:43 (17)	06:33	17:43	16:38 (24)
	23:45	21:37	20:50 (17)	19:35	16:38 (24)	15:52
18	02:53	04:53	20:44 (17)	06:36	17:39	16:38 (24)
	23:41	21:33	20:46 (17)	19:31	16:38 (24)	15:52
19	02:57	04:56	06:39	18:38 (50)	17:36	16:38 (24)
	23:36	21:29	19:27	18:46 (50)	17:32	16:10 (36)
20	03:02	05:00	06:43	18:39 (50)	17:28	16:45 (24)
	23:32	21:25	19:23	18:43 (50)	17:28	16:08 (36)
21	03:02	05:03	06:46	18:43 (50)	17:28	16:08 (36)
	23:28	21:21	19:20	18:43 (50)	17:28	16:07 (36)
22	03:06	05:07	06:49	18:43 (50)	17:28	16:07 (36)
	23:23	21:17	19:16	18:43 (50)	17:28	16:06 (36)
23	03:11	05:10	06:52	18:43 (50)	17:28	16:06 (36)
	23:19	21:13	19:12	18:43 (50)	17:28	16:06 (36)
24	03:15	21:49 (16)	05:14	18:43 (50)	17:28	16:06 (36)
	23:15	21:55 (16)	21:09	18:43 (50)	17:28	16:06 (36)
25	03:19	21:48 (16)	05:17	18:43 (50)	17:28	16:06 (36)
	23:11	21:56 (16)	21:05	18:43 (50)	17:28	16:06 (36)
26	03:24	21:48 (16)	05:21	18:43 (50)	17:28	16:06 (36)
	23:06	21:57 (16)	21:01	18:43 (50)	17:28	16:06 (36)
27	03:28	21:47 (16)	05:24	18:43 (50)	17:28	16:06 (36)
	23:02	21:57 (16)	20:57	18:43 (50)	17:28	16:06 (36)
28	03:32	21:47 (16)	05:28	18:43 (50)	17:28	16:06 (36)
	22:58	21:56 (16)	20:54	18:43 (50)	17:28	16:06 (36)
29	03:36	21:47 (16)	05:31	18:43 (50)	17:28	16:06 (36)
	22:54	21:53 (16)	20:50	18:43 (50)	17:28	16:06 (36)
30	03:40	21:47 (16)	05:34	18:43 (50)	17:28	16:06 (36)
	22:50	21:50 (16)	20:46	18:43 (50)	17:28	16:06 (36)
31	03:44	05:38		18:43 (50)	17:28	16:06 (36)
	22:46	20:42		18:43 (50)	17:28	16:06 (36)
Potential sun hours	660	525	396	297	176	91
Total, worst case	51	74	260	347	396	
Sun reduction	0.39	0.35	0.28	0.20	0.10	
Oper. time red.	0.96	0.96	0.96	0.96	0.96	
Wind dir. red.	0.59	0.59	0.60	0.67	0.68	
Total reduction	0.23	0.20	0.17	0.13	0.07	
Total, real	12	15	43	46	27	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 15
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** H - Tie 81**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June
1	10:46	09:13	07:28	06:28	08:00 (48)	04:30
2	13:43	15:37	17:20	20:04	18:53 (46)	21:49
3	10:44	09:09	07:24	06:24	07:59 (48)	04:26
4	13:45	15:41	17:24	20:07	18:57 (46)	21:53
5	10:42	09:05	07:20	06:21	07:58 (48)	04:22
6	13:48	15:45	17:27	20:10	19:00 (46)	21:57
7	10:40	09:02	07:17	06:17	07:58 (48)	04:18
8	13:51	15:49	17:31	20:14	19:01 (46)	22:00
9	10:38	08:58	07:13	06:13	07:58 (48)	04:14
10	13:55	15:53	17:34	20:17	19:03 (46)	22:04
11	10:36	08:54	07:09	06:09	06:44 (38)	04:10
12	13:58	15:57	17:37	20:21	19:04 (46)	22:08
13	10:33	08:51	07:05	06:05	06:40 (38)	04:06
14	14:01	16:01	17:41	07:43 (1)	19:05 (46)	22:12
15	10:31	08:47	07:01	06:01	06:36 (38)	04:02
16	14:05	16:04	17:44	07:44 (1)	19:43 (45)	22:16
17	10:28	08:43	06:57	06:34 (1)	06:37 (38)	03:58
18	14:08	16:08	17:48	07:44 (1)	19:48 (45)	22:20
19	10:25	08:40	06:54	06:34 (1)	06:38 (38)	03:54
20	14:12	16:12	17:51	07:43 (1)	19:50 (45)	22:24
21	10:22	08:36	06:50	07:28 (47)	05:49	03:50
22	14:15	16:16	17:54	07:42 (1)	19:51 (45)	22:28
23	10:19	08:32	06:46	07:25 (47)	05:45	03:46
24	14:19	16:19	17:58	07:40 (1)	19:52 (45)	22:32
25	10:16	08:29	06:42	07:23 (47)	05:41	03:42
26	14:23	16:23	18:01	07:40 (47)	20:44	22:36
27	10:13	08:25	06:38	07:22 (47)	05:37	03:38
28	14:27	16:27	18:04	07:40 (47)	20:48	22:40
29	10:10	08:21	06:34	07:21 (47)	05:33	03:33
30	14:31	16:30	18:08	07:40 (47)	20:51	22:44
31	10:07	08:17	06:30	07:20 (47)	05:30	03:29
32	14:34	16:34	18:11	07:40 (47)	20:55	22:48
33	10:04	08:14	06:27	07:20 (47)	05:26	03:25
34	14:38	16:38	18:14	07:40 (47)	20:58	22:53
35	10:01	08:10	06:23	07:20 (47)	05:22	03:21
36	14:42	16:41	18:18	07:40 (47)	21:02	22:57
37	09:58	08:06	06:19	07:20 (47)	05:18	03:17
38	14:46	16:45	18:21	07:39 (47)	21:05	23:01
39	09:54	08:02	06:15	07:20 (47)	05:14	03:13
40	14:50	16:49	18:24	07:38 (47)	21:09	23:05
41	09:51	07:58	06:11	07:22 (47)	05:10	03:09
42	14:54	16:52	18:27	07:37 (47)	21:12	23:10
43	09:48	07:55	06:07	07:24 (47)	05:06	03:04
44	14:58	16:56	18:31	07:35 (47)	21:16	23:14
45	09:44	07:51	06:03	07:27 (47)	05:02	03:00
46	15:02	16:59	18:34	07:30 (47)	21:19	23:19
47	09:41	07:47	05:59		04:58	02:52
48	15:06	17:03	18:37		21:23	23:23
49	09:37	07:43	05:56	07:13 (48)	04:54	02:47
50	15:10	17:06	18:41	07:25 (48)	21:27	23:28
51	09:34	07:40	05:52	07:09 (48)	04:50	02:43
52	15:14	17:10	18:44	07:28 (48)	21:30	23:32
53	09:30	07:36	05:48	07:07 (48)	04:46	02:38
54	15:18	17:13	18:47	07:30 (48)	21:34	23:37
55	09:27	07:32	05:44	07:04 (48)	04:42	02:34
56	15:22	17:17	18:51	07:31 (48)	21:38	23:42
57	09:23		06:40	08:03 (48)	04:38	02:29
58	15:26		19:54	08:32 (48)	21:41	23:47
59	09:20		06:36	08:02 (48)	04:34	02:25
60	15:30		19:57	08:33 (48)	21:45	23:51
61	09:16		06:32	08:01 (48)		02:20
62	15:33		20:00	08:33 (48)		23:57
Potential sun hours	140	227	362	461	601	704
Total, worst case			410	2085	103	
Sun reduction			0.36	0.44	0.39	
Oper. time red.			0.96	0.96	0.96	
Wind dir. red.			0.57	0.59	0.60	
Total reduction			0.20	0.25	0.23	
Total, real			82	522	24	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 16
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar**Calculation:** Posio Murtotuuli**Shadow receptor:** H - Tie 81**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	July	August	September	October	November	December
1		03:49	05:42	07:58 (48)	07:19	08:04 (47)
2		22:42	20:38	19:50 (45)	18:41	15:44
3		03:53	05:45	06:36 (38)	07:22	08:05 (47)
4		22:38	20:34	19:48 (45)	18:38	15:40
5		03:57	05:48	06:34 (38)	07:25	08:08 (47)
6		22:34	20:30	19:45 (45)	18:34	15:36
7		04:01	05:52	06:33 (38)	07:28	08:12 (1)
8		22:30	20:26	19:40 (45)	18:30	15:33
9	01:42	04:05	05:55	06:37 (38)	07:32	08:12 (1)
10	00:49	22:26	20:23	19:02 (46)	18:26	15:29
11	01:50	04:09	05:58	06:40 (38)	07:35	08:16 (1)
12	00:41	22:22	20:19	19:01 (46)	18:22	15:25
13	01:57	04:13	06:02	07:53 (48)	07:38	08:27
14	00:35	22:17	20:15	18:59 (46)	18:18	15:22
15	02:03	04:17	18:45 (46)	06:05	07:53 (48)	07:41
16	00:29	22:13	18:56 (46)	20:11	18:57 (46)	18:14
17	02:09	04:21	18:41 (46)	06:08	07:53 (48)	07:45
18	00:23	22:09	18:59 (46)	20:07	18:54 (46)	18:11
19	02:15	04:24	18:38 (46)	06:11	07:52 (48)	07:48
20	00:18	22:05	19:01 (46)	20:03	18:51 (46)	18:07
21	02:20	04:28	18:35 (46)	06:15	07:52 (48)	07:51
22	00:13	22:01	19:03 (46)	19:59	18:46 (46)	18:03
23	02:25	04:32	18:33 (46)	06:18	07:52 (48)	07:55
24	00:08	21:57	19:04 (46)	19:55	08:25 (48)	17:59
25	02:30	04:36	18:31 (46)	06:21	07:53 (48)	07:58
26	00:03	21:53	19:06 (46)	19:51	08:24 (48)	17:55
27	02:35	04:39	18:31 (46)	06:24	07:53 (48)	08:01
28	23:59	21:49	19:07 (46)	19:47	08:22 (48)	17:52
29	02:40	04:43	18:29 (46)	06:27	07:54 (48)	08:05
30	23:54	21:45	19:08 (46)	19:43	08:21 (48)	17:48
31	02:45	04:46	18:28 (46)	06:31	07:56 (48)	08:08
32	23:49	21:41	19:09 (46)	19:40	08:20 (48)	17:44
33	02:50	04:50	18:27 (46)	06:34	07:57 (48)	08:11
34	23:45	21:37	19:46 (45)	19:36	08:17 (48)	17:40
35	02:54	04:54	18:25 (46)	06:37	08:00 (48)	08:15
36	23:41	21:34	19:50 (45)	19:32	08:14 (48)	17:36
37	02:59	04:57	18:24 (46)	06:40		08:18
38	23:36	21:30	19:52 (45)	19:28		17:32
39	03:03	05:01	18:23 (46)	06:43		08:22
40	23:32	21:26	19:53 (45)	19:24		17:29
41	03:03	05:04	18:23 (46)	06:47	08:09 (47)	08:25
42	23:28	21:22	19:54 (45)	19:20	08:19 (47)	17:25
43	03:08	05:08	18:22 (46)	06:50	08:07 (47)	08:29
44	23:23	21:18	19:54 (45)	19:16	08:21 (47)	17:21
45	03:12	05:11	18:21 (46)	06:53	08:06 (47)	08:32
46	23:19	21:14	19:55 (45)	19:12	08:22 (47)	17:17
47	03:16	05:15	18:21 (46)	06:56	08:04 (47)	08:36
48	23:15	21:10	19:56 (45)	19:08	08:23 (47)	17:14
49	03:21	05:18	18:21 (46)	06:59	08:03 (47)	07:39
50	23:11	21:06	19:56 (45)	19:05	08:23 (47)	16:10
51	03:25	05:22	18:21 (46)	07:03	08:02 (47)	07:43
52	23:07	21:02	19:55 (45)	19:01	08:22 (47)	16:06
53	03:29	05:25	08:12 (48)	07:06	08:03 (47)	07:46
54	23:02	20:58	19:55 (45)	18:57	08:23 (47)	16:02
55	03:33	05:28	08:06 (48)	07:09	08:02 (47)	07:50
56	22:58	20:54	19:54 (45)	18:53	08:22 (47)	15:59
57	03:37	05:32	08:03 (48)	07:12	08:02 (47)	07:53
58	22:54	20:50	19:54 (45)	18:49	08:21 (47)	15:55
59	03:41	05:35	08:01 (48)	07:15	08:02 (47)	07:57
60	22:50	20:46	19:53 (45)	18:45	08:19 (47)	15:51
61	03:45	05:38	07:59 (48)			08:01
62	22:46	20:42	19:51 (45)			15:47
Potential sun hours	660	525	396		297	176
Total, worst case		1377	1187		65	92
Sun reduction		0.35	0.28		0.20	
Oper. time red.		0.96	0.96		0.96	
Wind dir. red.		0.60	0.58		0.57	
Total reduction		0.20	0.16		0.11	
Total, real		273	187		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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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12.12.2012 9:17 / 17

Licensed user:

Pöyry Finland Oy

P.O. Box 93

FI-02151 Espoo

+358 10 33 24271

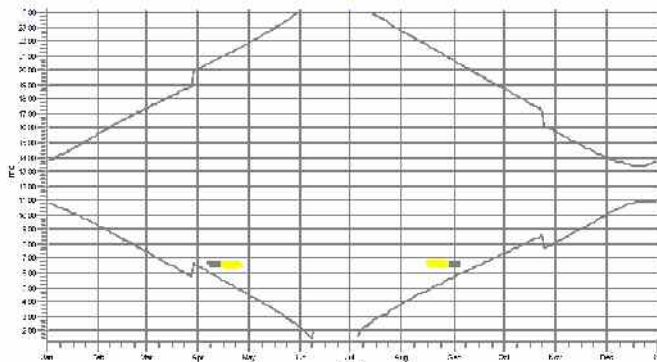
Atte Lohman / atte.lohman@poyry.com

Calculated:

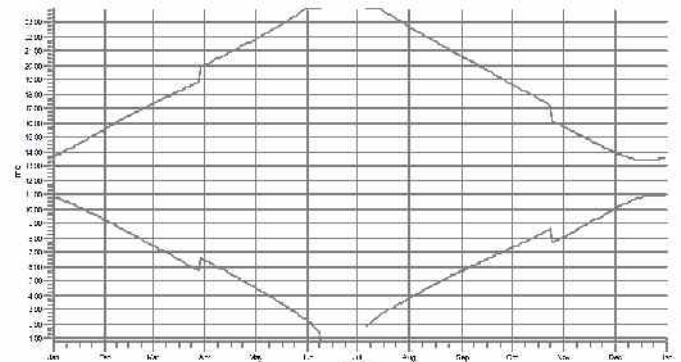
12.12.2012 3:42/2.8.563

SHADOW - Calendar, graphical**Calculation:** Posio Murtotuuli

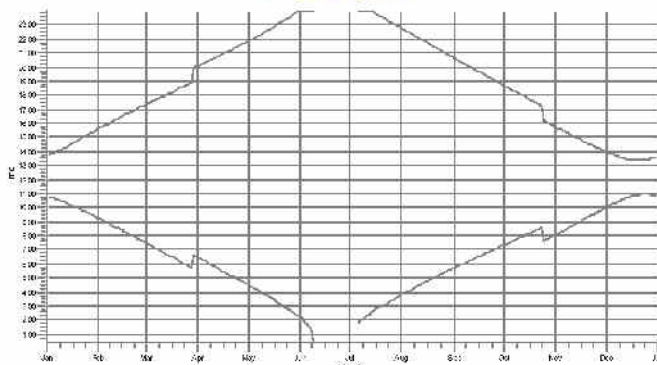
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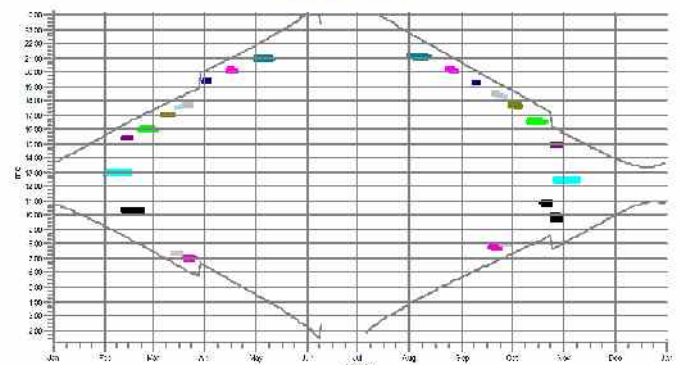
B: Suorsa



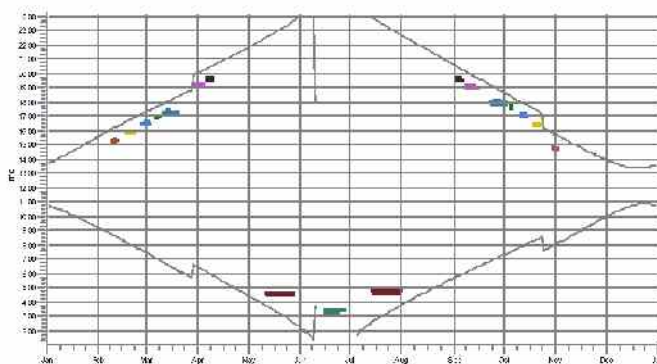
C: Ala-Outojärvi



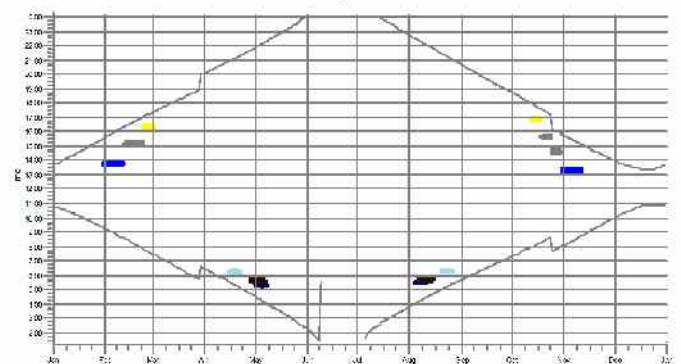
D: Lemmonlammit



E: Poksamo



F: Peilijärkä



WTGs

1: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (1)	9: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (9)	27: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (27)	39: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (39)
2: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (2)	10: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (10)	31: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (31)	41: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (41)
3: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (3)	11: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (11)	32: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (32)	43: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (43)
4: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (4)	12: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (12)	34: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (34)	44: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (44)
5: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (5)	13: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (13)	35: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (35)	
6: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (6)	14: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (14)	37: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (37)	
7: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (7)	26: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (26)	38: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (38)	

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

Printed/ Page

12.12.2012 9:17 / 18

Licensed user:

Pöyry Finland Oy

P.O. Box 93

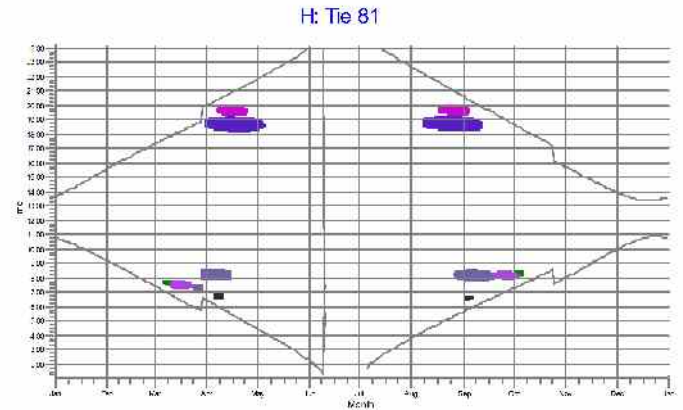
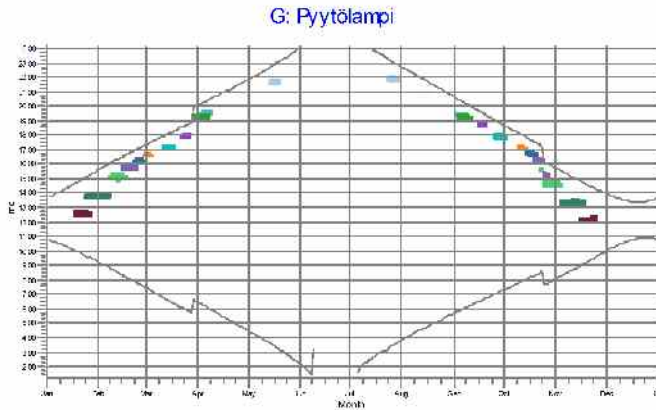
FI-02151 Espoo

+358 10 33 24271

Atte Lohman / atte.lohman@poyry.com

Calculated:

12.12.2012 3:42/2.8.563

SHADOW - Calendar, graphical**Calculation:** Posio Murtotuuli

WTGs

1: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (1)	23: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (23)	34: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (34)	47: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (47)
16: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (16)	24: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (24)	36: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (36)	48: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (48)
17: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (17)	25: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (25)	38: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (38)	50: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (50)
21: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (21)	30: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (30)	45: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (45)	
22: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (22)	31: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (31)	46: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (46)	

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 19
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 1 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (1)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:43	09:12 15:37	07:28 17:20	06:28 20:04	04:30 21:49	02:15 00:01		03:49 22:41	05:42 20:38	07:18 18:41	08:04 15:43	09:58 14:00
2	10:44 13:45	09:09 15:41	07:24 17:24	06:24 20:07	04:26 21:52	02:10 00:06		03:53 22:37	05:45 20:34	07:22 18:37	08:14-08:20/6 15:40	10:02 13:57
3	10:42 13:48	09:05 15:45	07:20 17:27	06:20 20:10	04:22 21:56	02:05 00:12		03:57 22:33	05:48 20:30	07:25 18:33	08:12-08:21/9 15:36	10:06 13:54
4	10:40 13:51	09:01 15:49	07:16 17:30	06:16 20:14	04:18 22:00	02:00 00:18		04:01 22:29	05:52 20:26	07:28 18:30	08:12-08:22/10 15:32	10:09 13:51
5	10:37 13:54	08:58 15:53	07:13 17:34	06:13 20:17	04:14 22:04	01:54 00:24	01:43 00:48	04:05 22:25	05:55 20:22	07:31 18:26	08:12-08:21/9 15:29	10:13 13:49
6	10:35 13:58	08:54 15:57	07:09 17:37	06:09 20:20	04:10 22:08	01:48 00:30	01:50 00:41	04:09 22:21	05:58 20:18	07:35 18:22	08:16-08:20/4 15:25	10:16 13:46
7	10:33 14:01	08:50 16:00	07:05 17:41	06:05 20:24	04:06 22:12	01:41 00:37	01:57 00:34	04:13 22:17	06:01 20:14	07:38 18:18		10:20 13:44
8	10:30 14:05	08:47 16:04	07:01 17:44	06:01 20:27	04:02 22:16	01:33 00:46	02:04 00:28	04:17 22:13	06:05 20:11	07:41 18:14		10:23 13:41
9	10:27 14:08	08:43 16:08	06:57 17:47	05:57 20:30	07:34-07:44/10 17:01-17:05/4	01:21 00:58	02:09 00:23	04:21 22:09	06:08 20:07	07:44 18:10		10:26 13:39
10	10:25 14:12	08:39 16:12	06:53 17:51	05:53 20:34	07:34-07:43/9 22:24	01:40 00:41	02:15 00:17	04:24 22:05	06:11 20:03	07:48 18:07		10:29 13:37
11	10:22 14:15	08:36 16:15	06:50 17:54	05:49 20:37	07:34-07:42/8 22:28	03:50 22:28	02:20 00:12	04:28 22:01	06:14 19:59	07:51 18:03		10:32 13:35
12	10:19 14:19	08:32 16:19	06:46 17:57	05:45 20:41	07:36-07:40/4 22:32	03:46 22:32	02:25 00:07	04:32 21:57	06:18 19:55	07:54 17:59		10:35 13:33
13	10:16 14:23	08:28 16:23	06:42 18:01	05:41 20:44	03:42 22:36	03:42 22:36	02:30 00:03	04:35 21:53	06:21 19:51	07:58 17:55		10:37 13:31
14	10:13 14:27	08:25 16:27	06:38 18:04	05:37 20:47	03:37 22:40	03:37 22:40	02:35 23:58	04:39 21:49	06:24 19:47	08:01 17:51		10:40 13:30
15	10:10 14:30	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44	03:33 22:44	02:40 23:53	04:43 21:45	06:27 19:43	08:04 17:48		10:42 13:28
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:54	03:29 22:48	03:29 22:48	02:45 23:49	04:46 21:41	06:30 19:39	08:08 17:44		10:44 13:27
17	10:04 14:38	08:13 16:38	06:26 18:14	05:25 20:58	03:25 22:52	03:25 22:52	02:50 23:45	04:50 21:37	06:34 19:35	08:11 17:40		10:46 13:26
18	10:00 14:42	08:10 16:41	06:23 18:17	05:21 21:01	03:21 22:57	03:21 22:57	02:54 23:40	04:53 21:33	06:37 19:32	08:14 17:36		10:48 13:26
19	09:57 14:46	08:06 16:45	06:19 18:21	05:18 21:05	03:17 23:01	03:17 23:01	02:59 23:36	04:57 21:29	06:40 19:28	08:18 17:32		10:49 13:25
20	09:54 14:50	08:02 16:48	06:15 18:24	05:14 21:08	03:13 23:05	03:13 23:05	03:03 23:31	05:01 21:25	06:43 19:24	08:21 17:29		10:50 13:25
21	09:51 14:54	07:58 16:52	06:11 18:27	05:10 21:12	03:08 23:09	03:08 23:09	03:03 23:27	05:04 21:21	06:46 19:20	08:25 17:25		10:51 13:25
22	09:47 14:58	07:54 16:56	06:07 18:31	05:06 21:16	03:04 23:14	03:04 23:14	03:08 23:23	05:08 21:17	06:49 19:16	08:28 17:21		10:52 13:26
23	09:44 15:02	07:51 16:59	06:03 18:34	05:02 21:19	03:00 23:18	03:00 23:18	03:12 23:19	05:11 21:13	06:53 19:12	08:32 17:17		10:53 13:26
24	09:40 15:06	07:47 17:03	05:59 18:37	04:58 21:23	02:51 23:23	02:51 23:23	03:16 23:14	05:15 21:09	06:56 19:08	08:35 17:13		10:56 13:27
25	09:37 15:10	07:43 17:06	05:55 18:40	04:54 21:26	02:47 23:27	02:47 23:27	03:20 23:10	05:18 21:06	06:59 19:04	07:39 16:10		10:58 13:28
26	09:33 15:14	07:39 17:10	05:51 18:44	04:50 21:30	02:43 23:32	02:43 23:32	03:25 23:06	05:21 21:02	07:02 19:01	07:42 16:06		10:52 13:29
27	09:30 15:18	07:35 17:13	05:48 18:47	04:46 21:34	02:38 23:37	02:38 23:37	03:29 23:02	05:25 20:58	07:05 18:57	07:46 16:02		10:52 13:31
28	09:26 15:22	07:32 17:17	05:44 18:50	04:42 21:37	02:34 23:41	02:34 23:41	03:33 22:58	05:28 20:54	07:09 18:53	07:49 15:58		10:51 13:33
29	09:23 15:25		06:40 19:54	04:38 21:41	02:29 23:46	02:29 23:46	03:37 22:54	05:32 20:50	07:12 18:49	07:53 15:55		10:50 13:35
30	09:19 15:29		06:36 19:57	04:34 21:45	02:25 23:51	02:25 23:51	03:41 22:50	05:35 20:46	07:15 18:45	07:57 15:51		10:49 13:37
31	09:16 15:33		06:32 20:00		02:20 23:56	02:20 23:56	03:45 22:46	05:38 20:42		08:00 15:47		10:48 13:39
Potential sun hours	140	227	362	461	600	706	659	525	396	297	176	93
Sum of minutes with flicker	0	0	52	0	0	0	0	0	0	49	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 20
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 2 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (2)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47 13:42	09:13 15:37	07:29 17:21	16:14-16:22/8 20:04	06:29 20:04	04:30 21:50	02:14 00:03	03:49 22:43	05:42 20:39	07:19 18:42	08:05 15:44	10:00 14:00
2	10:46 13:45	09:10 15:41	07:25 17:24	16:17-16:20/3 20:08	06:25 20:08	04:26 21:53	02:09 00:09	03:53 22:39	05:45 20:35	07:22 18:38	08:09 15:40	10:03 13:57
3	10:44 13:48	09:06 15:45	07:21 17:27	06:21 20:11	06:21 20:11	04:22 21:57	02:04 00:14	03:57 22:34	05:49 20:31	07:25 18:34	08:12 15:36	10:07 13:54
4	10:41 13:51	09:02 15:49	07:17 17:31	06:17 20:14	06:17 20:14	04:18 22:01	01:58 00:20	04:01 22:30	05:52 20:27	07:29 18:30	08:16 15:33	10:11 13:51
5	10:39 13:54	08:59 15:53	07:13 17:34	06:13 20:18	06:13 20:18	04:14 22:05	01:52 00:27	04:05 00:53	05:55 20:23	07:32 18:26	08:20 15:29	10:14 13:48
6	10:37 13:57	08:55 15:57	07:09 17:38	06:09 20:21	06:09 20:21	04:10 22:09	01:46 00:34	04:09 22:22	05:59 20:19	07:35 18:22	08:23 15:25	10:18 13:46
7	10:34 14:01	08:51 16:01	07:06 17:41	06:05 20:24	06:05 20:24	04:06 22:13	01:38 00:41	04:13 00:37	06:02 20:15	07:38 18:19	08:27 15:22	10:21 13:43
8	10:32 14:04	08:48 16:04	07:02 17:44	06:01 20:28	06:01 20:28	04:02 22:17	01:28 00:52	04:17 00:31	06:05 20:11	07:42 18:15	08:31 15:18	10:24 13:41
9	10:29 14:08	08:44 16:08	06:58 17:48	05:57 20:31	05:58 20:31	04:10 22:21	01:46 00:25	04:09 22:10	05:59 20:07	07:35 18:11	08:23 15:14	10:18 13:38
10	10:26 14:11	08:40 16:12	06:54 17:51	05:53 20:35	05:54 20:35	04:14 22:25	01:52 00:20	04:05 22:06	05:55 20:03	07:32 18:07	08:20 15:11	10:14 13:36
11	10:23 14:15	08:37 16:16	06:50 17:55	05:49 20:38	05:49 20:38	04:10 22:29	01:46 00:15	04:09 22:02	05:59 20:00	07:35 18:03	08:23 15:07	10:18 13:34
12	10:20 14:19	08:33 16:19	06:46 17:58	05:45 20:41	05:45 20:41	04:06 22:33	01:38 00:10	04:13 00:39	06:02 20:15	07:38 18:19	08:27 15:22	10:21 13:43
13	10:17 14:23	08:29 16:23	06:42 18:01	05:42 20:45	05:42 20:45	04:02 22:37	00:37 00:05	00:30 21:54	06:21 19:52	07:58 17:56	16:47-16:56/9 15:00	08:50 13:31
14	10:14 14:26	08:25 16:27	06:39 18:05	05:38 20:48	05:38 20:48	04:02 22:41	00:52 00:00	00:31 21:50	20:11 19:48	18:15 17:52	15:18 14:56	13:41 13:29
15	10:11 14:30	08:22 16:31	06:35 18:08	05:34 20:52	06:32-06:37/5 22:45	03:33 22:45	02:40 23:55	04:43 21:46	06:28 19:44	08:05 17:48	16:45-16:56/11 14:53	08:58 13:28
16	10:08 14:34	08:18 16:34	06:31 18:11	05:30 20:55	06:29-06:39/10 22:49	03:29 23:25	02:44 23:51	04:47 21:42	06:36-06:41/5 19:40	06:31 17:44	16:46-16:55/9 14:49	09:02 13:27
17	10:05 14:38	08:14 16:38	06:27 18:15	05:26 20:59	06:27-06:40/13 22:45	03:25 23:24	02:49 23:46	04:50 21:38	06:33-06:43/10 19:36	06:34 17:40	16:47-16:55/8 14:46	09:06 13:26
18	10:02 14:42	08:10 16:42	06:23 18:18	05:22 21:02	06:26-06:42/16 22:54	03:21 22:58	02:54 23:42	04:54 21:34	06:31-06:45/14 19:37	06:37 17:36	16:49-16:51/2 14:42	09:09 13:25
19	09:58 14:46	08:07 16:45	06:19 18:21	05:18 21:06	06:25-06:42/17 23:02	03:17 23:02	02:58 23:37	04:57 21:30	06:30-06:45/15 19:28	06:40 17:33	16:46-16:55/9 14:39	09:13 13:25
20	09:55 14:50	08:03 16:49	06:15 18:25	05:14 21:09	06:24-06:41/17 23:06	03:12 23:06	03:03 23:33	05:01 21:26	06:30-06:46/16 19:24	06:44 17:29	16:46-16:55/9 14:35	09:17 13:24
21	09:52 14:54	07:59 16:52	06:11 18:28	05:10 21:13	06:24-06:42/18 23:08	03:08 23:11	03:03 23:29	05:04 21:22	06:29-06:46/17 19:21	06:47 17:25	16:46-16:55/9 14:32	09:21 13:24
22	09:48 14:58	07:55 16:56	06:08 18:31	05:06 21:16	06:24-06:41/17 23:15	03:04 23:24	03:07 21:18	05:08 20:11	06:29-06:46/17 19:17	06:50 17:21	16:46-16:55/9 14:28	09:25 13:25
23	09:45 15:02	07:51 17:00	06:04 18:34	05:02 21:20	06:24-06:40/16 23:00	03:00 23:20	03:12 21:14	05:11 20:14	06:29-06:46/17 19:13	06:53 17:18	16:46-16:55/9 14:25	09:29 13:25
24	09:42 15:06	07:48 17:03	16:16-16:20/4 18:38	06:00 21:24	06:25-06:40/15 23:24	04:58 23:24	05:15 21:10	06:29-06:45/16 20:11	06:56 19:09	08:36 17:14	16:46-16:55/9 14:22	09:33 13:26
25	09:38 15:10	07:44 17:07	16:15-16:24/9 18:41	05:56 21:27	06:25-06:38/13 23:29	04:54 23:29	05:18 23:12	06:29-06:44/15 21:06	07:00 19:05	07:40 16:10	16:46-16:55/9 14:18	09:37 13:27
26	09:35 15:14	07:40 17:10	16:13-16:23/10 18:44	05:52 21:31	06:27-06:37/10 23:24	04:50 23:34	05:22 23:07	06:30-06:43/13 21:02	07:03 19:01	07:43 16:06	16:46-16:55/9 14:15	09:41 13:29
27	09:31 15:18	07:36 17:14	16:13-16:23/10 18:48	05:48 21:35	06:29-06:33/4 23:38	04:46 23:08	06:29-06:33/4 23:03	05:25 20:51	06:31-06:41/10 19:06	07:47 16:02	16:46-16:55/9 14:12	09:45 13:37
28	09:28 15:22	07:32 17:17	16:13-16:23/10 18:51	05:44 21:38	06:29-06:33/4 23:43	04:42 23:43	06:29-06:33/4 22:59	05:29 20:55	06:34-06:37/3 18:53	07:09 15:59	16:46-16:55/9 14:09	09:48 13:32
29	09:24 15:26	07:28 17:19	16:13-16:23/10 18:54	05:40 21:42	06:29-06:33/4 23:48	04:38 23:48	06:29-06:33/4 22:55	05:32 20:51	07:12 18:49	07:54 15:55	16:46-16:55/9 14:06	09:52 13:34
30	09:20 15:30	07:24 17:25	16:13-16:23/10 18:58	05:36 21:46	06:29-06:33/4 23:53	04:34 23:53	06:29-06:33/4 22:51	05:35 20:47	07:16 18:46	07:58 15:51	16:46-16:55/9 14:03	09:56 13:36
31	09:17 15:33	07:19 17:28	16:13-16:23/10 19:01	06:33 20:01	06:33 20:01	04:30 23:58	06:29-06:33/4 22:47	05:39 20:43	07:16 18:46	07:58 15:47	16:46-16:55/9 14:03	09:56 13:39
Potential sun hours	139	226	362	461	601	705	661	525	396	297	176	91
Sum of minutes with flicker	0	43	11	171	0	0	0	168	0	56	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 21
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 3 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (3)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13 13:40-13:52/12	07:28 06:28	04:30	02:14	00:14	00:03	03:49	05:42	07:19	08:05 13:10-13:24/14	10:00
	13:42	15:37	17:20 20:04	21:49	00:03	00:03	00:03	22:42	20:39	18:42	15:44	14:00
2	10:45	09:09 13:39-13:53/14	07:25 06:25	04:26	02:09	00:09	00:09	03:53	05:45	07:22	08:08 13:09-13:24/15	10:03
	13:45	15:41	17:24 20:07	21:53	00:09	00:09	00:09	22:38	20:35	18:38	15:40	13:57
3	10:43	09:06 13:38-13:54/16	07:21 06:21	04:22	02:04	00:14	00:14	03:57	05:48	07:25	08:12 13:09-13:25/16	10:07
	13:48	15:45	17:27 20:11	21:57	00:14	00:14	00:14	22:34	20:31	18:34	15:36	13:54
4	10:41	09:02 13:38-13:54/16	07:17 06:17	04:18	01:58	00:20	00:20	04:01	05:52	07:29	08:16 13:08-13:24/16	10:11
	13:51	15:49	17:31 20:14	22:01	00:20	00:20	00:20	22:30	20:27	18:30	15:32	13:51
5	10:39	08:59 13:39-13:55/16	07:13 06:13	04:14	01:52	00:26	00:26	04:05	05:55	07:32	08:19 13:08-13:25/17	10:14
	13:54	15:53	17:34 20:17	22:05	00:26	00:26	00:26	22:26	20:23	18:26	15:29	13:48
6	10:37	08:55 13:38-13:55/17	07:09 06:09	04:10	01:46	00:33	00:33	04:09	05:58	07:35	08:23 13:08-13:25/17	10:18
	13:57	15:57	17:38 20:21	22:09	00:33	00:33	00:33	22:22	20:19	18:22	15:25	13:46
7	10:34	08:51 13:38-13:55/17	07:05 06:05	04:06	01:38	00:41	00:41	04:13	06:02	07:38	08:27 13:08-13:25/17	10:21
	14:01	16:00	17:41 20:24	22:13	00:41	00:37	00:37	22:18	20:15	18:18	15:21	13:43
8	10:31	08:48 13:38-13:54/16	07:02 06:01	04:02	01:29	00:22	00:22	04:17	06:05	07:42	08:31 13:09-13:24/15	10:24
	14:04	16:04	17:44 20:28	22:17	00:51	00:31	00:31	22:14	20:11	18:15	15:18	13:41
9	10:29	08:44 13:40-13:55/15	06:58 05:57	03:58	02:36	00:28	00:28	04:20	06:08	07:45	08:35 13:10-13:23/13	10:27
	14:08	16:08	17:48 20:31	22:21	00:30	00:25	00:25	22:10	20:07	18:11	15:14	13:38
10	10:26	08:40 13:40-13:53/13	06:54 05:53	03:54	02:14	00:24	00:24	04:24	06:11	07:48	08:38 13:12-13:23/11	10:31
	14:11	16:12	17:51 20:34	22:25	00:20	00:20	00:20	22:06	20:03	18:07	15:11	13:36
11	10:23	08:36 13:42-13:52/10	06:50 05:49	03:50	02:19	00:28	00:28	04:28	06:15	07:52	08:42 13:13-13:21/8	10:34
	14:15	16:16	17:54 20:38	22:29	00:14	00:14	00:14	22:02	19:59	18:03	15:07	13:34
12	10:20	08:33 13:44-13:49/5	06:46 05:45	03:46	02:24	00:32	00:32	04:32	06:18	07:55	08:46	10:36
	14:19	16:19	17:58 20:41	22:33	00:09	00:09	00:09	21:58	19:55	17:59	15:03	13:32
13	10:17	08:29	06:42 05:41	03:41	02:29	00:35	00:35	04:35	06:21	07:58	08:50	10:39
	14:22	16:23	18:01 20:45	22:37	00:05	00:05	00:05	21:54	19:52	17:55	15:00	13:31
14	10:14	08:25	06:38 05:37	03:37	02:34	00:39	00:39	04:39	06:24	08:02	08:54	10:42
	14:26	16:27	18:04 20:48	22:41	00:00	00:00	00:00	21:50	19:48	17:52	14:56	13:29
15	10:11	08:21	06:35 05:34	03:33	02:39	00:43	00:43	04:43	06:27	08:05	08:58	10:44
	14:30	16:30	18:08 20:52	22:45	23:55	21:46	21:46	19:44	17:48	14:53	13:28	10:41
16	10:08	08:18	06:31 05:30	03:29	02:44	00:46	00:46	04:46	06:31	08:08	09:02	10:46
	14:34	16:34	18:11 20:55	22:49	23:51	21:42	21:42	19:40	17:44	14:49	13:27	10:40
17	10:05	08:14	06:27 05:26	03:25	02:49	00:50	00:50	04:50	06:34	08:12	09:05	10:48
	14:38	16:38	18:14 20:59	22:53	23:46	21:38	21:38	19:36	17:40	14:46	13:26	10:40
18	10:02	08:10	06:23 05:22	03:21	02:54	00:54	00:54	04:54	06:37	08:15	09:09	10:50
	14:42	16:41	18:18 21:02	22:58	23:42	21:34	21:34	19:32	17:36	14:42	13:25	10:40
19	09:58	08:06	06:19 05:18	03:17	02:58	00:57	00:57	04:57	06:40	08:19	09:13	10:51
	14:46	16:45	18:21 21:06	23:02	23:37	21:30	21:30	19:28	17:33	14:39	13:24	10:49
20	09:55	08:03	06:15 05:14	03:12	03:03	00:51	00:51	04:51	06:44	08:22	09:17	10:52
	14:50	16:49	18:24 21:09	23:06	23:33	21:26	21:26	19:24	17:29	14:35	13:24	10:49
21	09:52	07:59	06:11 05:10	03:08	03:03	00:50	00:50	04:50	06:47	08:25	09:21	10:53
	14:54	16:52	18:28 21:13	23:11	23:29	21:22	21:22	19:20	17:25	14:32	13:24	10:49
22	09:48	07:55	06:07 05:06	03:04	03:07	00:50	00:50	04:50	06:50	08:29	09:25	10:54
	14:58	16:56	18:31 21:16	23:15	23:24	21:18	21:18	19:16	17:21	14:28	13:25	10:49
23	09:45	07:51	06:04 05:02	03:00	03:11	00:51	00:51	04:51	06:53	08:32	09:29	10:54
	15:02	16:59	18:34 21:20	23:20	23:20	21:14	21:14	19:13	17:17	14:25	13:25	10:49
24	09:41	07:47	06:00 04:58	02:51	03:16	00:51	00:51	04:51	06:56	08:36	09:33	10:55
	15:06	17:03	18:38 21:24	23:24	23:16	21:10	21:10	19:09	17:14	14:22	13:26	10:49
25	09:38	07:44	05:56 04:54	02:47	03:20	00:51	00:51	04:51	07:00	07:39	09:37	10:55
	15:10	17:06	18:41 21:27	23:29	23:11	21:06	21:06	19:05	16:10	14:18	13:27	10:49
26	09:34	07:40	05:52 04:50	02:42	03:24	00:52	00:52	07:03	07:43	09:41	10:41	10:54
	15:14	17:10	18:44 21:31	23:33	23:07	21:02	21:02	19:01	16:06	14:15	13:28	10:49
27	09:31	07:36	05:48 04:46	02:38	03:29	00:52	00:52	07:06	07:47	09:44	10:44	10:54
	15:18	17:13	18:48 21:34	23:38	23:03	20:58	20:58	18:57	16:02	14:12	13:30	10:49
28	09:27	07:32	05:44 04:42	02:33	03:33	00:52	00:52	07:09	07:50	09:48	10:48	10:53
	15:21	17:17	18:51 21:38	23:43	22:59	20:54	20:54	18:53	15:59	14:09	13:32	10:49
29	09:24		06:40 04:38	02:29	03:37	00:52	00:52	07:12	07:54	09:52	10:52	10:52
	15:25		19:54 21:42	23:48	22:55	20:50	20:50	18:49	15:55	14:06	13:34	10:49
30	09:20		06:36 04:34	02:24	03:41	00:53	00:53	07:16	07:57	13:14-13:20/6	09:56	10:51
	15:29		19:57 21:46	23:53	22:51	20:46	20:46	18:45	15:51	14:03	13:36	10:49
31	09:17 13:41-13:50/9		06:32	02:19	03:45	00:58	00:58		08:01 13:11-13:22/11		10:49	10:49
	15:33		20:01	23:58	22:47	20:43	20:43		15:47		13:39	10:49
Potential sun hours	139	226	362	461	601	685	661	525	396	297	176	91
Sum of minutes with flicker	9	167	0	0	0	0	0	0	0	17	159	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 22
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 4 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (4)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:30	02:14		03:49	05:42 06:29-06:39/10	07:19	08:05	10:00
	13:42	15:37	17:20	20:04	21:50	00:03		22:43	20:39	18:42	15:44	13:59
2	10:45	09:10	07:25	06:25	04:26	02:09		03:53	05:45 06:29-06:38/9	07:22	08:08	10:03
	13:45	15:41	17:24	20:07	21:53	00:09		22:38	20:35	18:38	15:40	13:57
3	10:43	09:06	07:21	06:21	04:22	02:04		03:57	05:49 06:31-06:38/7	07:25	08:12	10:07
	13:48	15:45	17:27	20:11	21:57	00:14		22:34	20:31	18:34	15:36	13:54
4	10:41	09:02	07:17	06:17	04:18	01:58		04:01	05:52 06:34-06:36/2	07:29	08:16	10:11
	13:51	15:49	17:31	20:14	22:01	00:20		22:30	20:27	18:30	15:33	13:51
5	10:39	08:59	07:13	06:13	04:14	01:52	01:39	04:05	05:55	07:32	08:20	10:14
	13:54	15:53	17:34	20:18	22:05	00:27	00:53	22:26	20:23	18:26	15:29	13:48
6	10:37	08:55	07:09	06:09	04:10	01:46	01:48	04:09	05:58	07:35	08:23	10:18
	13:57	15:57	17:38	20:21	22:09	00:34	00:44	22:22	20:19	18:22	15:25	13:46
7	10:34	08:51	07:05	06:05	04:06	01:38	01:55	04:13	06:02	07:38	08:27	10:21
	14:01	16:00	17:41	20:24	22:13	00:42	00:37	22:18	20:15	18:18	15:21	13:43
8	10:32	08:48	07:02	06:01 06:37-06:39/2	04:02	01:28	02:02	04:17	06:05	07:42	08:31	10:24
	14:04	16:04	17:44	20:28	22:17	00:52	00:31	22:14	20:11	18:15	15:18	13:41
9	10:29	08:44	06:58	05:57 06:33-06:39/6	03:58	00:53	02:08	04:20	06:08	07:45	08:35	10:28
	14:08	16:08	17:48	20:31	22:21	01:31	00:25	22:10	20:07	18:11	15:14	13:38
10	10:26	08:40	06:54	05:53 06:30-06:39/9	03:54		02:13	04:24	06:11	07:48	08:38	10:31
	14:11	16:12	17:51	20:34	22:25		00:20	22:06	20:03	18:07	15:11	13:36
11	10:23	08:36	06:50	05:49 06:29-06:39/10	03:50		02:19	04:28	06:15	07:52	08:42	10:34
	14:15	16:16	17:54	20:38	22:29		00:15	22:02	19:59	18:03	15:07	13:34
12	10:20	08:33 15:02-15:09/7	06:46	05:45 06:30-06:39/9	03:46		02:24	04:32	06:18	07:55	08:46	10:36
	14:19	16:19	17:58	20:41	22:33		00:10	21:58	19:55	17:59	15:03	13:32
13	10:17	08:29 15:01-15:12/11	06:42	05:41 06:31-06:37/6	03:41		02:29	04:35	06:21	07:58	08:50	10:39
	14:22	16:23	18:01	20:45	22:37		00:05	21:54	19:52	17:55	15:00	13:30
14	10:14	08:25 14:59-15:13/14	06:38	05:37	03:37		02:34	04:39	06:24	08:02	08:54	10:42
	14:26	16:27	18:05	20:48	22:41		00:00	21:50	19:48	17:52	14:56	13:29
15	10:11	08:22 14:58-15:14/16	06:35	05:34	03:33		02:39	04:43	06:28	08:05	08:58	10:44
	14:30	16:31	18:08	20:52	22:45		23:55	21:46	19:44	17:48	14:53	13:28
16	10:08	08:18 14:58-15:15/17	06:31	05:30	03:29		02:44	04:46	06:31	08:08	09:02	10:46
	14:34	16:34	18:11	20:55	22:49		23:51	21:42	19:40	17:44	14:49	13:26
17	10:05	08:14 14:57-15:15/18	06:27	05:26	03:25		02:49	04:50	06:34	08:12	09:05	10:48
	14:38	16:38	18:14	20:59	22:54		23:46	21:38	19:36	17:40	14:46	13:26
18	10:02	08:10 14:57-15:15/18	06:23	05:22	03:21		02:53	04:54	06:37	08:15 15:35-15:40/5	09:09	10:50
	14:42	16:41	18:18	21:02	22:58		23:42	21:34	19:32	17:36	14:42	13:25
19	09:58	08:06 14:57-15:15/18	06:19	05:18	03:17		02:58	04:57	06:40	08:19 15:31-15:42/11	09:13	10:51
	14:46	16:45	18:21	21:06	23:02		23:37	21:30	19:28	17:33	14:39	13:24
20	09:55	08:03 14:58-15:15/17	06:15	05:14	03:12		03:03	05:01	06:44	08:22 15:29-15:43/14	09:17	10:52
	14:50	16:49	18:24	21:09	23:06		23:33	21:26	19:24	17:29	14:35	13:24
21	09:52	07:59 14:58-15:13/15	06:11	05:10	03:08		03:03	05:04	06:47	08:25 15:28-15:44/16	09:21	10:53
	14:54	16:52	18:28	21:13	23:11		23:29	21:22	19:20	17:25	14:32	13:24
22	09:48	07:55 14:59-15:12/13	06:07	05:06	03:04		03:07	05:08	06:50	08:29 15:28-15:45/17	09:25	10:54
	14:58	16:56	18:31	21:16	23:15		23:24	21:18	19:17	17:21	14:28	13:25
23	09:45	07:51 15:01-15:11/10	06:04	05:02	03:00		03:11	05:11	06:53	08:32 15:27-15:45/18	09:29	10:55
	15:02	16:59	18:34	21:20	23:20		23:20	21:14	19:13	17:17	14:25	13:25
24	09:41	07:48	06:00	04:58	02:51		03:16	05:15	06:56	08:36 15:27-15:45/18	09:33	10:55
	15:06	17:03	18:38	21:24	23:24		23:16	21:10	19:09	17:14	14:22	13:26
25	09:38	07:44	05:56	04:54	02:47		03:20	05:18	07:00	07:40 14:27-14:44/17	09:37	10:55
	15:10	17:06	18:41	21:27	23:29		23:12	21:06	19:05	16:10	14:18	13:27
26	09:34	07:40	05:52	04:50	02:42		03:24	05:22	07:03	07:43 14:27-14:44/17	09:41	10:54
	15:14	17:10	18:44	21:31	23:34		23:07	21:02	19:01	16:06	14:15	13:28
27	09:31	07:36	05:48	04:46	02:38		03:29	05:25	07:06	07:47 14:28-14:44/16	09:44	10:54
	15:18	17:13	18:48	21:35	23:38		23:03	20:58	18:57	16:02	14:12	13:30
28	09:27	07:32	05:44	04:42	02:33		03:33	05:28	07:09	07:50 14:29-14:43/14	09:48	10:53
	15:21	17:17	18:51	21:38	23:43		22:59	20:54	18:53	15:59	14:09	13:32
29	09:24		06:40	04:38	02:28		03:37	05:32	07:12	07:54 14:30-14:41/11	09:52	10:52
	15:25		19:54	21:42	23:48		22:55	20:50	18:49	15:55	14:06	13:34
30	09:20		06:36	04:34	02:24		03:41	05:35 06:31-06:37/6	07:16	07:57 14:33-14:38/5	09:56	10:51
	15:29		19:57	21:46	23:53		22:51	20:47	18:45	15:51	14:03	13:36
31	09:17		06:32		02:19		03:45	05:39 06:30-06:39/9		08:01		10:49
	15:33		20:01		23:58		22:47	20:43		15:47		13:38
Potential sun hours	139	226	362	461	601	685	661	525	396	297	176	91
Sum of minutes with flicker	0	226	174	0	42	0	0	0	15	28	179	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 23
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 5 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (5)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10:48	09:13	07:28	06:28	04:29	02:13		03:48	05:41	07:19	08:05	10:00	
	13:41	15:37	17:20	20:04	21:49	00:04		22:43	20:38	18:41	15:43	13:59	
2	10:46	09:09	07:24	06:24	04:25	02:07		03:53	05:45	07:22	08:08	10:04	
	13:44	15:41	17:23	20:07	21:53	00:10		22:38	20:34	18:37	15:39	13:56	
3	10:44	09:06	07:21	06:20	04:21	02:02		03:56	05:48	07:25	08:12	10:07	
	13:46	15:44	17:27	20:11	21:57	00:15		22:34	20:31	18:34	15:36	13:53	
4	10:42	09:02	07:17	06:16	04:17	01:56		04:00	05:51	07:28	08:16	10:11	
	13:50	15:48	17:30	20:14	22:01	00:21		22:30	20:27	18:30	15:32	13:50	
5	10:39	08:59	07:13	06:12	04:13	01:50		04:04	05:55	07:32	08:19	10:15	
	13:53	15:52	17:34	20:17	22:05	00:28		22:26	20:23	18:26	15:28	13:47	
6	10:37	08:55	07:09	06:08	04:09	01:43	01:45	04:08	05:58	07:35	08:23	10:18	
	13:56	15:56	17:37	20:21	22:09	00:35	00:46	22:22	20:19	18:22	15:25	13:45	
7	10:34	08:51	07:05	06:05	04:05	01:35	01:53	04:12	06:01	07:38	08:27	10:21	
	14:00	16:00	17:41	20:24	22:13	00:44	00:39	22:18	20:15	18:18	15:21	13:42	
8	10:32	08:47	07:01	06:01	04:01	01:23	02:00	04:16	06:04	07:41	08:31	10:25	
	14:03	16:04	17:44	20:27	22:17	00:56	00:32	22:14	20:11	18:14	15:17	13:40	
9	10:29	08:44	06:57	05:57	03:57	00:39	02:06	04:20	06:08	07:45	08:35	10:28	
	14:07	16:08	17:47	20:31	22:21	00:38	00:26	22:10	20:07	18:10	15:14	13:37	
10	10:26	08:40	06:54	05:53	03:53		02:12	04:24	06:11	07:48	08:38	10:31	
	14:10	16:11	17:51	20:34	22:25		00:21	22:06	20:03	18:07	15:10	13:35	
11	10:24	08:36	06:50	05:49	03:49		02:18	04:27	06:14	07:51	08:42	10:34	
	14:14	16:15	17:54	20:38	22:29		00:15	22:02	19:59	18:03	15:06	13:33	
12	10:21	08:33	06:46	05:45	03:45		02:23	04:31	06:17	07:55	08:46	10:37	
	14:18	16:19	17:57	20:41	22:33		00:10	21:58	19:55	17:59	15:03	13:31	
13	10:18	08:29	06:42	05:41	03:41		02:28	04:35	06:21	07:58	08:50	10:40	
	14:22	16:23	18:01	20:45	22:37		00:05	21:54	19:51	17:55	14:59	13:29	
14	10:14	08:25	06:38	05:37	03:37	20:03-20:06/3	02:33	04:39	06:24	08:01	08:54	10:42	
	14:25	16:26	18:04	20:48	22:41		00:00	21:50	19:47	17:51	14:55	13:28	
15	10:11	08:21	06:34	05:33	03:32	20:02-20:10/8	02:38	04:42	06:27	08:05	08:58	10:44	
	14:29	16:30	18:07	20:51	22:45		23:56	21:46	19:43	17:47	14:52	13:26	
16	10:08	08:18	06:30	05:29	03:28	20:01-20:13/12	02:43	04:46	06:30	08:08	09:02	10:47	
	14:33	16:34	18:11	20:55	22:49		23:51	21:42	19:40	17:44	14:48	13:25	
17	10:05	08:14	06:27	05:25	03:24	20:01-20:13/12	02:48	04:49	06:34	08:11	09:05	10:49	
	14:37	16:37	18:14	20:58	22:54		23:47	21:38	19:36	17:40	14:45	13:24	
18	10:02	08:10	06:23	05:21	03:20	20:02-20:13/11	02:52	04:53	06:37	08:15	09:09	10:50	
	14:41	16:41	18:17	21:02	22:58		23:42	21:34	19:32	17:36	14:41	13:24	
19	09:58	08:06	06:19	05:17	03:16	20:02-20:11/9	02:57	04:57	06:40	08:18	09:13	10:52	
	14:45	16:45	18:21	21:05	23:02	20:03-20:09/6	23:38	21:30	19:28	17:32	14:38	13:23	
20	09:55	08:02	06:15	05:13	03:11		03:02	05:00	06:43	08:22	09:17	10:53	
	14:49	16:48	18:24	21:09	23:07		23:33	21:26	19:24	17:28	14:34	13:23	
21	09:52	07:59	06:11	05:09	03:07		03:02	05:04	06:46	08:25	09:21	10:54	
	14:53	16:52	18:27	21:13	23:11		23:29	21:22	19:20	17:25	14:31	13:23	
22	09:48	07:55	06:07	05:05	03:03		03:06	05:07	06:50	08:29	09:25	10:55	
	14:57	16:55	18:31	21:16	23:15		23:25	21:18	19:16	17:21	14:28	13:23	
23	09:45	07:51	06:03	05:01	02:54		03:11	05:11	20:07-20:14/7	06:53	08:32	09:29	10:55
	15:01	16:59	18:34	21:20	23:20		23:20	21:14	19:12	17:17	14:24	13:24	
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	20:05-20:15/10	06:56	08:36	09:33	10:55
	15:05	17:02	18:37	21:23	23:25		23:16	21:10	19:08	17:13	14:21	13:25	
25	09:38	07:43	05:55	04:53	02:46		03:19	05:18	20:04-20:15/11	06:59	07:39	09:37	10:55
	15:09	17:06	18:41	21:27	23:29		23:12	21:06	19:05	16:09	14:18	13:26	
26	09:34	07:40	05:52	04:49	02:41		03:24	05:21	20:03-20:15/12	07:02	07:43	09:41	10:55
	15:13	17:10	18:44	21:31	23:34		23:08	21:02	19:01	16:06	14:14	13:27	
27	09:31	07:36	05:48	04:45	02:37		03:28	05:24	20:03-20:14/11	07:06	07:46	09:45	10:54
	15:17	17:13	18:47	21:34	23:39		23:03	20:58	18:57	16:02	14:11	13:29	
28	09:27	07:32	05:44	04:41	02:32		03:32	05:28	20:03-20:10/7	07:09	07:50	09:48	10:54
	15:21	17:17	18:51	21:38	23:43		22:59	20:54	18:53	15:58	14:08	13:31	
29	09:24		06:40	04:37	02:27		03:36	05:31	20:03-20:06/3	07:12	07:54	09:52	10:52
	15:25		19:54	21:42	23:48		22:55	20:50	18:49	15:54	14:05	13:33	
30	09:20		06:36	04:33	02:23		03:40	05:35	07:15	07:57	09:56	10:51	
	15:29		19:57	21:46	23:53		22:51	20:46	18:45	15:51	14:02	13:35	
31	09:17		06:32		02:18		03:44	05:38		08:01		10:50	
	15:33		20:01		23:59		22:47	20:42		15:47		13:37	
Potential sun hours	139	226	362	461	602	694	662	526	397	297	175	90	
Sum of minutes with flicker	0	0	0	61	0	0	0	61	0	0	0	0	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 24
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 6 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (6)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10:48 13:41	09:13 15:37	07:28 17:20	06:28 20:04	04:29 21:49	20:51-21:00/9 00:04	02:12	03:48 22:43	21:04-21:09/5 20:38	05:41 20:38	07:18 18:41	08:05 15:43	10:00 13:59
2	10:46 13:43	09:09 15:40	07:24 17:23	06:24 20:07	04:25 21:53	20:51-21:04/13 00:10	02:07	03:52 22:38	21:03-21:12/9 20:34	05:45 20:34	07:22 18:37	08:08 15:39	10:04 13:56
3	10:44 13:46	09:06 15:44	07:20 17:27	06:20 20:10	04:21 21:57	20:49-21:04/15 00:15	02:02	03:56 22:34	21:01-21:13/12 20:30	05:48 20:30	07:25 18:33	08:12 15:36	10:07 13:53
4	10:42 13:49	09:02 15:48	07:17 17:30	06:16 20:14	04:17 22:01	20:49-21:04/15 00:21	01:56	04:00 22:30	21:00-21:14/14 20:27	05:51 20:27	07:28 18:30	08:16 15:32	10:11 13:50
5	10:39 13:53	08:58 15:52	07:13 17:34	06:12 20:17	04:13 22:05	20:49-21:05/16 00:28	01:50	04:04 22:26	21:00-21:14/14 20:23	05:55 20:23	07:31 18:26	08:19 15:28	10:14 13:47
6	10:37 13:56	08:55 15:56	07:09 17:37	06:08 20:21	04:09 22:09	20:49-21:04/15 00:35	01:43	04:08 22:22	20:59-21:14/15 20:19	05:58 20:19	07:35 18:22	08:23 15:24	10:18 13:44
7	10:34 13:59	08:51 16:00	07:05 17:41	06:04 20:24	04:05 22:13	20:49-21:04/15 00:44	01:35	04:12 22:18	20:59-21:14/15 20:15	06:01 20:15	07:38 18:18	08:27 15:21	10:21 13:42
8	10:32 14:03	08:47 16:04	07:01 17:44	06:01 20:27	04:01 22:17	20:50-21:04/14 00:56	01:23	04:16 22:14	20:58-21:14/16 20:11	06:04 20:11	07:41 18:14	08:31 15:17	10:25 13:39
9	10:29 14:07	08:44 16:07	06:57 17:47	05:57 20:31	03:57 22:21	20:50-21:03/13 01:38	00:42	04:20 22:10	20:58-21:13/15 20:07	06:08 20:07	07:45 18:10	08:35 15:13	10:28 13:37
10	10:26 14:10	08:40 16:11	06:54 17:51	05:53 20:34	03:53 22:25	20:51-21:02/11 00:21	02:12	04:24 22:06	20:59-21:13/14 20:03	06:11 20:03	07:48 18:06	08:38 15:10	10:31 13:35
11	10:23 14:14	08:36 16:15	06:50 17:54	05:49 20:38	03:49 22:29	20:52-21:01/9 00:15	02:17	04:27 22:02	21:00-21:12/12 19:59	06:14 19:59	07:51 18:03	08:42 15:06	10:34 13:33
12	10:21 14:18	08:33 16:19	06:46 17:57	05:45 20:41	03:45 22:33	20:55-20:58/3 00:20	02:23	04:31 21:58	21:01-21:08/7 19:55	06:17 19:55	07:55 17:59	08:46 15:03	10:37 13:31
13	10:18 14:21	08:29 16:22	06:42 18:01	05:41 20:44	03:41 22:37		02:28	04:35 21:54	21:02-21:05/3 19:51	06:21 19:51	07:58 17:55	08:50 14:59	10:40 13:29
14	10:14 14:25	08:25 16:26	06:38 18:04	05:37 20:48	03:36 22:41		02:33	04:38 21:50	06:24 19:47	06:24 19:47	08:01 17:51	08:54 14:55	10:42 13:28
15	10:11 14:29	08:21 16:30	06:34 18:07	05:33 20:51	03:32 22:45		02:38	04:42 21:46	06:27 19:43	06:27 19:43	08:05 17:47	08:58 14:52	10:44 13:26
16	10:08 14:33	08:18 16:34	06:30 18:11	05:29 20:55	03:28 22:49		02:43	04:46 21:42	06:30 19:40	06:30 19:40	08:08 17:43	09:02 14:48	10:47 13:25
17	10:05 14:37	08:14 16:37	06:26 18:14	05:25 20:58	03:24 22:54		02:48	04:49 21:38	06:33 19:36	06:33 19:36	08:11 17:40	09:05 14:45	10:49 13:24
18	10:02 14:41	08:10 16:41	06:23 18:17	05:21 21:02	03:20 22:58		02:52	04:53 21:34	06:37 19:32	06:37 19:32	08:15 17:36	09:09 14:41	10:50 13:23
19	09:58 14:45	08:06 16:45	06:19 18:21	05:17 21:05	03:16 23:02		02:57	04:57 21:30	06:40 19:28	06:40 19:28	08:18 17:32	09:13 14:38	10:52 13:23
20	09:55 14:49	08:02 16:48	06:15 18:24	05:13 21:09	03:11 23:07		03:02	05:00 21:26	06:43 19:24	06:43 19:24	08:22 17:28	09:17 14:34	10:53 13:23
21	09:52 14:53	07:59 16:52	06:11 18:27	05:09 21:13	03:07 23:11		03:02	05:04 21:22	06:46 19:20	06:46 19:20	08:25 17:24	09:21 14:31	10:54 13:23
22	09:48 14:57	07:55 16:55	06:07 18:31	05:05 21:16	03:03 23:15		03:06	05:07 21:18	06:50 19:16	06:50 19:16	08:29 17:21	09:25 14:27	10:55 13:23
23	09:45 15:01	07:51 16:59	06:03 18:34	05:01 21:20	02:54 23:20		03:10	05:11 21:14	06:53 19:12	06:53 19:12	08:32 17:17	09:29 14:24	10:55 13:24
24	09:41 15:05	07:47 17:02	05:59 18:37	04:57 21:23	02:50 23:25		03:15	05:14 21:10	06:56 19:08	06:56 19:08	08:36 17:13	09:33 14:21	10:55 13:25
25	09:38 15:09	07:43 17:06	05:55 18:41	04:53 21:27	02:45 23:29		03:19	05:18 21:06	06:59 19:04	06:59 19:04	07:39 16:09	09:37 14:17	10:55 13:26
26	09:34 15:13	07:40 17:09	05:51 18:44	04:49 21:31	02:41 23:34		03:23	05:21 21:02	07:02 19:01	07:02 19:01	07:43 16:06	09:41 14:14	10:55 13:27
27	09:31 15:17	07:36 17:13	05:48 18:47	04:45 21:34	02:36 23:39		03:28	05:24 20:58	07:06 18:57	07:06 18:57	07:46 16:02	09:45 14:11	10:54 13:29
28	09:27 15:21	07:32 17:16	05:44 18:51	04:41 21:38	02:32 23:43		03:32	05:28 20:54	07:09 18:53	07:09 18:53	07:50 15:58	09:48 14:08	10:54 13:30
29	09:24 15:25		06:40 19:54	04:37 21:42	02:27 23:48		03:36	05:31 20:50	07:12 18:49	07:12 18:49	07:54 15:54	09:52 14:05	10:52 13:32
30	09:20 15:29		06:36 19:57	04:33 21:46	20:53-20:57/4 23:53	02:22	03:40	05:35	07:15	07:15	07:57	09:56	10:51
31	09:17 15:33		06:32 20:00		02:17 23:59		03:44	05:38			08:01		10:50
Potential sun hours	138	226	362	461	602		686	526	397	297	175	90	
Sum of minutes with flicker	0	0	0	4	148		0	0	151	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 25
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 7 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (7)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:48	09:13	07:28	06:28	05:18-05:20/2	02:13		03:49	05:41	07:19	08:05	10:00
	13:41	15:37	17:20	20:04	21:49	00:04		22:43	20:38	18:41	15:43	13:59
2	10:46	09:09	07:24	06:24	05:15-05:21/6	02:08		03:53	05:45	07:22	08:08	10:04
	13:44	15:41	17:24	20:07	21:53	00:09		22:38	20:35	18:37	15:39	13:56
3	10:44	09:06	07:21	06:20	05:14-05:23/9	02:02		03:57	05:48	07:25	08:12	10:07
	13:47	15:44	17:27	20:11	21:57	00:15		22:34	20:31	18:34	15:36	13:53
4	10:42	09:02	07:17	06:16	05:14-05:23/9	01:57		04:01	05:26-05:29/3	05:51	07:28	08:16
	13:50	15:48	17:30	20:14	22:01	00:21		22:30	20:27	18:30	15:32	13:50
5	10:39	08:58	07:13	06:12	05:13-05:23/10	01:50		04:04	05:24-05:31/7	05:55	07:32	08:19
	13:53	15:52	17:34	20:17	22:05	00:28		22:26	20:23	18:26	15:28	13:47
6	10:37	08:55	07:09	06:09	05:14-05:23/9	01:44	01:45	04:08	05:23-05:31/8	05:58	07:35	08:23
	13:56	15:56	17:37	20:21	22:09	00:35	00:46	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	05:14-05:22/8	01:35	01:53	04:12	05:23-05:33/10	06:01	07:38	08:27
	14:00	16:00	17:41	20:24	22:13	00:43	00:39	22:18	20:15	18:18	15:21	13:42
8	10:32	08:47	07:01	06:01	05:15-05:20/5	01:24	02:00	04:16	05:23-05:33/10	06:05	19:15-19:20/5	07:41
	14:03	16:04	17:44	20:27	22:17	00:55	00:32	22:14	20:11	18:14	15:17	13:40
9	10:29	08:44	06:57	05:57	03:57	02:12	02:06	04:20	05:23-05:32/9	06:08	19:13-19:21/8	07:45
	14:07	16:08	17:47	20:31	22:21	00:01	00:26	22:10	20:07	18:10	15:14	13:37
10	10:26	08:40	06:54	05:53	03:53		02:12	04:24	05:23-05:31/8	06:11	19:12-19:22/10	07:48
	14:10	16:11	17:51	20:34	22:25		00:21	22:06	20:03	18:07	15:10	13:35
11	10:23	08:36	06:50	05:49	03:49		02:18	04:27	05:24-05:30/6	06:14	19:12-19:18/6	07:51
	14:14	16:15	17:54	20:38	22:29		00:15	22:02	19:59	18:03	15:06	13:33
12	10:21	08:33	06:46	05:45	03:45		02:23	04:31	19:58	07:55	08:46	10:37
	14:18	16:19	17:57	20:41	22:33		00:10	21:58	19:55	17:59	15:03	13:31
13	10:18	08:29	06:42	05:41	03:41		02:28	04:35	06:21	07:58	08:50	10:40
	14:22	16:23	18:01	20:45	22:37		00:05	21:54	19:51	17:55	14:59	13:29
14	10:14	08:25	06:38	05:37	03:37		02:33	04:39	06:24	08:01	08:54	10:42
	14:26	16:26	18:04	20:48	22:41		00:00	21:50	19:47	17:51	14:56	13:28
15	10:11	08:21	06:34	05:33	03:33		02:38	04:42	06:27	08:05	08:58	10:44
	14:29	16:30	18:08	20:51	22:45		00:00	21:46	19:44	17:47	14:52	13:27
16	10:08	08:18	06:30	05:29	03:28		02:43	04:46	06:30	08:08	09:02	10:47
	14:33	16:34	18:11	20:55	22:49		00:00	21:42	19:40	17:44	14:48	13:25
17	10:05	08:14	06:27	05:25	03:24		02:48	04:50	06:34	08:12	09:05	10:48
	14:37	16:37	18:14	20:58	22:54		00:00	21:38	19:36	17:40	14:45	13:24
18	10:02	08:10	06:23	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:50
	14:41	16:41	18:17	21:02	22:58		00:00	21:34	19:32	17:36	14:41	13:24
19	09:58	08:06	06:19	05:17	03:16		02:57	04:57	06:40	08:18	09:13	10:52
	14:45	16:45	18:21	21:06	23:02		00:00	21:30	19:28	17:32	14:38	13:23
20	09:55	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:22	09:17	10:53
	14:49	16:48	18:24	21:09	23:07		00:00	21:26	19:24	17:28	14:34	13:23
21	09:52	07:59	06:11	05:09	03:07		03:02	05:04	06:46	08:25	09:21	10:54
	14:53	16:52	18:27	21:13	23:11		00:00	21:22	19:20	17:25	14:31	13:23
22	09:48	07:55	06:07	05:05	03:03		03:06	05:07	06:50	08:29	09:25	10:55
	14:57	16:55	18:31	21:16	23:15		00:00	21:18	19:16	17:21	14:28	13:23
23	09:45	07:51	06:03	05:01	02:54		03:11	05:11	06:53	08:32	09:29	10:55
	15:01	16:59	18:34	21:20	23:20		00:00	21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:36	09:33	10:55
	15:05	17:03	18:37	21:23	23:24		00:00	21:10	19:08	17:13	14:21	13:25
25	09:38	07:43	05:55	04:53	02:46		03:19	05:18	06:59	08:39	09:37	10:55
	15:09	17:06	18:41	21:27	23:29		00:00	21:06	19:05	16:09	14:18	13:26
26	09:34	07:40	05:52	04:49	02:41		03:24	05:21	07:02	08:43	09:41	10:55
	15:13	17:10	18:44	21:31	23:34		00:00	21:02	19:01	16:06	14:14	13:27
27	09:31	07:36	05:48	04:45	02:37		03:28	05:25	07:06	08:46	09:45	10:54
	15:17	17:13	18:47	21:34	23:39		00:00	20:58	18:57	16:02	14:11	13:29
28	09:27	07:32	05:44	04:41	02:32		03:32	05:28	07:09	08:50	09:48	10:53
	15:21	17:17	18:51	21:38	23:43		00:00	20:54	18:53	15:58	14:08	13:31
29	09:24		06:40	04:37	02:27		03:36	05:31	07:12	08:54	09:52	10:52
	15:25		19:54	21:42	23:48		00:00	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:23		03:40	05:35	07:15	08:57	09:56	10:51
	15:29		19:57	21:46	23:53		00:00	20:46	18:45	15:51	14:02	13:30
31	09:17		06:32	04:28	02:18		03:45	05:38		08:01		10:50
	15:33		20:01	23:59	23:59		00:00	20:42		15:47		13:37
Potential sun hours	139	226	362	461	602	706	662	526	397	297	176	91
Sum of minutes with flicker	0	0	2	30	58	0	0	61	32	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 26
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 8 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (8)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:30	02:14		03:49	05:41	07:18	08:04	09:59
	13:41	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:26	02:09		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:40	13:56
3	10:43	09:05	07:20	06:20	04:22	02:03		03:57	05:48	07:25	08:12	10:07
	13:47	15:45	17:27	20:10	21:57	00:14		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:17	06:16	04:18	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:49	17:30	20:14	22:00	00:20		22:30	20:26	18:30	15:32	13:51
5	10:39	08:58	07:13	06:12	04:14	01:52	01:39	04:05	05:55	07:31	08:19	10:14
	13:54	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:09	04:09	01:45	01:47	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:33	00:44	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:05	01:38	01:55	04:12	06:01	07:38	08:27	10:21
	14:00	16:00	17:41	20:24	22:12	00:41	00:37	22:18	20:15	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:28	02:01	04:16	06:04	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:51	00:30	22:14	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	02:02	02:07	04:20	06:08	07:44	08:34	10:27
	14:07	16:08	17:47	20:31	22:20	00:34	00:25	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:06	20:03	18:07	15:10	13:36
11	10:23	08:36	06:50	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:15	16:15	17:54	20:37	22:28		00:14	22:02	19:59	18:03	15:07	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:58	19:55	17:59	15:03	13:32
13	10:17	08:29	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:39
	14:22	16:23	18:01	20:44	22:36		00:04	21:54	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:50	19:47	17:51	14:56	13:29
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:45		23:55	21:46	19:43	17:47	14:52	13:27
16	10:08	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:46
	14:34	16:34	18:11	20:55	22:49		23:50	21:42	19:39	17:44	14:49	13:26
17	10:04	08:14	06:26	05:25	03:25		02:49	04:50	06:34	08:11	09:05	10:47
	14:38	16:37	18:14	20:58	22:53		23:46	21:38	19:36	17:40	14:45	13:25
18	10:01	08:10	06:23	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:41	16:41	18:17	21:02	22:57		23:41	21:34	19:32	17:36	14:42	13:25
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:51
	14:45	16:45	18:21	21:05	23:02		23:37	21:30	19:28	17:32	14:38	13:24
20	09:55	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:22	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:26	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:21	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:25	14:31	13:24
22	09:48	07:55	06:07	05:05	03:04		03:07	05:07	06:49	08:28	09:25	10:53
	14:57	16:55	18:31	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:20	21:14	19:12	17:17	14:25	13:25
24	09:41	07:47	05:59	04:57	02:51		03:15	05:14	06:56	08:36	09:32	10:54
	15:05	17:03	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:54	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:50	02:42		03:24	05:21	07:02	07:43	09:40	10:54
	15:13	17:10	18:44	21:30	23:33		23:07	21:02	19:01	16:06	14:15	13:28
27	09:30	07:36	05:48	04:46	02:37		03:28	05:25	07:06	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:11	13:30
28	09:27	07:32	05:44	04:42	02:33		03:32	05:28	07:09	07:50	09:48	10:52
	15:21	17:17	18:50	21:38	23:42		22:59	20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:38	02:28		03:37	05:31	07:12	07:53	09:52	10:51
	15:25		19:54	21:42	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:34	02:23		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:01		10:49
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	707	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 27
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 9 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (9)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	15:52-16:07/15	06:28	04:29	02:13	03:49	05:41	07:18	08:04	10:00
	13:41	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	15:52-16:05/13	06:24	04:25	02:08	03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:09		22:38	20:34	18:37	15:39	13:56
3	10:43	09:06	07:20	15:54-16:03/9	06:20	04:21	02:03	03:57	05:48	07:25	08:12	10:07
	13:47	15:44	17:27	20:10	21:57	00:15		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:17	06:16	04:17	01:57		04:01	05:51	07:28	08:16	10:11
	13:50	15:48	17:30	20:14	22:01	00:21		22:30	20:26	18:30	15:32	13:50
5	10:39	08:58	07:13	06:12	04:13	01:51	01:37	04:04	05:55	07:31	08:19	10:14
	13:53	15:52	17:34	20:17	22:05	00:27	00:54	22:26	20:23	18:26	15:28	13:47
6	10:37	08:55	07:09	06:08	04:09	01:44	01:46	04:08	05:58	07:35	08:23	10:18
	13:56	15:56	17:37	20:21	22:08	00:34	00:45	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:05	01:36	01:54	04:12	06:01	07:38	08:27	10:21
	14:00	16:00	17:41	20:24	22:12	00:42	00:38	22:18	20:15	18:18	15:21	13:42
8	10:31	08:47	07:01	06:01	04:01	01:26	02:00	04:16	06:04	07:41	08:31	10:24
	14:03	16:04	17:44	20:27	22:16	00:53	00:31	22:14	20:11	18:14	15:17	13:40
9	10:29	08:44	06:57	05:57	03:57	00:18	02:07	04:20	06:08	07:45	08:34	10:28
	14:07	16:08	17:47	20:31	22:20	02:29	00:26	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:54	05:53	03:53		02:12	04:24	06:11	07:48	16:31-16:36/5	08:38
	14:11	16:11	17:51	20:34	22:24		00:20	22:06	20:03	18:07	15:10	13:35
11	10:23	08:36	06:50	05:49	03:49		02:18	04:27	06:14	07:51	16:27-16:38/11	08:42
	14:14	16:15	17:54	20:38	22:28		00:15	22:02	19:59	18:03	15:06	13:33
12	10:20	08:32	06:46	05:45	03:45		02:23	04:31	06:17	07:55	16:26-16:40/14	08:46
	14:18	16:19	17:57	20:41	22:32		00:10	21:58	19:55	17:59	15:03	13:31
13	10:17	08:29	06:42	05:41	03:41		02:29	04:35	06:21	07:58	16:24-16:40/16	08:50
	14:22	16:23	18:01	20:44	22:37		00:05	21:54	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	16:24-16:40/16	08:54
	14:26	16:26	18:04	20:48	22:41		00:00	21:50	19:47	17:51	14:56	13:28
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:05	16:24-16:40/16	08:57
	14:29	16:30	18:07	20:51	22:45		23:55	21:46	19:43	17:47	14:52	13:27
16	10:08	08:17	06:30	05:29	03:28		02:43	04:46	06:30	08:08	16:24-16:40/16	09:01
	14:33	16:34	18:11	20:55	22:49		23:51	21:42	19:39	17:44	14:48	13:26
17	10:05	08:14	06:26	05:25	03:24		02:48	04:49	06:33	08:11	16:23-16:39/16	09:05
	14:37	16:37	18:14	20:58	22:53		23:46	21:38	19:36	17:40	14:45	13:25
18	10:01	08:10	06:23	05:21	03:20		02:53	04:53	06:37	08:15	16:24-16:39/15	09:09
	14:41	16:41	18:17	21:02	22:58		23:42	21:34	19:32	17:36	14:41	13:24
19	09:58	08:06	06:19	05:17	03:16		02:57	04:57	06:40	08:18	16:25-16:37/12	09:13
	14:45	16:45	18:21	21:05	23:02		23:37	21:30	19:28	17:32	14:38	13:24
20	09:55	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:22	16:26-16:36/10	09:17
	14:49	16:48	18:24	21:09	23:06		23:33	21:26	19:24	17:28	14:35	13:23
21	09:51	07:59	15:57-16:03/6	06:11	05:09	03:07	03:02	05:04	06:46	08:25	16:30-16:32/2	09:21
	14:53	16:52	18:27	21:12	23:11		23:28	21:22	19:20	17:24	14:31	13:23
22	09:48	07:55	15:55-16:06/11	06:07	05:05	03:03	03:06	05:07	06:49	08:29		09:25
	14:57	16:55	18:31	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:45	07:51	15:54-16:07/13	06:03	05:01	02:55	03:11	05:11	06:53	08:32		09:29
	15:01	16:59	18:34	21:20	23:20		23:20	21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	15:52-16:07/15	05:59	04:57	02:50	03:15	05:14	06:56	08:36		09:33
	15:05	17:02	18:37	21:23	23:24		23:16	21:10	19:08	17:13	14:21	13:25
25	09:38	07:43	15:51-16:08/17	05:55	04:53	02:46	03:19	05:18	06:59	07:39		09:37
	15:09	17:06	18:41	21:27	23:29		23:11	21:06	19:04	16:09	14:18	13:26
26	09:34	07:40	15:51-16:08/17	05:51	04:49	02:41	03:24	05:21	07:02	07:43		09:40
	15:13	17:10	18:44	21:31	23:33		23:07	21:02	19:01	16:06	14:14	13:28
27	09:31	07:36	15:51-16:08/17	05:48	04:45	02:37	03:28	05:24	07:06	07:46		09:44
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:11	13:29
28	09:27	07:32	15:52-16:08/16	05:44	04:41	02:32	03:32	05:28	07:09	07:50		09:48
	15:21	17:16	18:50	21:38	23:43		22:59	20:54	18:53	15:58	14:08	13:31
29	09:24		06:40	04:37	02:28		03:36	05:31	07:12	07:53		09:52
	15:25		19:54	21:42	23:48		22:55	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:23		03:40	05:35	07:15	07:57		09:56
	15:29		19:57	21:45	23:53		22:51	20:46	18:45	15:51	14:02	13:35
31	09:16		06:32		02:18		03:45	05:38		08:01		10:49
	15:33		20:00		23:58		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	602	687	661	525	396	297	176	91
Sum of minutes with flicker	0	112	37	0	0	0	0	0	0	149	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 28
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 10 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (10)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10:47 13:41	09:13 15:37	07:28 17:20	06:28 20:04	04:29 21:49	02:13 00:04		03:49 22:42	05:41 20:38	07:18 18:41	17:35-17:46/11	08:04 15:43	10:00 13:59
2	10:46 13:44	09:09 15:41	07:24 17:23	06:24 20:07	04:25 21:53	02:08 00:09		03:53 22:38	05:45 20:34	07:22 18:37	17:33-17:46/13	08:08 15:39	10:03 13:56
3	10:44 13:47	09:06 15:45	07:20 17:27	06:20 20:10	04:21 21:57	02:02 00:15		03:57 22:34	05:48 20:30	07:25 18:34	17:32-17:46/14	08:12 15:36	10:07 13:53
4	10:41 13:50	09:02 15:48	07:17 17:30	06:16 20:14	04:17 22:01	01:57 00:21		04:01 22:30	05:51 20:27	07:28 18:30	17:32-17:46/14	08:16 15:32	10:11 13:50
5	10:39 13:53	08:58 15:52	07:13 17:34	06:12 20:17	04:13 22:05	01:51 00:27	01:36 00:54	04:05 22:26	05:55 20:23	07:31 18:26	17:32-17:43/11	08:19 15:28	10:14 13:47
6	10:37 13:56	08:55 15:56	07:09 17:37	06:08 20:21	04:09 22:09	01:44 00:34	01:46 00:45	04:08 22:22	05:58 20:19	07:35 18:22	17:33-17:39/6	08:23 15:25	10:18 13:45
7	10:34 14:00	08:51 16:00	07:05 17:41	16:57-17:01/4 20:24	06:05 22:12	04:05 00:43	01:36 00:38	01:54 22:18	04:12 20:15	06:01 18:18	17:34-17:35/1	08:27 15:21	10:21 13:42
8	10:32 14:03	08:47 16:04	07:01 17:44	16:56-17:04/8 20:27	06:01 22:16	04:01 00:54	01:25 00:32	02:00 22:14	04:16 20:11	06:04 18:14		08:31 15:17	10:24 13:40
9	10:29 14:07	08:44 16:08	06:57 17:47	16:55-17:08/13 20:31	05:57 22:20	03:57 02:10	23:35 00:26	02:07 22:10	04:20 20:07	06:08 18:10		08:34 15:14	10:28 13:37
10	10:26 14:11	08:40 16:11	06:54 17:51	16:54-17:08/14 20:34	05:53 22:24	03:53		02:12 00:20	04:24 22:06	06:11 20:03		08:38 15:10	10:31 13:35
11	10:23 14:14	08:36 16:15	06:50 17:54	16:54-17:08/14 20:38	05:49 22:28	03:49		02:18 00:15	04:27 22:02	06:14 19:59		08:42 15:06	10:34 13:33
12	10:20 14:18	08:32 16:19	06:46 17:57	16:55-17:07/12 20:41	05:45 22:33	03:45		02:23 00:10	04:31 21:58	06:17 19:55		08:46 15:03	10:37 13:31
13	10:17 14:22	08:29 16:23	06:42 18:01	16:55-17:06/11 20:44	05:41 22:37	03:41		02:28 00:05	04:35 21:54	06:21 19:51		08:50 17:55	10:39 13:30
14	10:14 14:26	08:25 16:26	06:38 18:04	16:58-17:03/5 20:48	05:37 22:41	03:37		02:34 00:00	04:39 21:50	06:24 19:47		08:54 17:51	10:42 13:28
15	10:11 14:29	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:45	03:33		02:38 23:55	04:42 21:46	06:27 19:43		08:58 17:47	10:44 13:27
16	10:08 14:33	08:17 16:34	06:30 18:11	05:29 20:55	03:28 22:49	03:28		02:43 23:51	04:46 21:42	06:30 19:40		09:01 17:44	10:46 13:26
17	10:05 14:37	08:14 16:37	06:26 18:14	05:25 20:58	03:24 22:53	03:24		02:48 23:46	04:50 21:38	06:34 19:36		09:05 17:40	10:48 13:25
18	10:02 14:41	08:10 16:41	06:23 18:17	05:21 21:02	03:20 22:58	03:20		02:53 23:42	04:53 21:34	06:37 19:32		09:09 17:36	10:50 13:24
19	09:58 14:45	08:06 16:45	06:19 18:21	05:17 21:05	03:16 23:02	03:16		02:57 23:37	04:57 21:30	06:40 19:28		09:13 17:32	10:51 13:23
20	09:55 14:49	08:02 16:48	06:15 18:24	05:13 21:09	03:12 23:06	03:12		03:02 23:33	05:00 21:26	06:43 19:24		09:17 17:28	10:53 13:23
21	09:52 14:53	07:59 16:52	06:11 18:27	05:09 21:13	03:07 23:11	03:07		03:02 23:29	05:04 21:22	06:46 19:20		08:25 17:25	10:54 13:23
22	09:48 14:57	07:55 16:55	06:07 18:31	05:05 21:16	03:03 23:15	03:03		03:06 23:24	05:07 21:18	06:50 19:16		08:29 17:21	10:54 13:24
23	09:45 15:01	07:51 16:59	06:03 18:34	05:01 21:20	02:55 23:20	02:55		03:11 23:20	05:11 21:14	06:53 19:12		08:32 17:17	10:55 13:24
24	09:41 15:05	07:47 17:02	05:59 18:37	04:57 21:23	02:50 23:24	02:50		03:15 23:16	05:14 21:10	06:56 19:08		08:36 17:13	10:55 13:25
25	09:38 15:09	07:43 17:06	05:55 18:41	04:53 21:27	02:46 23:29	02:46		03:19 23:11	05:18 21:06	06:59 19:04		07:39 16:09	10:55 13:26
26	09:34 15:13	07:40 17:10	05:52 18:44	04:49 21:31	02:41 23:34	02:41		03:24 23:07	05:21 21:02	07:02 19:01		07:43 16:06	10:54 13:27
27	09:31 15:17	07:36 17:13	05:48 18:47	04:45 21:34	02:37 23:38	02:37		03:28 23:03	05:25 20:58	07:06 18:57		07:46 16:02	10:54 13:29
28	09:27 15:21	07:32 17:17	05:44 18:51	04:41 21:38	02:32 23:43	02:32		03:32 22:59	05:28 20:54	07:09 18:53		07:50 15:58	10:53 13:31
29	09:24 15:25		06:40 19:54	04:37 21:42	02:28 23:48	02:28		03:36 22:55	05:31 20:50	07:12 18:49		07:54 15:54	10:52 13:33
30	09:20 15:29		06:36 19:57	04:33 21:45	02:23 23:53	02:23		03:40 22:51	05:35 20:46	07:15 18:45	17:36-17:44/8	09:56 15:51	10:51 13:35
31	09:17 15:33		06:32 20:00		02:18 23:58			03:45 22:47	05:38 20:42	08:01 15:47			10:49 13:38
Potential sun hours	139	226	362	461	602	687	661	525	396	297	176	91	0
Sum of minutes with flicker	0	0	81	0	0	0	0	0	8	70	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 29
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 11** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (11)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10:47 13:41	09:13 15:37	07:28 17:20	06:28 20:04	04:30 21:49	02:13 00:03		03:49 22:42	05:41 20:38	07:18 18:41	08:04 15:43	09:59 13:59	
2	10:45 13:44	09:09 15:41	07:24 17:23	06:24 20:07	04:26 21:53	02:08 00:09		03:53 22:38	05:45 20:34	07:22 18:37	08:08 15:39	10:03 13:56	
3	10:43 13:47	09:06 15:45	07:20 17:27	06:20 20:10	04:21 21:57	02:03 00:14		03:57 22:34	05:48 20:30	07:25 18:33	08:12 15:36	10:07 13:53	
4	10:41 13:50	09:02 15:48	07:17 17:30	06:16 20:14	04:17 22:01	01:57 00:20		04:01 22:30	05:51 20:26	07:28 18:30	08:15 15:32	10:10 13:50	
5	10:39 13:53	08:58 15:52	07:13 17:34	06:12 20:17	04:13 22:05	01:51 00:27	01:37	04:05 22:26	05:55 20:23	07:31 18:26	08:19 15:28	10:14 13:48	
6	10:36 13:57	08:55 15:56	07:09 17:37	06:09 20:21	04:09 22:08	01:45 00:34	01:47	04:08 22:22	05:58 20:19	07:35 18:22	08:23 15:25	10:17 13:45	
7	10:34 14:00	08:51 16:00	07:05 17:41	06:05 20:24	04:05 22:12	01:37 00:42	01:54	04:12 22:18	06:01 20:15	07:38 18:18	08:27 15:21	10:21 13:42	
8	10:31 14:03	08:47 16:04	07:01 17:44	06:01 20:27	04:01 22:16	01:27 00:52	02:01	04:16 22:14	06:04 20:11	07:41 18:14	08:31 15:17	10:24 13:40	
9	10:29 14:07	08:44 16:08	06:57 17:47	05:57 20:31	03:57 22:20	01:28 00:43	02:07	04:20 22:10	06:08 20:07	07:45 18:10	08:34 15:14	10:27 13:38	
10	10:26 14:11	08:40 16:11	06:54 17:51	05:53 20:34	03:53 22:24		02:13	04:24 22:06	06:11 20:03	07:48 18:07	08:38 15:10	10:30 13:36	
11	10:23 14:14	08:36 16:15	15:19-15:24/5	06:50 17:54	05:49 20:38	03:49 22:28	02:18	04:28 22:02	06:14 19:59	07:51 18:03	08:42 15:06	10:33 13:33	
12	10:20 14:18	08:32 16:19	15:19-15:29/10	06:46 17:57	05:45 20:41	03:45 22:32	02:24	04:31 21:58	06:17 19:55	07:55 17:59	08:46 15:03	10:36 13:32	
13	10:17 14:22	08:29 16:23	15:19-15:31/12	06:42 18:01	05:41 20:44	03:41 22:36	02:29	04:35 21:54	06:21 19:51	07:58 17:55	08:50 14:59	10:39 13:30	
14	10:14 14:26	08:25 16:26	15:19-15:30/11	06:38 18:04	05:37 20:48	03:37 22:41	02:34	04:39 21:50	06:24 19:47	08:01 17:51	08:54 14:56	10:41 13:28	
15	10:11 14:30	08:21 16:30	15:19-15:30/11	06:34 18:07	05:33 20:51	03:33 22:45	02:39	04:42 21:46	06:27 19:43	08:05 17:47	08:57 14:52	10:44 13:27	
16	10:08 14:33	08:17 16:34	15:20-15:29/9	06:30 18:11	05:29 20:55	03:29 22:49	02:44	04:46 21:42	06:30 19:39	08:08 17:44	09:01 14:49	10:46 13:26	
17	10:05 14:37	08:14 16:37	15:22-15:27/5	06:26 18:14	05:25 20:58	03:24 22:53	02:48	04:50 21:38	06:34 19:36	08:11 17:40	09:05 14:45	10:48 13:25	
18	10:01 14:41	08:10 16:41		06:23 18:17	05:21 21:02	03:20 22:57	02:53	04:53 21:34	06:37 19:32	08:15 17:36	09:09 14:42	10:50 13:24	
19	09:58 14:45	08:06 16:45		06:19 18:21	05:17 21:05	03:16 23:02	02:58	04:57 21:30	06:40 19:28	08:18 17:32	09:13 14:38	10:51 13:24	
20	09:55 14:49	08:02 16:48		06:15 18:24	05:13 21:09	03:12 23:06	03:02	05:00 21:26	06:43 19:24	08:22 17:28	09:17 14:35	10:52 13:24	
21	09:51 14:53	07:59 16:52		06:11 18:27	05:09 21:12	03:08 23:11	03:02	05:04 21:22	06:46 19:20	08:25 17:25	09:21 14:31	10:53 13:24	
22	09:48 14:57	07:55 16:55		06:07 18:31	05:05 21:16	03:03 23:15	03:06	05:07 21:18	06:50 19:16	08:29 17:21	09:25 14:28	10:54 13:24	
23	09:45 15:01	07:51 16:59		06:03 18:34	05:01 21:20	02:55 23:19	03:11	05:11 21:14	06:53 19:12	08:32 17:17	09:29 14:24	10:54 13:24	
24	09:41 15:05	07:47 17:03		05:59 18:37	04:57 21:23	02:50 23:24	03:15	05:14 21:10	06:56 19:08	08:36 17:13	09:33 14:21	10:55 13:25	
25	09:38 15:09	07:43 17:06		05:55 18:41	04:53 21:27	02:46 23:29	03:20	05:18 21:06	06:59 19:04	14:51-14:58/7	09:36 14:18	10:54 13:26	
26	09:34 15:13	07:40 17:10		05:51 18:44	04:49 21:31	02:42 23:33	03:24	05:21 21:02	07:02 19:01	07:43 16:06	14:49-14:59/10	09:40 14:15	10:54 13:28
27	09:31 15:17	07:36 17:13		05:48 18:47	04:46 21:34	02:37 23:38	03:28	05:25 20:58	07:06 18:57	07:46 16:02	14:48-14:59/11	09:44 14:11	10:54 13:29
28	09:27 15:21	07:32 17:17		05:44 18:50	04:42 21:38	02:32 23:43	03:32	05:28 20:54	07:09 18:53	07:50 15:58	14:48-15:00/12	09:48 14:08	10:53 13:31
29	09:24 15:25			06:40 19:54	04:38 21:42	02:28 23:48	03:36	05:31 20:50	07:12 18:49	07:53 15:54	14:48-15:00/12	09:52 14:05	10:52 13:33
30	09:20 15:29			06:36 19:57	04:34 21:45	02:23 23:53	03:41	05:35 20:46	07:15 18:45	07:57 15:51	14:48-14:57/9	09:56 14:02	10:51 13:35
31	09:16 15:33			06:32 20:00		02:18 23:58	03:45	05:38 20:42		08:01 15:47	14:49-14:53/4		10:49 13:38
Potential sun hours	139	226	362	461	601	708	661	525	396	297	176	91	
Sum of minutes with flicker	0	63	0	0	0	0	0	0	0	65	0	0	

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 30
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 12** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (12)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:29	02:13		03:49	05:41	07:19	08:05	10:00
	13:41	15:37	17:20	20:04	21:49	00:04		22:42	20:38	18:41	15:43	13:59
2	10:46	09:09	07:24	06:24	04:25	02:08		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:09		22:38	20:34	18:37	15:39	13:56
3	10:44	09:06	07:21	06:20	04:21	02:02		03:57	05:48	07:25	08:12	10:07
	13:47	15:44	17:27	20:11	21:57	00:15		22:34	20:31	18:34	15:36	13:53
4	10:41	09:02	07:17	06:16	04:17	01:57		04:01	05:51	07:28	08:16	10:11
	13:50	15:48	17:30	20:14	22:01	00:21		22:30	20:27	18:30	15:32	13:50
5	10:39	08:58	07:13	06:12	04:13	01:51	01:36	04:04	05:55	07:32	08:19	10:14
	13:53	15:52	17:34	20:17	22:05	00:27	00:55	22:26	20:23	18:26	15:28	13:47
6	10:37	08:55	07:09	06:09	04:09	01:44	01:46	04:08	05:58	07:35	08:23	10:18
	13:56	15:56	17:37	20:21	22:09	00:35	00:46	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:05	01:36	01:53	04:12	06:01	07:38	08:27	10:21
	14:00	16:00	17:41	20:24	22:13	00:43	00:38	22:18	20:15	18:18	15:21	13:42
8	10:32	08:47	07:01	06:01	04:01	01:25	02:00	04:16	06:05	07:41	08:31	10:25
	14:03	16:04	17:44	20:27	22:16	00:54	00:32	22:14	20:11	18:14	15:17	13:40
9	10:29	08:44	06:57	05:57	03:57	04:07	02:06	04:20	06:08	07:45	08:34	10:28
	14:07	16:08	17:47	20:31	22:20	04:21	00:26	22:10	20:07	18:10	15:14	13:37
10	10:26	08:40	06:54	05:53	03:53		02:12	04:24	06:11	07:48	08:38	10:31
	14:10	16:11	17:51	20:34	22:24		00:20	22:06	20:03	18:07	15:10	13:35
11	10:23	08:36	06:50	05:49	03:49		02:18	04:27	06:14	07:51	08:42	10:34
	14:14	16:15	17:54	20:38	22:29		00:15	22:02	19:59	18:03	15:06	13:33
12	10:20	08:33	06:46	05:45	03:45		02:23	04:31	06:17	07:55	08:46	10:37
	14:18	16:19	17:57	20:41	22:33		00:10	21:58	19:55	17:59	15:03	13:31
13	10:17	08:29	06:42	05:41	03:41		02:28	04:35	06:21	07:58	08:50	10:39
	14:22	16:23	18:01	20:44	22:37		00:05	21:54	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:33	04:39	06:24	08:01	08:54	10:42
	14:26	16:26	18:04	20:48	22:41		00:00	21:50	19:47	17:51	14:56	13:28
15	10:11	08:21	06:34	05:33	03:33		02:38	04:42	06:27	08:05	08:58	10:44
	14:29	16:30	18:07	20:51	22:45		23:56	21:46	19:43	17:47	14:52	13:27
16	10:08	08:18	06:30	05:29	03:28		02:43	04:46	06:30	08:08	09:01	10:46
	14:33	16:34	18:11	20:55	22:49		23:51	21:42	19:40	17:44	14:48	13:26
17	10:05	08:14	06:27	05:25	03:24		02:48	04:50	06:34	08:11	09:05	10:48
	14:37	16:37	18:14	20:58	22:53		23:46	21:38	19:36	17:40	14:45	13:25
18	10:02	08:10	06:23 17:37-17:39/2	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:50
	14:41	16:41	18:17	21:02	22:58		23:42	21:34	19:32	17:36	14:41	13:24
19	09:58	08:06	06:19 17:36-17:42/6	05:17	03:16		02:57	04:57	06:40 18:25-18:31/6	08:18	09:13	10:51
	14:45	16:45	18:21	21:05	23:02		23:37	21:30	19:28	17:32	14:38	13:23
20	09:55	08:02	06:15 17:35-17:46/11	05:13	03:12		03:02	05:00	06:43 18:22-18:32/10	08:22	09:17	10:53
	14:49	16:48	18:24	21:09	23:06		23:33	21:26	19:24	17:28	14:35	13:23
21	09:52	07:59	06:11 17:35-17:47/12	05:09	03:07		03:02	05:04	06:46 18:21-18:33/12	08:25	09:21	10:54
	14:53	16:52	18:27	21:13	23:11		23:29	21:22	19:20	17:25	14:31	13:23
22	09:48	07:55	06:07 17:35-17:47/12	05:05	03:03		03:06	05:07	06:50 18:20-18:32/12	08:29	09:25	10:54
	14:57	16:55	18:31	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:45	07:51	06:03 17:35-17:46/11	05:01	02:54		03:11	05:11	06:53 18:19-18:31/12	08:32	09:29	10:55
	15:01	16:59	18:34	21:20	23:20		23:20	21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59 17:37-17:45/8	04:57	02:50		03:15	05:14	06:56 18:20-18:27/7	08:36	09:33	10:55
	15:05	17:03	18:37	21:23	23:24		23:16	21:10	19:08	17:13	14:21	13:25
25	09:38	07:43	05:55	04:53	02:46		03:19	05:18	06:59 18:20-18:23/3	07:39	09:37	10:55
	15:09	17:06	18:41	21:27	23:29		23:12	21:06	19:05	16:09	14:18	13:26
26	09:34	07:40	05:52	04:49	02:41		03:24	05:21	07:02	07:43	09:41	10:55
	15:13	17:10	18:44	21:31	23:34		23:07	21:02	19:01	16:06	14:14	13:27
27	09:31	07:36	05:48	04:45	02:37		03:28	05:25	07:06	07:46	09:44	10:54
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:11	13:29
28	09:27	07:32	05:44	04:41	02:32		03:32	05:28	07:09	07:50	09:48	10:53
	15:21	17:17	18:51	21:38	23:43		22:59	20:54	18:53	15:58	14:08	13:31
29	09:24		06:40	04:37	02:28		03:36	05:31	07:12	07:54	09:52	10:52
	15:25		19:54	21:42	23:48		22:55	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:23		03:40	05:35	07:15	07:57	09:56	10:51
	15:29		19:57	21:46	23:53		22:51	20:46	18:45	15:51	14:02	13:35
31	09:17		06:32		02:18		03:45	05:38		08:01		10:49
	15:33		20:01		23:58		22:47	20:42		15:47		13:38
Potential sun hours	139	226	362	461	602	685	661	525	396	297	176	91
Sum of minutes with flicker	0	0	62	0	0	0	0	0	62	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 31
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 13** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (13)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13 12:51-13:00/9	07:28 06:28	04:29	02:13	00:03	03:49	05:41	07:18	08:04 12:15-12:36/21	09:59	
	13:41	15:37	17:20 20:04	21:49	00:03	22:42	20:38	18:41	15:43	13:59		
2	10:45	09:09 12:49-13:02/13	07:24 06:24	04:25	02:08	00:09	03:53	05:45	07:22	08:08 12:16-12:37/21	10:03	
	13:44	15:41	17:23 20:07	21:53	00:09	22:38	20:34	18:37	15:39	13:56		
3	10:43	09:05 12:48-13:04/16	07:20 06:20	04:21	02:03	00:03	03:57	05:48	07:25	08:12 12:15-12:36/21	10:07	
	13:47	15:44	17:27 20:10	21:57	00:14	22:34	20:30	18:33	15:36	13:53		
4	10:41	09:02 12:47-13:05/18	07:16 06:16	04:17	01:57	00:01	04:01	05:51	07:28	08:15 12:15-12:36/21	10:10	
	13:50	15:48	17:30 20:14	22:01	00:20	22:30	20:26	18:30	15:32	13:50		
5	10:39	08:58 12:46-13:06/20	07:13 06:12	04:13	01:51	01:37	04:04	05:55	07:31	08:19 12:16-12:36/20	10:14	
	13:53	15:52	17:34 20:17	22:04	00:27	00:54	22:26	18:26	15:28	13:47		
6	10:36	08:55 12:46-13:06/20	07:09 06:08	04:09	01:44	01:46	04:08	05:58	07:35	08:23 12:17-12:36/19	10:17	
	13:56	15:56	17:37 20:20	22:08	00:34	00:45	22:22	18:22	15:25	13:45		
7	10:34	08:51 12:46-13:07/21	07:05 06:04	04:05	01:36	01:54	04:12	06:01	07:38	08:27 12:18-12:35/17	10:21	
	14:00	16:00	17:40 20:24	22:12	00:42	00:38	22:18	20:15	18:18	15:21	13:42	
8	10:31	08:47 12:46-13:07/21	07:01 06:01	04:01	01:26	02:00	04:16	06:04	07:41	08:30 12:19-12:34/15	10:24	
	14:03	16:04	17:44 20:27	22:16	00:53	00:31	22:14	20:11	18:14	15:17	13:40	
9	10:29	08:43 12:46-13:08/22	06:57 05:57	03:57	02:12	02:07	04:20	06:08	07:44	08:34 12:20-12:33/13	10:27	
	14:07	16:07	17:47 20:31	22:20	00:41	00:25	22:10	20:07	18:10	15:14	13:37	
10	10:26	08:40 12:46-13:07/21	06:53 05:53	03:53	02:12	02:12	04:24	06:11	07:48	08:38 12:22-12:31/9	10:30	
	14:10	16:11	17:51 20:34	22:24	00:20	00:20	22:06	20:03	18:06	15:10	13:35	
11	10:23	08:36 12:46-13:06/20	06:50 05:49	03:49	02:18	04:27	06:14	07:51	08:42	15:10	13:33	
	14:14	16:15	17:54 20:37	22:28	00:15	00:15	22:02	19:59	18:03	15:06	13:33	
12	10:20	08:32 12:47-13:06/19	06:46 05:45	03:45	02:23	04:31	06:17	07:54	08:46	15:06	13:36	
	14:18	16:19	17:57 20:41	22:32	00:09	01:58	19:55	17:59	15:03	13:31		
13	10:17	08:29 12:48-13:06/18	06:42 05:41	03:41	02:29	04:35	06:21	07:58	08:50	15:03	13:39	
	14:22	16:23	18:01 20:44	22:36	00:05	01:54	19:51	17:55	14:59	13:30		
14	10:14	08:25 12:49-13:04/15	06:38 05:37	03:37	02:34	04:39	06:24	08:01	08:53	14:59	13:30	
	14:26	16:26	18:04 20:48	22:41	00:00	01:50	19:47	17:51	14:55	13:28		
15	10:11	08:21 12:51-13:03/12	06:34 05:33	03:32	02:38	04:42	06:27	08:04	08:57	14:52	13:27	
	14:29	16:30	18:07 20:51	22:45	00:09	01:58	19:53	17:57	14:52	13:27		
16	10:08	08:17 12:54-12:59/5	06:30 05:29	03:28	02:43	04:46	06:30	08:08	09:01	14:48	13:26	
	14:33	16:34	18:11 20:55	22:49	00:15	02:12	19:39	17:43	14:48	13:26		
17	10:05	08:14	06:26 05:25	03:24	02:48	04:49	06:33	08:11	09:05	14:48	13:25	
	14:37	16:37	18:14 20:58	22:53	00:26	02:18	19:35	17:40	14:45	13:25		
18	10:01	08:10	06:22 05:21	03:20	02:53	04:53	06:37	08:15	09:09	14:41	13:24	
	14:41	16:41	18:17 21:02	22:57	00:31	02:14	19:32	17:36	14:41	13:24		
19	09:58	08:06	06:19 05:17	03:16	02:57	04:57	06:40	08:18	09:13	14:38	13:24	
	14:45	16:45	18:21 21:05	23:02	00:37	02:13	19:28	17:32	14:38	13:24		
20	09:55	08:02	06:15 05:13	03:12	03:02	05:00	06:43	08:22	09:17	14:34	13:23	
	14:49	16:48	18:24 21:09	23:06	00:33	02:16	19:24	17:28	14:34	13:23		
21	09:51	07:58	06:11 05:09	03:07	03:02	05:04	06:46	08:25	09:21	14:31	13:23	
	14:53	16:52	18:27 21:12	23:10	00:38	02:22	19:20	17:24	14:31	13:23		
22	09:48	07:55	06:07 05:05	03:03	03:06	05:07	06:49	08:28	09:25	14:28	13:24	
	14:57	16:55	18:31 21:16	23:15	00:34	02:18	19:16	17:21	14:28	13:24		
23	09:44	07:51	06:03 05:01	02:55	03:11	05:11	06:53	08:32	09:29	14:24	13:24	
	15:01	16:59	18:34 21:20	23:19	00:30	02:14	19:12	17:17	14:24	13:24		
24	09:41	07:47	05:59 04:57	02:50	03:15	05:14	06:56	08:35	09:32	14:21	13:25	
	15:05	17:02	18:37 21:23	23:24	00:35	02:10	19:08	17:13	14:21	13:25		
25	09:38	07:43	05:55 04:53	02:46	03:19	05:18	06:59	07:39	09:36	14:18	13:26	
	15:09	17:06	18:40 21:27	23:29	00:31	02:06	19:04	16:09	14:18	13:26		
26	09:34	07:39	05:51 04:49	02:41	03:24	05:21	07:02	07:43 12:23-12:30/7	09:40	14:14	13:27	
	15:13	17:09	18:44 21:30	23:33	00:37	02:02	19:00	16:06	14:14	13:27		
27	09:31	07:36	05:47 04:45	02:37	03:28	05:24	07:05	07:46 12:20-12:32/12	09:44	14:11	13:29	
	15:17	17:13	18:47 21:34	23:38	00:33	02:08	18:57	16:02	14:11	13:29		
28	09:27	07:32	05:44 04:41	02:32	03:32	05:28	07:09	07:50 12:19-12:35/16	09:48	14:08	13:31	
	15:21	17:16	18:50 21:38	23:43	00:36	05:24	18:53	15:58	14:08	13:31		
29	09:23		05:40 04:37	02:28	03:36	05:31	07:12	07:53 12:17-12:35/18	09:52	14:05	13:33	
	15:25		19:54 21:42	23:48	00:35	05:20	18:49	15:54	14:05	13:33		
30	09:20		05:36 04:33	02:23	03:40	05:35	07:15	07:57 12:16-12:36/20	09:56	14:02	13:35	
	15:29		19:57 21:45	23:53	00:34	05:26	18:45	15:50	14:02	13:35		
31	09:16		05:32	02:18	03:44	05:38		08:01 12:16-12:37/21	10:49	13:38		
	15:33		20:00	23:58	00:41	02:46	20:42	15:47				
Potential sun hours	139	226	362	461	601	689	661	525	396	297	176	91
Sum of minutes with flicker	0	270	0	0	0	0	0	0	0	94	177	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 32
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 14 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (14)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47 13:41	09:13 15:37	07:28 17:20	06:28 20:04	04:29 21:49	02:13 00:03		03:48 22:42	05:41 20:38	07:18 18:41	08:04 15:43	09:59 13:59
2	10:45 13:44	09:09 15:40	07:24 17:23	06:24 20:07	04:25 21:53	02:08 00:09		03:52 22:38	05:45 20:34	07:21 18:37	08:08 15:39	10:03 13:56
3	10:43 13:47	09:05 15:44	07:20 17:27	06:20 20:10	04:21 21:57	02:02 00:14		03:56 22:34	05:48 20:30	07:25 18:33	08:12 15:36	10:07 13:53
4	10:41 13:50	09:02 15:48	07:16 17:30	06:16 20:14	04:17 22:00	01:57 00:20		04:00 22:30	05:51 20:26	07:28 18:29	08:15 15:32	10:10 13:50
5	10:39 13:53	08:58 15:52	07:13 17:34	06:12 20:17	04:13 22:04	01:51 00:27	01:37	04:04 22:26	05:54 20:22	07:31 18:26	08:19 15:28	10:14 13:47
6	10:36 13:56	08:54 15:56	07:09 17:37	06:08 20:20	04:09 22:08	01:44 00:34	01:46	04:08 22:22	05:58 20:18	07:35 18:22	08:23 15:24	10:17 13:45
7	10:34 14:00	08:51 16:00	07:05 17:40	06:04 20:24	04:05 22:12	01:36 00:42	01:54	04:12 22:18	06:01 20:15	07:38 18:18	08:27 15:21	10:21 13:42
8	10:31 14:03	08:47 16:04	07:01 17:44	06:00 20:27	04:01 22:16	01:26 00:53	02:00	04:16 22:14	06:04 20:11	07:41 18:14	08:30 15:17	10:24 13:40
9	10:29 14:07	08:43 16:07	06:57 17:47	05:57 20:30	03:57 22:20	00:03 23:55	02:07	04:20 22:10	06:08 20:07	07:44 18:10	08:34 15:13	10:27 13:37
10	10:26 14:10	08:40 16:11	06:53 17:50	05:53 20:34	03:53 22:24		02:12	04:24 22:06	06:11 20:03	07:48 18:06	08:38 15:10	10:30 13:35
11	10:23 14:14	08:36 16:15	10:15-10:24/9	06:49 17:54	05:49 20:37	03:49	02:18	04:27 22:02	06:14 19:59	07:51 18:02	08:42 15:06	10:33 13:33
12	10:20 14:18	08:32 16:19	10:13-10:27/14	06:46 17:57	05:45 20:41	03:45	02:23	04:31 21:58	06:17 19:55	07:54 17:59	08:46 15:03	10:36 13:31
13	10:17 14:22	08:28 16:22	10:12-10:28/16	06:42 18:01	05:41 20:44	03:41	02:28	04:35 21:54	06:20 19:51	07:58 17:55	08:49 14:59	10:39 13:30
14	10:14 14:25	08:25 16:26	10:11-10:29/18	06:38 18:04	05:37 20:48	03:37	02:33	04:38 21:50	06:24 19:47	08:01 17:51	08:53 14:55	10:41 13:28
15	10:11 14:29	08:21 16:30	10:11-10:30/19	06:34 18:07	05:33 20:51	03:32	02:38	04:42 21:46	06:27 19:43	08:04 17:47	08:57 14:52	10:44 13:27
16	10:08 14:33	08:17 16:34	10:10-10:29/19	06:30 18:11	05:29 20:55	03:28	02:43	04:46 21:42	06:30 19:39	08:08 17:43	09:01 14:48	10:46 13:25
17	10:04 14:37	08:13 16:37	10:10-10:30/20	06:26 18:14	05:25 20:58	03:24	02:48	04:49 21:38	06:33 19:35	08:11 17:40	09:05 14:45	10:48 13:25
18	10:01 14:41	08:10 16:41	10:10-10:30/20	06:22 18:17	05:21 21:02	03:20	02:53	04:53 21:34	06:37 19:31	08:15 17:36	09:09 14:41	10:49 13:24
19	09:58 14:45	08:06 16:44	10:09-10:29/20	06:19 18:21	05:17 21:05	03:16	02:57	04:56 21:30	06:40 19:28	08:18 17:32	09:13 14:38	10:51 13:23
20	09:55 14:49	08:02 16:48	10:10-10:29/19	06:15 18:24	05:13 21:09	03:12	03:02	05:00 21:26	06:43 19:24	08:21 17:28	09:17 14:34	10:52 13:23
21	09:51 14:53	07:58 16:52	10:11-10:28/17	06:11 18:27	05:09 21:12	03:07	03:02	05:04 21:22	06:46 19:20	08:25 17:24	09:21 14:31	10:53 13:23
22	09:48 14:57	07:55 16:55	10:12-10:27/15	06:07 18:30	05:05 21:16	03:03	03:06	05:07 21:18	06:49 19:16	08:28 17:21	09:25 14:28	10:54 13:24
23	09:44 15:01	07:51 16:59	10:14-10:25/11	06:03 18:34	05:01 21:19	02:54	03:11	05:11 21:14	06:53 19:12	08:32 17:17	09:29 14:24	10:54 13:24
24	09:41 15:05	07:47 17:02	10:18-10:20/2	05:59 18:37	04:57 21:23	02:50	03:15	05:14 21:10	06:56 19:08	08:35 17:13	09:32 14:21	10:55 13:25
25	09:38 15:09	07:43 17:06		05:55 18:40	04:53 21:27	02:46	03:19	05:17 21:06	06:59 19:04	07:39 16:09	09:40-10:00/20	10:54 13:26
26	09:34 15:13	07:39 17:09		05:51 18:44	04:49 21:30	02:41	03:24	05:21 21:02	07:02 19:00	07:43 16:05	09:40-09:59/19	10:54 13:27
27	09:31 15:17	07:36 17:13		05:47 18:47	04:45 21:34	02:37	03:28	05:24 20:58	07:05 18:57	07:46 16:02	09:40-09:59/19	10:54 13:29
28	09:27 15:21	07:32 17:16		05:43 18:50	04:41 21:38	02:32	03:32	05:28 20:54	07:09 18:53	07:50 15:58	09:41-09:59/18	10:53 13:31
29	09:23 15:25			06:40 19:54	04:37 21:41	02:27	03:36	05:31 20:50	07:12 18:49	07:53 15:54	09:42-09:57/15	10:52 13:33
30	09:20 15:29			06:36 19:57	04:33 21:45	02:23	03:40	05:34 20:46	07:15 18:45	07:57 15:50	09:42-09:56/14	10:50 13:35
31	09:16 15:33			06:32 20:00		02:18	03:44	05:38 20:42		08:01 15:47	09:45-09:54/9	10:49 13:38
Potential sun hours	139	226	362	461	601	708	661	525	396	297	176	91
Sum of minutes with flicker	0	219	0	0	0	0	0	0	0	226	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 33
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 15** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (15)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:29	02:13		03:49	05:41	07:18	08:04	09:59
	13:41	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:25	02:08		03:53	05:45	07:21	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:21	02:03		03:57	05:48	07:25	08:12	10:07
	13:47	15:44	17:27	20:10	21:57	00:14		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:16	06:16	04:17	01:57		04:01	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:14	22:00	00:20		22:30	20:26	18:29	15:32	13:50
5	10:39	08:58	07:13	06:12	04:13	01:51	01:38	04:04	05:55	07:31	08:19	10:14
	13:53	15:52	17:34	20:17	22:04	00:26	00:53	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:09	01:45	01:47	04:08	05:58	07:35	08:23	10:17
	13:56	15:56	17:37	20:20	22:08	00:33	00:44	22:22	20:18	18:22	15:25	13:45
7	10:34	08:51	07:05	06:04	04:05	01:37	01:54	04:12	06:01	07:38	08:27	10:21
	14:00	16:00	17:40	20:24	22:12	00:41	00:37	22:18	20:15	18:18	15:21	13:42
8	10:31	08:47	07:01	06:00	04:01	01:27	02:01	04:16	06:04	07:41	08:30	10:24
	14:03	16:04	17:44	20:27	22:16	00:52	00:31	22:14	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	03:40	02:07	04:20	06:08	07:44	08:34	10:27
	14:07	16:07	17:47	20:30	22:20	01:40	00:25	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:06	20:03	18:06	15:10	13:35
11	10:23	08:36	06:49	05:49	03:49		02:18	04:27	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:03	15:06	13:33
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:39
	14:22	16:22	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:49	19:47	17:51	14:56	13:28
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:29	16:30	18:07	20:51	22:45		23:55	21:45	19:43	17:47	14:52	13:27
16	10:08	08:17	06:30	05:29	03:28		02:43	04:46	06:30	08:08	09:01	10:46
	14:33	16:34	18:11	20:55	22:49		23:50	21:41	19:39	17:43	14:48	13:26
17	10:04	08:13	06:26	05:25	03:24		02:48	04:49	06:33	08:11	09:05	10:48
	14:37	16:37	18:14	20:58	22:53		23:46	21:37	19:35	17:40	14:45	13:25
18	10:01	08:10	06:22	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:41	16:41	18:17	21:02	22:57		23:41	21:33	19:31	17:36	14:41	13:24
19	09:58	08:06	06:19	05:17	03:16		02:57	04:57	06:40	08:18	09:13	10:51
	14:45	16:44	18:21	21:05	23:02		23:37	21:30	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:21	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:26	19:24	17:28	14:34	13:23
21	09:51	07:58	06:11	05:09	03:07		03:02	05:04	06:46	08:25	09:21	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:24	14:31	13:24
22	09:48	07:55	06:07	05:05	03:03		03:06	05:07	06:49	08:28	09:24	10:54
	14:57	16:55	18:30	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:20	21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:25
25	09:37	07:43	05:55	04:53	02:46		03:19	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:26
26	09:34	07:39	05:51	04:49	02:41		03:24	05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:05	14:14	13:28
27	09:30	07:36	05:47	04:45	02:37		03:28	05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:11	13:29
28	09:27	07:32	05:44	04:41	02:32		03:32	05:28	07:09	07:50	09:48	10:53
	15:21	17:16	18:50	21:38	23:43		22:59	20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:37	02:28		03:36	05:31	07:12	07:53	09:52	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:23		03:40	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:50	14:02	13:35
31	09:16		06:32		02:18		03:45	05:38		08:01		10:49
	15:33		20:00		23:58		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	706	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 34
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 16 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (16)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47 13:41	09:13 15:36	07:28 17:20	06:28 20:03	04:29 21:49	02:13 00:03		03:48 22:42	05:41 20:38	07:18 18:41	08:04 15:43	09:59 13:59
2	10:45 13:44	09:09 15:40	07:24 17:23	06:24 20:07	04:25 21:53	02:08 00:08		03:52 22:38	05:44 20:34	07:21 18:37	08:08 15:39	10:03 13:56
3	10:43 13:47	09:05 15:44	07:20 17:27	06:20 20:10	04:21 21:57	02:03 00:14		03:56 22:34	05:48 20:30	07:25 18:33	08:12 15:35	10:07 13:53
4	10:41 13:50	09:02 15:48	07:16 17:30	06:16 20:14	04:17 22:00	01:57 00:20		04:00 22:30	05:51 20:26	07:28 18:29	08:15 15:32	10:10 13:50
5	10:39 13:53	08:58 15:52	07:12 17:33	06:12 20:17	04:13 22:04	01:51 00:26	01:37 00:53	04:04 22:26	05:54 20:22	07:31 18:26	08:19 15:28	10:14 13:47
6	10:36 13:56	08:54 15:56	07:09 17:37	06:08 20:20	04:09 22:08	01:44 00:33	01:46 00:44	04:08 22:22	05:58 20:18	07:34 18:22	08:23 15:24	10:17 13:45
7	10:34 14:00	08:51 16:00	07:05 17:40	06:04 20:24	04:05 22:12	01:37 00:42	01:54 00:37	04:12 22:18	06:01 20:14	07:38 18:18	08:26 15:21	10:21 13:42
8	10:31 14:03	08:47 16:04	07:01 17:44	06:00 20:27	04:01 22:16	01:26 00:52	02:00 00:31	04:16 22:14	06:04 20:11	07:41 18:14	08:30 15:17	10:24 13:40
9	10:28 14:07	08:43 16:07	06:57 17:47	05:56 20:30	03:57 22:20	01:29 00:47	02:07 00:25	04:20 22:09	06:07 20:07	07:44 18:10	08:34 15:13	10:27 13:37
10	10:26 14:10	08:40 16:11	06:53 17:50	05:53 20:34	03:53 22:24		02:12 00:20	04:24 22:05	06:11 20:03	07:48 18:06	08:38 15:10	10:30 13:35
11	10:23 14:14	08:36 16:15	06:49 17:54	05:49 20:37	03:49 22:28		02:18 00:14	04:27 22:01	06:14 19:59	07:51 18:02	08:42 15:06	10:33 13:33
12	10:20 14:18	08:32 16:19	06:46 17:57	05:45 20:41	03:45 22:32		02:23 00:09	04:31 21:57	06:17 19:55	07:54 17:59	08:46 15:03	10:36 13:31
13	10:17 14:22	08:28 16:22	06:42 18:01	05:41 20:44	03:41 22:36		02:28 00:04	04:35 21:53	06:20 19:51	07:58 17:55	08:49 14:59	10:39 13:30
14	10:14 14:25	08:25 16:26	06:38 18:04	05:37 20:48	03:37 22:40		02:34 00:00	04:38 21:49	06:24 19:47	08:01 17:51	08:53 14:55	10:41 13:28
15	10:11 14:29	08:21 16:30	06:34 18:07	05:33 20:51	03:32 22:45		02:38 23:55	04:42 21:45	06:27 19:43	08:04 17:47	08:57 14:52	10:44 13:27
16	10:08 14:33	08:17 16:33	06:30 18:10	05:29 20:55	03:28 22:49	21:36-21:40/4	02:43 23:50	04:46 21:41	06:30 19:39	08:08 17:43	09:01 14:48	10:46 13:26
17	10:04 14:37	08:13 16:37	06:26 18:14	05:25 20:58	03:24 22:53	21:37-21:46/9	02:48 23:46	04:49 21:37	06:33 19:35	08:11 17:39	09:05 14:45	10:48 13:25
18	10:01 14:41	08:10 16:41	06:22 18:17	05:21 21:02	03:20 22:57	21:37-21:46/9	02:53 23:41	04:53 21:33	06:36 19:31	08:15 17:36	09:09 14:41	10:49 13:24
19	09:58 14:45	08:06 16:44	06:18 18:20	05:17 21:05	03:16 23:02	21:38-21:45/7	02:57 23:37	04:56 21:29	06:40 19:28	08:18 17:32	09:13 14:38	10:51 13:23
20	09:54 14:49	08:02 16:48	06:15 18:24	05:13 21:09	03:12 23:06	21:40-21:45/5	03:02 23:32	05:00 21:25	06:43 19:24	08:21 17:28	09:17 14:34	10:52 13:23
21	09:51 14:53	07:58 16:52	06:11 18:27	05:09 21:12	03:07 23:10		03:02 23:28	05:04 21:22	06:46 19:20	08:25 17:24	09:21 14:31	10:53 13:23
22	09:48 14:57	07:54 16:55	06:07 18:30	05:05 21:16	03:03 23:15		03:06 23:24	05:07 21:18	06:49 19:16	08:28 17:20	09:24 14:28	10:54 13:24
23	09:44 15:01	07:51 16:59	06:03 18:34	05:01 21:19	02:54 23:19		03:11 23:20	05:11 21:14	06:52 19:12	08:32 17:17	09:28 14:24	10:54 13:24
24	09:41 15:05	07:47 17:02	05:59 18:37	04:57 21:23	02:50 23:24	21:49-21:55/6	03:15 23:15	05:14 21:10	06:56 19:08	08:35 17:13	09:32 14:21	10:54 13:25
25	09:37 15:09	07:43 17:06	05:55 18:40	04:53 21:27	02:46 23:28	21:48-21:56/8	03:19 23:11	05:17 21:06	06:59 19:04	07:39 16:09	09:36 14:18	10:54 13:26
26	09:34 15:13	07:39 17:09	05:51 18:44	04:49 21:30	02:41 23:33	21:48-21:57/9	03:24 23:07	05:21 21:02	07:02 19:00	07:42 16:05	09:40 14:14	10:54 13:27
27	09:30 15:17	07:35 17:13	05:47 18:47	04:45 21:34	02:37 23:38	21:47-21:57/10	03:28 23:03	05:24 20:58	07:05 18:56	07:46 16:02	09:44 14:11	10:53 13:29
28	09:27 15:21	07:32 17:16	05:43 18:50	04:41 21:38	02:32 23:43	21:47-21:56/9	03:32 22:59	05:28 20:54	07:09 18:53	07:50 15:58	09:48 14:08	10:53 13:31
29	09:23 15:25		06:40 19:54	04:37 21:41	02:28 23:47	21:47-21:53/6	03:36 22:54	05:31 20:50	07:12 18:49	07:53 15:54	09:52 14:05	10:52 13:33
30	09:20 15:29		06:36 19:57	04:33 21:45	02:23 23:52	21:47-21:50/3	03:40 22:50	05:34 20:46	07:15 18:45	07:57 15:50	09:55 14:02	10:50 13:35
31	09:16 15:33		06:32 20:00		02:18 23:58		03:44 22:46	05:38 20:42		08:00 15:47		10:49 13:38
Potential sun hours	139	226	362	461	601	708	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	51	0	51	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 35
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 17 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (17)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:12	07:28	06:28	04:29	20:36-20:46/10	02:13	03:49	05:41	07:18	08:04	09:59
	13:41	15:37	17:20	20:03	21:49		00:03	22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:25	20:38-20:44/6	02:08	03:53	05:45	07:21	08:08	10:03
	13:44	15:40	17:23	20:07	21:53		00:08	22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:21		02:03	03:57	05:48	07:25	08:11	10:06
	13:47	15:44	17:27	20:10	21:56		00:14	22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:16	06:16	04:17		01:57	04:00	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:14	22:00		00:20	22:30	20:26	18:29	15:32	13:50
5	10:38	08:58	07:12	06:12	04:13		01:51	04:04	05:54	07:31	08:19	10:14
	13:53	15:52	17:34	20:17	22:04		00:26	22:26	20:22	18:26	15:28	13:47
6	10:36	08:54	07:09	06:08	04:09		01:45	04:08	05:58	07:34	08:23	10:17
	13:56	15:56	17:37	20:20	22:08		00:33	22:22	20:18	18:22	15:24	13:45
7	10:34	08:51	07:05	06:04	04:05		01:37	04:12	06:01	07:38	08:26	10:20
	14:00	16:00	17:40	20:24	22:12		00:41	22:17	20:14	18:18	15:21	13:42
8	10:31	08:47	07:01	06:00	04:01		01:27	04:16	06:04	07:41	08:30	10:24
	14:03	16:04	17:44	20:27	22:16		00:51	22:13	20:10	18:14	15:17	13:40
9	10:28	08:43	06:57	05:56	03:57		00:51	04:20	06:08	07:44	08:34	10:27
	14:07	16:07	17:47	20:30	22:20		01:27	22:09	20:07	18:10	15:13	13:38
10	10:25	08:40	06:53	05:53	03:53			04:24	20:49-20:50/1	06:11	07:48	08:38
	14:11	16:11	17:50	20:34	22:24			22:05	20:03	18:06	15:10	13:35
11	10:23	08:36	06:49	05:49	03:49			04:27	20:45-20:53/8	06:14	07:51	08:42
	14:14	16:15	17:54	20:37	22:28			22:01	19:59	18:02	15:06	13:33
12	10:20	08:32	06:46	05:45	03:45			04:31	20:45-20:55/10	06:17	07:54	08:45
	14:18	16:19	17:57	20:41	22:32			21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41			04:35	20:44-20:55/11	06:20	07:58	08:49
	14:22	16:22	18:01	20:44	22:36			21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37			04:38	20:43-20:55/12	06:24	08:01	08:53
	14:26	16:26	18:04	20:48	22:40			21:49	19:47	17:51	14:55	13:28
15	10:11	08:21	06:34	05:33	03:33			04:42	20:43-20:55/12	06:27	08:04	08:57
	14:29	16:30	18:07	20:51	22:44			21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:28			04:46	20:43-20:53/10	06:30	08:08	09:01
	14:33	16:34	18:10	20:54	22:49			21:41	19:39	17:43	14:48	13:26
17	10:04	08:13	06:26	05:25	03:24			04:49	20:43-20:50/7	06:33	08:11	09:05
	14:37	16:37	18:14	20:58	22:53			21:37	19:35	17:40	14:45	13:25
18	10:01	08:10	06:22	05:21	03:20			04:53	20:44-20:46/2	06:36	08:14	09:09
	14:41	16:41	18:17	21:01	22:57			21:33	19:31	17:36	14:41	13:24
19	09:58	08:06	06:18	05:17	03:16			04:57	06:40	08:18	09:13	10:51
	14:45	16:44	18:20	21:05	23:01			21:29	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12			05:00	06:43	08:21	09:17	10:52
	14:49	16:48	18:24	21:09	23:06			21:25	19:24	17:28	14:34	13:23
21	09:51	07:58	06:11	05:09	03:07			05:04	06:46	08:25	09:20	10:53
	14:53	16:52	18:27	21:12	23:10			21:21	19:20	17:24	14:31	13:24
22	09:48	07:54	06:07	05:05	03:03			05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:15			21:17	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55			05:11	06:52	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19			21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50			05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24			21:10	19:08	17:13	14:21	13:25
25	09:37	07:43	05:55	04:53	20:37-20:41/4			05:17	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28			21:06	19:04	16:09	14:18	13:26
26	09:34	07:39	05:51	04:49	20:37-20:44/7			05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:44	21:30	23:33			21:02	19:00	16:05	14:14	13:28
27	09:30	07:35	05:47	04:45	20:36-20:47/11			05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38			20:58	18:56	16:02	14:11	13:29
28	09:27	07:32	05:43	04:41	20:36-20:48/12			05:28	07:08	07:50	09:48	10:52
	15:21	17:16	18:50	21:38	23:42			20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:37	20:35-20:47/12			05:31	07:12	07:53	09:51	10:51
	15:25		19:54	21:41	23:47			20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	20:36-20:47/11			05:34	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52			20:46	18:45	15:50	14:02	13:35
31	09:16		06:32		02:18			05:38		08:00		10:49
	15:33		20:00		23:57			20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	685	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	57	16	0	0	73	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 36
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 18 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (18)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:30	02:14		03:49	05:41	07:18	08:04	09:59
	13:42	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:26	02:09		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:40	13:56
3	10:43	09:05	07:20	06:20	04:22	02:04		03:57	05:48	07:25	08:12	10:06
	13:47	15:45	17:27	20:10	21:57	00:14		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:16	06:16	04:18	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:49	17:30	20:14	22:00	00:19		22:30	20:26	18:30	15:32	13:51
5	10:38	08:58	07:13	06:12	04:14	01:52	01:39	04:05	05:55	07:31	08:19	10:14
	13:54	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:10	01:46	01:48	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:33	00:43	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:05	01:38	01:55	04:12	06:01	07:38	08:27	10:20
	14:00	16:00	17:41	20:24	22:12	00:40	00:36	22:18	20:15	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:29	02:02	04:16	06:04	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:50	00:30	22:14	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	02:32	02:08	04:20	06:08	07:44	08:34	10:27
	14:07	16:08	17:47	20:31	22:20	04:12	00:24	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:06	20:03	18:07	15:10	13:36
11	10:23	08:36	06:50	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:15	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:03	15:07	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:49	19:47	17:51	14:56	13:29
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:55	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:45
	14:34	16:34	18:11	20:55	22:49		23:50	21:41	19:39	17:44	14:49	13:26
17	10:04	08:13	06:26	05:25	03:25		02:49	04:50	06:33	08:11	09:05	10:47
	14:38	16:37	18:14	20:58	22:53		23:46	21:38	19:36	17:40	14:45	13:25
18	10:01	08:10	06:23	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:42	16:41	18:17	21:02	22:57		23:41	21:34	19:32	17:36	14:42	13:25
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:50
	14:45	16:45	18:21	21:05	23:01		23:37	21:30	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:22	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:26	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:21	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:25	14:31	13:24
22	09:48	07:55	06:07	05:05	03:04		03:07	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:31	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:14	19:12	17:17	14:25	13:25
24	09:41	07:47	05:59	04:58	02:51		03:16	05:14	06:56	08:35	09:32	10:54
	15:05	17:03	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:54	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:50	02:42		03:24	05:21	07:02	07:43	09:40	10:54
	15:13	17:10	18:44	21:30	23:33		23:07	21:02	19:01	16:06	14:15	13:28
27	09:30	07:36	05:48	04:46	02:37		03:28	05:25	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:12	13:30
28	09:27	07:32	05:44	04:42	02:33		03:32	05:28	07:09	07:50	09:48	10:52
	15:21	17:17	18:50	21:38	23:42		22:58	20:54	18:53	15:58	14:08	13:32
29	09:23		06:40	04:38	02:28		03:37	05:31	07:12	07:53	09:52	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:34
30	09:20		06:36	04:34	02:24		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:01		10:49
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	686	660	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 37
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 19 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (19)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:29	02:14		03:49	05:41	07:18	08:04	09:59
	13:41	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:25	02:09		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:21	02:03		03:57	05:48	07:25	08:12	10:06
	13:47	15:45	17:27	20:10	21:57	00:14		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:16	06:16	04:17	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:14	22:00	00:20		22:30	20:26	18:30	15:32	13:50
5	10:38	08:58	07:13	06:12	04:13	01:52	01:39	04:05	05:55	07:31	08:19	10:14
	13:53	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:09	01:45	01:47	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:33	00:44	22:22	20:18	18:22	15:25	13:45
7	10:34	08:51	07:05	06:04	04:05	01:38	01:55	04:12	06:01	07:38	08:27	10:20
	14:00	16:00	17:40	20:24	22:12	00:41	00:37	22:18	20:15	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:28	02:01	04:16	06:04	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:51	00:30	22:14	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	02:02	02:07	04:20	06:08	07:44	08:34	10:27
	14:07	16:08	17:47	20:31	22:20	00:34	00:25	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:05	20:03	18:06	15:10	13:36
11	10:23	08:36	06:50	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:03	15:06	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:49	19:47	17:51	14:56	13:29
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:55	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:45
	14:34	16:34	18:11	20:55	22:49		23:50	21:41	19:39	17:43	14:49	13:26
17	10:04	08:13	06:26	05:25	03:24		02:48	04:50	06:33	08:11	09:05	10:47
	14:37	16:37	18:14	20:58	22:53		23:46	21:37	19:35	17:40	14:45	13:25
18	10:01	08:10	06:22	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:41	16:41	18:17	21:02	22:57		23:41	21:33	19:32	17:36	14:42	13:24
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:51
	14:45	16:45	18:21	21:05	23:01		23:37	21:30	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:21	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:26	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:21	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:24	14:31	13:24
22	09:48	07:55	06:07	05:05	03:03		03:07	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:14	19:12	17:17	14:24	13:25
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:53	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:49	02:42		03:24	05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:06	14:15	13:28
27	09:30	07:36	05:47	04:45	02:37		03:28	05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:11	13:30
28	09:27	07:32	05:44	04:41	02:33		03:32	05:28	07:09	07:50	09:48	10:52
	15:21	17:16	18:50	21:38	23:42		22:58	20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:37	02:28		03:37	05:31	07:12	07:53	09:52	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:23		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:01		10:49
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	707	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 38
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 20 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (20)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:12	07:28	06:28	04:29	02:14		03:49	05:41	07:18	08:04	09:59
	13:41	15:37	17:20	20:04	21:49	00:02		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:25	02:09		03:53	05:45	07:21	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:21	02:03		03:57	05:48	07:25	08:11	10:06
	13:47	15:45	17:27	20:10	21:56	00:13		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:16	06:16	04:17	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:14	22:00	00:19		22:30	20:26	18:29	15:32	13:50
5	10:38	08:58	07:13	06:12	04:13	01:52	01:39	04:05	05:55	07:31	08:19	10:14
	13:53	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:09	01:45	01:47	04:08	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:33	00:43	22:22	20:18	18:22	15:25	13:45
7	10:33	08:51	07:05	06:04	04:05	01:38	01:55	04:12	06:01	07:38	08:26	10:20
	14:00	16:00	17:40	20:24	22:12	00:40	00:36	22:18	20:14	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:28	02:01	04:16	06:04	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:50	00:30	22:13	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	01:46	02:07	04:20	06:08	07:44	08:34	10:27
	14:07	16:08	17:47	20:30	22:20	00:07	00:24	22:09	20:07	18:10	15:14	13:38
10	10:25	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:05	20:03	18:06	15:10	13:36
11	10:23	08:36	06:49	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:03	15:06	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:45	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:49	19:47	17:51	14:56	13:29
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:55	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:45
	14:34	16:34	18:11	20:55	22:49		23:50	21:41	19:39	17:43	14:49	13:26
17	10:04	08:13	06:26	05:25	03:24		02:48	04:49	06:33	08:11	09:05	10:47
	14:37	16:37	18:14	20:58	22:53		23:45	21:37	19:35	17:40	14:45	13:25
18	10:01	08:10	06:22	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:41	16:41	18:17	21:02	22:57		23:41	21:33	19:31	17:36	14:42	13:24
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:50
	14:45	16:45	18:21	21:05	23:01		23:37	21:29	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:21	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:25	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:20	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:24	14:31	13:24
22	09:48	07:55	06:07	05:05	03:03		03:07	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:14	19:12	17:17	14:24	13:25
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:53	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:49	02:42		03:24	05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:06	14:15	13:28
27	09:30	07:35	05:47	04:45	02:37		03:28	05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:37		23:03	20:58	18:57	16:02	14:11	13:30
28	09:27	07:32	05:44	04:41	02:33		03:32	05:28	07:09	07:50	09:48	10:52
	15:21	17:16	18:50	21:38	23:42		22:58	20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:37	02:28		03:36	05:31	07:12	07:53	09:51	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:23		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:00		10:49
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	706	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 39
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 21** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (21)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1 472	1 235	617	489	483	8 422

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

	January	February	March	April	May	June	July	August	September	October	November	December		
1	10:46	09:12	07:28	06:28	04:29	02:14		03:49	05:41	07:18	08:04	09:59		
	13:41	15:37	17:20	20:03	21:49	00:02		22:42	20:38	18:41	15:43	13:59		
2	10:45	09:09	07:24	06:24	04:25	02:09		03:53	05:45	07:21	08:08	10:03		
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56		
3	10:43	09:05	07:20	06:20	19:29-19:31/2	04:21	02:03	03:57	05:48	19:25-19:32/7	07:25	08:11	10:06	
	13:47	15:44	17:27	20:10	21:56	00:13		22:34	20:30	18:33	15:36	13:53		
4	10:41	09:02	07:16	06:16	19:27-19:34/7	04:17	01:58	04:01	05:51	19:23-19:33/10	07:28	08:15	10:10	
	13:50	15:48	17:30	20:14	22:00	00:19		22:30	20:26	18:29	15:32	13:50		
5	10:38	08:58	07:12	06:12	19:26-19:37/11	04:13	01:52	01:39	04:05	19:22-19:33/11	07:31	08:19	10:13	
	13:53	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:22	18:26	15:28	13:48		
6	10:36	08:54	07:09	06:08	19:26-19:37/11	04:09	01:45	01:47	04:08	05:58	19:22-19:33/11	07:34	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:33	00:43	22:21	20:18	18:22	15:25	13:45		
7	10:33	08:51	07:05	06:04	19:25-19:36/11	04:05	01:38	01:55	04:12	06:01	19:21-19:32/11	07:38	08:26	10:20
	14:00	16:00	17:40	20:24	22:12	00:40	00:36	22:17	20:14	18:18	15:21	13:43		
8	10:31	08:47	07:01	06:00	19:26-19:36/10	04:01	01:28	02:01	04:16	06:04	19:22-19:29/7	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:50	00:30	22:13	20:11	18:14	15:17	13:40		
9	10:28	08:43	06:57	05:57	19:27-19:34/7	03:57	01:45	02:07	04:20	06:08	19:23-19:25/2	07:44	08:34	10:27
	14:07	16:07	17:47	20:30	22:20	00:15	00:24	22:09	20:07	18:10	15:14	13:38		
10	10:25	08:39	06:53	05:53		03:53		02:13	04:24	06:11		07:48	08:38	10:30
	14:11	16:11	17:50	20:34	22:24		00:19	22:05	20:03	18:06	15:10	13:36		
11	10:23	08:36	06:49	05:49		03:49		02:19	04:27	06:14		07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:03	15:06	13:34		
12	10:20	08:32	06:46	05:45		03:45		02:24	04:31	06:17		07:54	08:45	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32		
13	10:17	08:28	06:42	05:41		03:41		02:29	04:35	06:20		07:58	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30		
14	10:14	08:25	06:38	05:37		03:37		02:34	04:39	06:24		08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:49	19:47	17:51	14:56	13:28		
15	10:10	08:21	06:34	05:33		03:33		02:39	04:42	06:27		08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:54	21:45	19:43	17:47	14:52	13:27		
16	10:07	08:17	06:30	05:29		03:28		02:44	04:46	06:30		08:08	09:01	10:45
	14:33	16:34	18:11	20:54	22:49		23:50	21:41	19:39	17:43	14:48	13:26		
17	10:04	08:13	06:26	05:25		03:24		02:48	04:49	06:33		08:11	09:05	10:47
	14:37	16:37	18:14	20:58	22:53		23:45	21:37	19:35	17:40	14:45	13:25		
18	10:01	08:10	06:22	05:21		03:20		02:53	04:53	06:37		08:14	09:09	10:49
	14:41	16:41	18:17	21:01	22:57		23:41	21:33	19:31	17:36	14:41	13:24		
19	09:58	08:06	06:18	05:17		03:16		02:58	04:57	06:40		08:18	09:13	10:50
	14:45	16:44	18:20	21:05	23:01		23:37	21:29	19:28	17:32	14:38	13:24		
20	09:54	08:02	06:15	05:13		03:12		03:02	05:00	06:43		08:21	09:16	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:25	19:24	17:28	14:35	13:24		
21	09:51	07:58	06:11	05:09		03:08		03:02	05:04	06:46		08:25	09:20	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:21	19:20	17:24	14:31	13:24		
22	09:48	07:54	06:07	05:05		03:03		03:07	05:07	06:49		08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:14		23:24	21:17	19:16	17:21	14:28	13:24		
23	09:44	07:51	06:03	05:01		02:55		03:11	05:11	06:52		08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:14	19:12	17:17	14:24	13:25		
24	09:41	07:47	05:59	04:57		02:50		03:15	05:14	06:56		08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:23		23:15	21:10	19:08	17:13	14:21	13:25		
25	09:37	07:43	05:55	04:53		02:46		03:20	05:18	06:59		07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27		
26	09:34	07:39	05:51	04:49		02:42		03:24	05:21	07:02		07:42	09:40	10:54
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:05	14:15	13:28		
27	09:30	07:35	05:47	04:45		02:37		03:28	05:24	07:05		07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:37		23:02	20:58	18:56	16:02	14:11	13:30		
28	09:27	07:32	05:43	04:41		02:33		03:32	05:28	07:09		07:50	09:48	10:52
	15:21	17:16	18:50	21:38	23:42		22:58	20:54	18:53	15:58	14:08	13:31		
29	09:23		06:40	04:37		02:28		03:36	05:31	07:12		07:53	09:51	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33		
30	09:20		06:36	04:33		02:23		03:41	05:35	07:15		07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:50	14:02	13:36		
31	09:16		06:32			02:19		03:45	05:38			08:00		10:48
	15:33		20:00		23:57		22:46	20:42		15:47				13:38
Potential sun hours	139	226	362	461	601	707	661	525	396	297	176	91		
Sum of minutes with flicker	0	0	0	59	0	0	0	0	59	0	0	0		

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 40
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 22 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (22)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:12	07:28	06:28 19:13-19:23/10	04:29	02:14		03:49	05:41	07:18	08:04	09:59
	13:41	15:37	17:20	20:03	21:49	00:02		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24 19:11-19:24/13	04:25	02:09		03:53	05:45	07:21	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20 19:11-19:25/14	04:21	02:03		03:57	05:48	07:25	08:11	10:06
	13:47	15:44	17:27	20:10	21:56	00:13		22:34	20:30	18:33	15:36	13:53
4	10:40	09:02	07:16	06:16 19:10-19:25/15	04:17	01:58		04:01	05:51 19:09-19:18/9	07:28	08:15	10:10
	13:50	15:48	17:30	20:13	22:00	00:19		22:30	20:26	18:29	15:32	13:50
5	10:38	08:58	07:12	06:12 19:10-19:24/14	04:13	01:52	01:39	04:05	05:54 19:07-19:19/12	07:31	08:19	10:13
	13:53	15:52	17:34	20:17	22:04	00:26	00:51	22:25	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08 19:10-19:23/13	04:09	01:45	01:47	04:08	05:58 19:06-19:19/13	07:34	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:32	00:43	22:21	20:18	18:22	15:25	13:45
7	10:33	08:51	07:05	06:04 19:10-19:22/12	04:05	01:38	01:55	04:12	06:01 19:05-19:19/14	07:38	08:26	10:20
	14:00	16:00	17:40	20:24	22:12	00:40	00:36	22:17	20:14	18:18	15:21	13:43
8	10:31	08:47	07:01	06:00 19:12-19:21/9	04:01	01:28	02:01	04:16	06:04 19:05-19:19/14	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:50	00:30	22:13	20:10	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	02:02	02:07	04:20	06:08 19:04-19:18/14	07:44	08:34	10:27
	14:07	16:07	17:47	20:30	22:20	01:33	00:24	22:09	20:07	18:10	15:14	13:38
10	10:25	08:39	06:53	05:53	03:53		02:13	04:24	06:11 19:05-19:17/12	07:48	08:38	10:30
	14:11	16:11	17:50	20:34	22:24		00:19	22:05	20:03	18:06	15:10	13:36
11	10:22	08:36	06:49	05:49	03:49		02:19	04:27	06:14 19:05-19:15/10	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:02	15:06	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17 19:07-19:13/6	07:54	08:45	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41		02:29	04:35	06:20	07:58	08:49	10:38
	14:22	16:22	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:47	22:40		23:59	21:49	19:47	17:51	14:56	13:28
15	10:10	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:54	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:28		02:44	04:46	06:30	08:08	09:01	10:45
	14:33	16:34	18:10	20:54	22:48		23:50	21:41	19:39	17:43	14:48	13:26
17	10:04	08:13	06:26	05:25	03:24		02:48	04:49	06:33	08:11	09:05	10:47
	14:37	16:37	18:14	20:58	22:53		23:45	21:37	19:35	17:40	14:45	13:25
18	10:01	08:10	06:22	05:21	03:20		02:53	04:53	06:36	08:14	09:09	10:49
	14:41	16:41	18:17	21:01	22:57		23:41	21:33	19:31	17:36	14:41	13:24
19	09:58	08:06	06:18	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:50
	14:45	16:44	18:20	21:05	23:01		23:36	21:29	19:27	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:21	09:16	10:51
	14:49	16:48	18:24	21:08	23:06		23:32	21:25	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:20	10:52
	14:53	16:52	18:27	21:12	23:10		23:28	21:21	19:20	17:24	14:31	13:24
22	09:48	07:54	06:07	05:05	03:03		03:07	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:14		23:23	21:17	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:52	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:13	19:12	17:17	14:24	13:25
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:23		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:53	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:26	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:49	02:42		03:24	05:21	07:02	07:42	09:40	10:53
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:05	14:15	13:28
27	09:30	07:35	05:47	04:45	02:37		03:28	05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:37		23:02	20:58	18:56	16:02	14:11	13:30
28	09:27	07:32	05:43	04:41	02:33		03:32	05:28	07:08	07:49	09:48	10:52
	15:21	17:16	18:50	21:38	23:42		22:58	20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:37	02:28		03:36	05:31	07:12	07:53	09:51	10:51
	15:25		19:53	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:23		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:50	14:02	13:36
31	09:16		06:32 19:16-19:21/5		02:19		03:45	05:38		08:00		10:48
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	701	660	525	396	297	176	91
Sum of minutes with flicker	0	0	5	100	0	0	0	0	104	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 41
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 23** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (23)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10:46 13:42	09:12 15:37	07:28 17:20	06:28 20:03	04:29 21:49	02:14 00:02		03:49 22:42	05:41 20:38	07:18 18:41	17:46-17:56/10	08:04 15:43	09:59 13:59
2	10:44 13:44	09:09 15:41	07:24 17:23	06:24 20:07	04:25 21:52	02:09 00:07		03:53 22:38	05:45 20:34	07:21 18:37	17:48-17:55/7	08:08 15:39	10:02 13:56
3	10:42 13:47	09:05 15:44	07:20 17:27	06:20 20:10	04:21 21:56	02:04 00:13		03:57 22:34	05:48 20:30	07:25 18:33		08:11 15:36	10:06 13:53
4	10:40 13:50	09:01 15:48	07:16 17:30	06:16 20:13	04:17 22:00	01:58 00:19		04:01 22:29	05:51 20:26	07:28 18:29		08:15 15:32	10:10 13:51
5	10:38 13:54	08:58 15:52	07:12 17:34	06:12 20:17	04:13 22:04	01:52 00:25	01:39 00:51	04:05 22:25	05:54 20:22	07:31 18:26		08:19 15:28	10:13 13:48
6	10:36 13:57	08:54 15:56	07:09 17:37	06:08 20:20	04:09 22:08	01:46 00:32	01:48 00:43	04:08 22:21	05:58 20:18	07:34 18:22		08:23 15:25	10:17 13:45
7	10:33 14:00	08:50 16:00	07:05 17:40	06:04 20:24	04:05 22:12	01:39 00:40	01:55 00:36	04:12 22:17	06:01 20:14	07:38 18:18		08:26 15:21	10:20 13:43
8	10:31 14:04	08:47 16:04	07:01 17:44	06:00 20:27	04:01 22:16	01:29 00:49	02:02 00:30	04:16 22:13	06:04 20:10	07:41 18:14		08:30 15:17	10:23 13:40
9	10:28 14:07	08:43 16:08	06:57 17:47	05:57 20:30	03:57 22:20	01:23 00:58	02:08 00:24	04:20 22:09	06:08 20:07	07:44 18:10		08:34 15:14	10:27 13:38
10	10:25 14:11	08:39 16:11	06:53 17:50	05:53 20:34	03:53 22:24		02:13 00:19	04:24 22:05	06:11 20:03	07:48 18:06		08:38 15:10	10:30 13:36
11	10:22 14:15	08:36 16:15	06:49 17:54	05:49 20:37	03:49 22:28		02:19 00:13	04:27 22:01	06:14 19:59	07:51 18:03		08:41 15:06	10:33 13:34
12	10:19 14:18	08:32 16:19	06:46 17:57	05:45 20:41	03:45 22:32		02:24 00:08	04:31 21:57	06:17 19:55	07:54 17:59		08:45 15:03	10:35 13:32
13	10:16 14:22	08:28 16:23	06:42 18:01	05:41 20:44	03:41 22:36		02:29 00:04	04:35 21:53	06:20 19:51	07:58 17:55		08:49 14:59	10:38 13:30
14	10:13 14:26	08:25 16:26	06:38 18:04	05:37 20:47	03:37 22:40		02:34 23:59	04:39 21:49	06:24 19:47	08:01 17:51		08:53 14:56	10:41 13:29
15	10:10 14:30	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44		02:39 23:54	04:42 21:45	06:27 19:43	08:04 17:47		08:57 14:52	10:43 13:27
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:54	03:29 22:48		02:44 23:50	04:46 21:41	06:30 19:39	08:08 17:43		09:01 14:49	10:45 13:26
17	10:04 14:37	08:13 16:37	06:26 18:14	05:25 20:58	03:24 22:53		02:49 23:45	04:49 21:37	06:33 19:35	08:11 17:40		09:05 14:45	10:47 13:25
18	10:01 14:41	08:09 16:41	06:22 18:17	05:21 21:01	03:20 22:57		02:53 23:41	04:53 21:33	06:36 19:31	08:14 17:36		09:09 14:42	10:49 13:25
19	09:57 14:45	08:06 16:44	06:18 18:20	05:17 21:05	03:16 23:01		02:58 23:36	04:57 21:29	06:40 19:28	08:18 17:32		09:12 14:38	10:50 13:24
20	09:54 14:49	08:02 16:48	06:15 18:24	05:13 21:08	03:12 23:05		03:02 23:32	05:00 21:25	06:43 19:24	08:21 17:28		09:16 14:35	10:51 13:24
21	09:51 14:53	07:58 16:52	06:11 18:27	05:09 21:12	03:08 23:10		03:02 23:28	05:04 21:21	06:46 19:20	08:25 17:24		09:20 14:31	10:52 13:24
22	09:47 14:57	07:54 16:55	06:07 18:30	05:05 21:16	03:03 23:14		03:07 23:23	05:07 21:17	06:49 19:16	08:28 17:21		09:24 14:28	10:53 13:24
23	09:44 15:01	07:51 16:59	06:03 18:34	05:01 21:19	02:55 23:19		03:11 23:19	05:11 21:13	06:52 19:12	08:32 17:17		09:28 14:24	10:53 13:25
24	09:41 15:05	07:47 17:02	05:59 18:37	04:57 21:23	02:51 23:23		03:15 23:15	05:14 21:09	06:56 19:08	08:35 17:13		09:32 14:21	10:54 13:26
25	09:37 15:09	07:43 17:06	05:55 18:40	04:53 21:26	02:46 23:28		03:20 23:11	05:18 21:06	06:59 19:04	17:52-17:56/4		09:36 14:18	10:54 13:27
26	09:34 15:13	07:39 17:09	05:51 18:44	04:49 21:30	02:42 23:32		03:24 23:06	05:21 21:02	07:02 19:00	17:49-17:58/9		09:40 14:15	10:53 13:28
27	09:30 15:17	07:35 17:13	05:47 18:47	04:45 21:34	02:37 23:37		03:28 23:02	05:24 20:58	07:05 18:56	17:47-17:58/11		09:44 14:11	10:53 13:30
28	09:27 15:21	07:32 17:16	05:43 18:50	04:41 21:37	02:33 23:42		03:32 22:58	05:28 20:54	07:08 18:53	17:46-17:58/12		09:47 14:08	10:52 13:32
29	09:23 15:25		06:40 19:53	04:37 21:41	02:28 23:47		03:37 22:54	05:31 20:50	07:12 18:49	17:46-17:59/13		09:51 14:05	10:51 13:34
30	09:20 15:29		06:36 19:57	04:33 21:45	02:24 23:52		03:41 22:50	05:35 20:46	07:15 18:45	17:46-17:58/12		09:55 14:02	10:50 13:36
31	09:16 15:33		06:32 20:00		02:19 23:57		03:45 22:46	05:38 20:42		08:00 15:47			10:48 13:38
Potential sun hours	139	226	362	461	601	685	660	525	396	297	176	92	0
Sum of minutes with flicker	0	0	79	0	0	0	0	0	61	17	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 42
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 24 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (24)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:42	09:12 15:37	07:28 17:20	06:28 20:03	04:29 21:49	02:14 00:02		03:49 22:42	05:41 20:38	07:18 18:41	08:04 15:43	09:59 13:59
2	10:44 13:44	09:09 15:41	07:24 17:23	06:24 20:07	04:25 21:52	02:09 00:07		03:53 22:38	05:45 20:34	07:21 18:37	08:08 15:39	10:02 13:56
3	10:42 13:47	09:05 15:45	07:20 17:27	06:20 20:10	04:21 21:56	02:04 00:13		03:57 22:33	05:48 20:30	07:25 18:33	08:11 15:36	10:06 13:53
4	10:40 13:50	09:01 15:48	07:16 17:30	06:16 20:13	04:17 22:00	01:58 00:19		04:01 22:29	05:51 20:26	07:28 18:29	08:15 15:32	10:10 13:51
5	10:38 13:54	08:58 15:52	07:12 17:34	06:12 20:17	04:13 22:04	01:53 00:25	01:40	04:05 22:25	05:54 20:22	07:31 18:26	08:19 15:28	10:13 13:48
6	10:36 13:57	08:54 15:56	07:09 17:37	06:08 20:20	04:09 22:08	01:46 00:32	01:48	04:09 22:21	05:58 20:18	07:34 18:22	08:22 15:25	10:17 13:45
7	10:33 14:00	08:50 16:00	07:05 17:40	06:04 20:24	04:05 22:12	01:39 00:39	01:56	04:12 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:20 13:43
8	10:30 14:04	08:47 16:04	07:01 17:44	06:00 20:27	04:01 22:16	01:30 00:49	02:02	04:16 22:13	06:04 20:10	07:41 18:14	08:30 15:17	10:23 13:40
9	10:28 14:07	08:43 16:08	06:57 17:47	05:57 20:30	03:57 22:20	01:59 01:04	02:08	04:20 22:09	06:08 20:07	07:44 18:10	08:34 15:14	10:26 13:38
10	10:25 14:11	08:39 16:11	06:53 17:50	05:53 20:34	03:53 22:24		02:14	04:24 22:05	06:11 20:03	07:48 18:06	08:38 15:10	10:29 13:36
11	10:22 14:15	08:36 16:15	06:49 17:54	05:49 20:37	03:49 22:28		02:19	04:28 22:01	06:14 19:59	07:51 18:02	08:41 15:06	10:32 13:34
12	10:19 14:18	08:32 16:19	06:45 17:57	05:45 20:41	03:45 22:32		02:24	04:31 21:57	06:17 19:55	07:54 17:59	08:45 15:03	10:35 13:32
13	10:16 14:22	08:28 16:23	06:42 18:01	05:41 20:44	03:41 22:36		02:29	04:35 21:53	06:20 19:51	07:57 17:55	08:49 14:59	10:38 13:30
14	10:13 14:26	08:24 16:26	06:38 18:04	05:37 20:47	03:37 22:40		02:34	04:39 21:49	06:24 19:47	16:41-16:48/7 17:51	08:53 14:56	10:40 13:29
15	10:10 14:30	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44		02:39	04:42 21:45	06:27 19:43	16:39-16:49/10 17:47	08:57 14:52	10:43 13:28
16	10:07 14:34	08:17 16:34	06:30 18:10	05:29 20:54	03:29 22:48		02:44	04:46 21:41	06:30 19:39	16:38-16:50/12 17:43	09:01 14:49	10:45 13:26
17	10:04 14:38	08:13 16:37	06:26 18:14	05:25 20:58	03:25 22:52		02:49	04:50 21:37	06:33 19:35	16:38-16:50/12 17:40	09:05 14:45	10:47 13:25
18	10:01 14:41	08:09 16:41	06:22 18:17	05:21 21:01	03:20 22:57		02:53	04:53 21:33	06:36 19:31	16:38-16:50/12 17:36	09:08 14:42	10:48 13:25
19	09:57 14:45	08:06 16:45	06:18 18:20	05:17 21:05	03:16 23:01		02:58	04:57 21:29	06:40 19:27	16:37-16:45/8 17:32	09:12 14:38	10:50 13:24
20	09:54 14:49	08:02 16:48	06:15 18:24	05:13 21:08	03:12 23:05		03:02	05:00 21:25	06:43 19:24	16:38-16:41/3 17:28	09:16 14:35	10:51 13:24
21	09:51 14:53	07:58 16:52	06:11 18:27	05:09 21:12	03:08 23:10		03:02	05:04 21:21	06:46 19:20	16:38-16:41/3 17:24	09:20 14:31	10:52 13:24
22	09:47 14:57	07:54 16:55	16:07-16:11/4 18:30	05:05 21:16	03:04 23:14		03:07	05:07 21:17	06:49 19:16	08:28 17:21	09:24 14:28	10:53 13:24
23	09:44 15:01	07:51 16:59	16:07-16:16/9 18:34	05:01 21:19	02:55 23:19		03:11	05:11 21:13	06:52 19:12	08:32 17:17	09:28 14:25	10:53 13:25
24	09:40 15:05	07:47 17:02	16:06-16:18/12 18:37	05:59 21:23	02:51 23:23		03:16	05:14 21:09	06:56 19:08	08:35 17:13	09:32 14:21	10:53 13:26
25	09:37 15:09	07:43 17:06	16:06-16:18/12 18:40	05:55 21:26	02:46 23:28		03:20	05:18 21:05	06:59 19:04	07:39 16:09	09:36 14:18	10:53 13:27
26	09:34 15:13	07:39 17:09	16:07-16:18/11 18:44	05:51 21:30	02:42 23:32		03:24	05:21 21:02	07:02 19:00	07:42 16:06	09:40 14:15	10:53 13:28
27	09:30 15:17	07:35 17:13	16:07-16:16/9 18:47	05:47 21:34	02:37 23:37		03:28	05:24 20:58	07:05 18:56	07:46 16:02	09:43 14:12	10:52 13:30
28	09:27 15:21	07:32 17:16	16:09-16:14/5 18:50	05:43 21:37	02:33 23:42		03:32	05:28 20:54	07:08 18:53	07:49 15:58	09:47 14:08	10:52 13:32
29	09:23 15:25			06:40 19:53	04:37 21:41		03:37	05:31 20:50	07:12 18:49	07:53 15:54	09:51 14:05	10:51 13:34
30	09:19 15:29			06:36 19:57	04:33 21:45		03:41	05:35 20:46	07:15 18:45	07:57 15:51	09:55 14:02	10:49 13:36
31	09:16 15:33			06:32 20:00			03:45	05:38 20:42		08:00 15:47		10:48 13:38
Potential sun hours	139	226	362	461	601	707	660	525	396	297	176	92
Sum of minutes with flicker	0	62	0	0	0	0	0	0	0	64	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 43
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 25 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (25)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:12	07:28 16:31-16:39/8	06:28	04:30	02:14		03:49	05:41	07:18	08:04	09:59
	13:42	15:37	17:20	20:03	21:49	00:02		22:42	20:38	18:41	15:43	13:59
2	10:44	09:09	07:24 16:31-16:41/10	06:24	04:26	02:09		03:53	05:45	07:21	08:08	10:02
	13:44	15:41	17:23	20:07	21:52	00:07		22:38	20:34	18:37	15:39	13:56
3	10:42	09:05	07:20 16:32-16:40/8	06:20	04:22	02:04		03:57	05:48	07:25	08:11	10:06
	13:47	15:45	17:27	20:10	21:56	00:13		22:33	20:30	18:33	15:36	13:53
4	10:40	09:01	07:16 16:34-16:38/4	06:16	04:17	01:58		04:01	05:51	07:28	08:15	10:10
	13:51	15:48	17:30	20:13	22:00	00:19		22:29	20:26	18:29	15:32	13:51
5	10:38	08:58	07:12	06:12	04:13	01:53	01:40	04:05	05:55	07:31	08:19	10:13
	13:54	15:52	17:34	20:17	22:04	00:25	00:50	22:25	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:09	01:46	01:48	04:09	05:58	07:34	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:32	00:42	22:21	20:18	18:22	15:25	13:45
7	10:33	08:50	07:05	06:04	04:05	01:39	01:56	04:12	06:01	07:38	08:26	10:20
	14:00	16:00	17:40	20:24	22:12	00:39	00:35	22:17	20:14	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:30	02:02	04:16	06:04	07:41	08:30	10:23
	14:04	16:04	17:44	20:27	22:16	00:49	00:29	22:13	20:10	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	00:58	02:08	04:20	06:08	07:44	08:34	10:26
	14:07	16:08	17:47	20:30	22:20	01:02	00:24	22:09	20:07	18:10	15:14	13:38
10	10:25	08:39	06:53	05:53	03:53		02:14	04:24	06:11	07:48 17:07-17:13/6	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:18	22:05	20:03	18:06	15:10	13:36
11	10:22	08:36	06:49	05:49	03:49		02:19	04:28	06:14	07:51 17:06-17:15/9	08:41	10:32
	14:15	16:15	17:54	20:37	22:28		00:13	22:01	19:59	18:03	15:06	13:34
12	10:19	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54 17:04-17:14/10	08:45	10:35
	14:18	16:19	17:57	20:41	22:32		00:08	21:57	19:55	17:59	15:03	13:32
13	10:16	08:28	06:42	05:41	03:41		02:29	04:35	06:21	07:58 17:04-17:10/6	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:03	21:53	19:51	17:55	14:59	13:30
14	10:13	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01 17:05-17:06/1	08:53	10:40
	14:26	16:26	18:04	20:47	22:40		23:59	21:49	19:47	17:51	14:56	13:29
15	10:10	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:54	21:45	19:43	17:47	14:52	13:28
16	10:07	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:45
	14:34	16:34	18:11	20:54	22:48		23:50	21:41	19:39	17:43	14:49	13:26
17	10:04	08:13	06:26	05:25	03:25		02:49	04:50	06:33	08:11	09:05	10:47
	14:38	16:37	18:14	20:58	22:53		23:45	21:37	19:35	17:40	14:45	13:25
18	10:01	08:09	06:22	05:21	03:20		02:53	04:53	06:37	08:14	09:09	10:48
	14:42	16:41	18:17	21:01	22:57		23:41	21:33	19:31	17:36	14:42	13:25
19	09:57	08:06	06:18	05:17	03:16		02:58	04:57	06:40	08:18	09:12	10:50
	14:45	16:45	18:20	21:05	23:01		23:36	21:29	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:21	09:16	10:51
	14:49	16:48	18:24	21:08	23:05		23:32	21:25	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:20	10:52
	14:53	16:52	18:27	21:12	23:10		23:28	21:21	19:20	17:24	14:31	13:24
22	09:47	07:54	06:07	05:05	03:04		03:07	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:14		23:23	21:17	19:16	17:21	14:28	13:25
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:53
	15:01	16:59	18:34	21:19	23:19		23:19	21:13	19:12	17:17	14:25	13:25
24	09:41	07:47	05:59	04:57	02:51		03:16	05:14	06:56	08:35	09:32	10:53
	15:05	17:02	18:37	21:23	23:23		23:15	21:09	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:53	02:46		03:20	05:18	06:59	07:39	09:36	10:53
	15:09	17:06	18:40	21:26	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:49	02:42		03:24	05:21	07:02	07:42	09:40	10:53
	15:13	17:09	18:44	21:30	23:32		23:06	21:02	19:00	16:06	14:15	13:28
27	09:30	07:35	05:47	04:45	02:38		03:28	05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:37		23:02	20:58	18:56	16:02	14:12	13:30
28	09:27	07:32 16:31-16:35/4	05:44	04:42	02:33		03:32	05:28	07:09	07:49	09:47	10:52
	15:21	17:16	18:50	21:37	23:42		22:58	20:54	18:53	15:58	14:08	13:32
29	09:23		06:40	04:38	02:28		03:37	05:31	07:12	07:53	09:51	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:34
30	09:19		06:36	04:34	02:24		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:00		10:48
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	684	660	525	396	297	176	92
Sum of minutes with flicker	0	4	30	0	0	0	0	0	0	32	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 44
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 26** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (26)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:29	02:13		03:48	05:41	07:18	08:04	09:59
	13:41	15:36	17:20	20:03	21:49	00:03		22:42	20:38	18:41	15:43	13:58
2	10:45	09:09	07:24	06:24	04:25	02:07		03:52	05:44	07:21	08:08	10:03
	13:43	15:40	17:23	20:07	21:53	00:09		22:38	20:34	18:37	15:39	13:55
3	10:43	09:05	07:20	06:20	04:21	02:02		03:56	05:48	07:25	08:12	10:07
	13:46	15:44	17:27	20:10	21:57	00:14		22:34	20:30	18:33	15:35	13:53
4	10:41	09:02	07:16	06:16	04:17	01:56		04:00	05:51	07:28	08:15	10:10
	13:49	15:48	17:30	20:13	22:00	00:21		22:30	20:26	18:29	15:32	13:50
5	10:39	08:58	07:12	06:12	04:13	01:50	01:36	04:04	05:54	07:31	08:19	10:14
	13:53	15:52	17:33	20:17	22:04	00:27	00:54	22:26	20:22	18:25	15:28	13:47
6	10:36	08:54	07:09	06:08	04:09	01:43	01:45	04:08	05:58	07:34	08:23	10:17
	13:56	15:56	17:37	20:20	22:08	00:34	00:45	22:22	20:18	18:22	15:24	13:44
7	10:34	08:51	07:05	06:04	04:05	01:35	01:53	04:12	06:01	07:38	08:27	10:21
	13:59	16:00	17:40	20:24	22:12	00:43	00:38	22:18	20:14	18:18	15:21	13:42
8	10:31	08:47	07:01	06:00	04:01	01:25	02:00	04:16	06:04	07:41	08:30	10:24
	14:03	16:03	17:44	20:27	22:16	00:54	00:31	22:14	20:10	18:14	15:17	13:39
9	10:29	08:43	06:57	05:56	03:57	02:54	02:06	04:20	06:07	07:44	08:34	10:27
	14:06	16:07	17:47	20:30	22:20	03:46	00:25	22:10	20:07	18:10	15:13	13:37
10	10:26	08:40	06:53	05:52	03:53		02:12	04:23	06:11	07:48	08:38	10:30
	14:10	16:11	17:50	20:34	22:24		00:20	22:06	20:03	18:06	15:10	13:35
11	10:23	08:36	06:49	05:48	03:49		02:17	04:27	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:15	22:01	19:59	18:02	15:06	13:33
12	10:20	08:32	06:45	05:45	03:45		02:23	04:31	06:17	07:54	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:10	21:57	19:55	17:59	15:02	13:31
13	10:17	08:28	06:42	05:41	03:40		02:28	04:35	06:20	07:58	08:49	10:39
	14:21	16:22	18:00	20:44	22:36		00:05	21:53	19:51	17:55	14:59	13:29
14	10:14	08:25	06:38	05:37	03:36		02:33	04:38	06:24	08:01	08:53	10:41
	14:25	16:26	18:04	20:48	22:40		00:00	21:49	19:47	17:51	14:55	13:28
15	10:11	08:21	06:34	05:33	03:32		02:38	04:42	06:27	08:04	08:57	10:44
	14:29	16:30	18:07	20:51	22:45		23:55	21:45	19:43	17:47	14:52	13:26
16	10:08	08:17	06:30	05:29	03:28		02:43	04:46	06:30	08:08	09:01	10:46
	14:33	16:33	18:10	20:55	22:49		23:50	21:41	19:39	17:43	14:48	13:25
17	10:04	08:13	06:26	05:25	03:24		02:48	04:49	06:33	07:44-07:50/6	08:11	09:05
	14:37	16:37	18:14	20:58	22:53		23:46	21:37	19:35	17:39	14:45	13:24
18	10:01	08:10	06:22	05:21	03:20		02:52	04:53	06:36	07:43-07:53/10	08:14	09:09
	14:41	16:41	18:17	21:02	22:57		23:41	21:33	19:31	17:36	14:41	13:24
19	09:58	08:06	06:18	05:17	03:15		02:57	04:56	06:40	07:41-07:53/12	08:18	09:13
	14:45	16:44	18:20	21:05	23:02		23:37	21:29	19:27	17:32	14:38	13:23
20	09:55	08:02	06:15	05:13	03:11		03:01	05:00	06:43	07:40-07:53/13	08:21	09:17
	14:49	16:48	18:24	21:09	23:06		23:33	21:25	19:24	17:28	14:34	13:23
21	09:51	07:58	06:11	05:09	03:07		03:01	05:03	06:46	07:40-07:52/12	08:25	09:21
	14:53	16:51	18:27	21:12	23:10		23:28	21:22	19:20	17:24	14:31	13:23
22	09:48	07:54	06:07	05:05	03:03		03:06	05:07	06:49	07:40-07:51/11	08:28	09:25
	14:57	16:55	18:30	21:16	23:15		23:24	21:18	19:16	17:20	14:27	13:23
23	09:44	07:51	06:03	05:01	02:54		03:10	05:10	06:52	07:40-07:50/10	08:32	09:28
	15:01	16:59	18:34	21:19	23:19		23:20	21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	07:42-07:48/6	08:35	09:32
	15:05	17:02	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:25
25	09:37	07:43	05:55	04:53	02:45		03:19	05:17	06:59	07:39	09:36	10:55
	15:09	17:06	18:40	21:27	23:29		23:11	21:06	19:04	16:09	14:17	13:26
26	09:34	07:39	05:51	04:49	02:41		03:23	05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:05	14:14	13:27
27	09:30	07:35	05:47	04:45	02:36		03:28	05:24	07:05	07:46	09:44	10:54
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:56	16:01	14:11	13:29
28	09:27	07:32	05:43	04:41	02:32		03:32	05:28	07:08	07:50	09:48	10:53
	15:21	17:16	18:50	21:38	23:43		22:59	20:54	18:52	15:58	14:08	13:30
29	09:23		06:39	04:37	02:27		03:36	05:31	07:12	07:53	09:52	10:52
	15:24		19:53	21:41	23:48		22:54	20:50	18:49	15:54	14:04	13:32
30	09:20		06:36	04:33	02:22		03:40	05:34	07:15	07:57	09:56	10:51
	15:28		19:57	21:45	23:53		22:50	20:46	18:45	15:50	14:01	13:35
31	09:16		06:32		02:18		03:44	05:38		08:00		10:49
	15:32		20:00		23:58		22:46	20:42		15:46		13:37
Potential sun hours	139	226	362	461	602	685	661	525	396	297	176	91
Sum of minutes with flicker	0	0	79	0	0	0	0	0	80	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 45
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 27 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (27)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:29	02:13		03:48	05:41	07:18	08:04	09:59
	13:41	15:36	17:20	20:03	21:49	00:03		22:42	20:38	18:41	15:43	13:58
2	10:45	09:09	07:24	06:24	04:25	02:07		03:52	05:44	07:21	08:08	10:03
	13:43	15:40	17:23	20:07	21:53	00:09		22:38	20:34	18:37	15:39	13:55
3	10:43	09:05	07:20	06:20	04:21	02:02		03:56	05:48	07:25	08:11	10:07
	13:46	15:44	17:27	20:10	21:57	00:14		22:34	20:30	18:33	15:35	13:53
4	10:41	09:02	07:16	06:16	04:17	01:56		04:00	05:51	07:28	08:15	10:10
	13:49	15:48	17:30	20:13	22:00	00:20		22:30	20:26	18:29	15:32	13:50
5	10:39	08:58	07:12	06:12	04:13	01:50	01:36	04:04	05:54	07:31	08:19	10:14
	13:53	15:52	17:33	20:17	22:04	00:27	00:54	22:26	20:22	18:25	15:28	13:47
6	10:36	08:54	07:09	06:08	04:09	01:44	01:45	04:08	05:58	07:34	08:23	10:17
	13:56	15:56	17:37	20:20	22:08	00:34	00:45	22:22	20:18	18:22	15:24	13:44
7	10:34	08:51	07:05	06:04	04:05	01:36	01:53	04:12	06:01	07:38	08:26	10:21
	13:59	16:00	17:40	20:24	22:12	00:42	00:38	22:18	20:14	18:18	15:21	13:42
8	10:31	08:47	07:01	06:00	04:01	01:25	02:00	04:16	06:04	07:41	08:30	10:24
	14:03	16:03	17:44	20:27	22:16	00:53	00:31	22:14	20:10	18:14	15:17	13:39
9	10:28	08:43	06:57	05:56	03:57	23:37	02:06	04:20	06:07	07:44	08:34	10:27
	14:06	16:07	17:47	20:30	22:20	02:09	00:25	22:09	20:07	18:10	15:13	13:37
10	10:26	08:40	06:53	05:52	03:53		02:12	04:23	06:11	07:48	08:38	10:30
	14:10	16:11	17:50	20:34	22:24		00:20	22:05	20:03	18:06	15:10	13:35
11	10:23	08:36	06:49	05:48	03:49		02:18	04:27	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:02	15:06	13:33
12	10:20	08:32	06:45	05:45	03:45		02:23	04:31	06:17	07:54	08:46	10:36
	14:18	16:18	17:57	20:41	22:32		00:09	21:57	19:55	17:58	15:02	13:31
13	10:17	08:28	06:42	05:41	03:40		02:28	04:35	06:20	07:58	08:49	10:39
	14:21	16:22	18:00	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:29
14	10:14	08:25	06:38	05:37	03:36		02:33	04:38	06:24	08:01	08:53	10:41
	14:25	16:26	18:04	20:47	22:40		00:00	21:49	19:47	17:51	14:55	13:28
15	10:11	08:21	06:34	05:33	03:32		02:38	04:42	06:27	08:04	08:57	10:44
	14:29	16:30	18:07	20:51	22:45		23:55	21:45	19:43	17:47	14:52	13:26
16	10:08	08:17	06:30	05:29	03:28		02:43	04:46	06:30	08:08	09:01	10:46
	14:33	16:33	18:10	20:54	22:49		23:50	21:41	19:39	17:43	14:48	13:25
17	10:04	08:13	06:26	05:25	03:24		02:48	04:49	06:33	08:11	09:05	10:48
	14:37	16:37	18:14	20:58	22:53		23:46	21:37	19:35	17:39	14:45	13:24
18	10:01	08:10	06:22	05:21	03:20		02:52	04:53	06:36	08:14	09:09	10:49
	14:41	16:41	18:17	21:01	22:57		23:41	21:33	19:31	17:36	14:41	13:24
19	09:58	08:06	06:18	05:17	03:15		02:57	04:56	06:40	08:18	09:13	10:51
	14:45	16:44	18:20	21:05	23:02		23:37	21:29	19:27	17:32	14:38	13:23
20	09:54	08:02	06:14	05:13	03:11		03:01	05:00	06:43	08:21	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:33	21:25	19:24	17:28	14:34	13:23
21	09:51	07:58	06:11	05:09	03:07		03:01	05:03	06:46	08:25	09:21	10:53
	14:53	16:51	18:27	21:12	23:10		23:28	21:21	19:20	17:24	14:31	13:23
22	09:48	07:54	06:07	05:05	03:03		03:06	05:07	06:49	08:28	09:24	10:54
	14:57	16:55	18:30	21:16	23:15		23:24	21:17	19:16	17:20	14:27	13:23
23	09:44	07:51	06:03	05:01	02:54		03:10	05:10	06:52	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:20	21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:25
25	09:37	07:43	05:55	04:53	02:45		03:19	05:17	06:59	07:58-08:04/6	07:39	09:36
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:17	13:26
26	09:34	07:39	05:51	04:49	02:41		03:23	05:21	07:02	07:56-08:05/9	07:42	09:40
	15:13	17:09	18:43	21:30	23:33		23:07	21:02	19:00	16:05	14:14	13:27
27	09:30	07:35	05:47	04:45	02:36		03:28	05:24	07:05	07:55-08:05/10	07:46	09:44
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:56	16:01	14:11	13:29
28	09:27	07:32	05:43	04:41	02:32		03:32	05:28	07:08	07:55-08:05/10	07:50	09:48
	15:21	17:16	18:50	21:38	23:43		22:59	20:54	18:52	15:58	14:08	13:30
29	09:23		06:39	04:37	02:27		03:36	05:31	07:12	07:55-08:04/9	07:53	09:52
	15:24		19:53	21:41	23:48		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:33	02:22		03:40	05:34	07:15	07:55-08:02/7	07:57	09:55
	15:28		19:57	21:45	23:53		22:50	20:46	18:45	15:50	14:01	13:35
31	09:16		06:32		02:18		03:44	05:38		08:00		10:49
	15:32		20:00		23:58		22:46	20:42		15:46		13:37
Potential sun hours	139	226	362	461	602	687	661	525	396	297	176	91
Sum of minutes with flicker	0	0	50	0	0	0	0	0	51	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 46
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 28 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (28)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:12	07:28	06:28	04:29	02:13		03:48	05:41	07:18	08:04	09:59
	13:41	15:36	17:20	20:03	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:25	02:08		03:52	05:44	07:21	08:08	10:03
	13:44	15:40	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:21	02:03		03:56	05:48	07:25	08:11	10:06
	13:47	15:44	17:26	20:10	21:56	00:14		22:34	20:30	18:33	15:35	13:53
4	10:41	09:02	07:16	06:16	04:17	01:57		04:00	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:13	22:00	00:20		22:30	20:26	18:29	15:32	13:50
5	10:38	08:58	07:12	06:12	04:13	01:51	01:37	04:04	05:54	07:31	08:19	10:14
	13:53	15:52	17:33	20:17	22:04	00:26	00:53	22:26	20:22	18:25	15:28	13:47
6	10:36	08:54	07:09	06:08	04:09	01:44	01:46	04:08	05:58	07:34	08:23	10:17
	13:56	15:56	17:37	20:20	22:08	00:33	00:44	22:21	20:18	18:22	15:24	13:45
7	10:34	08:51	07:05	06:04	04:05	01:37	01:54	04:12	06:01	07:38	08:26	10:20
	14:00	16:00	17:40	20:23	22:12	00:41	00:37	22:17	20:14	18:18	15:21	13:42
8	10:31	08:47	07:01	06:00	04:01	01:26	02:00	04:16	06:04	07:41	08:30	10:24
	14:03	16:03	17:44	20:27	22:16	00:52	00:31	22:13	20:10	18:14	15:17	13:40
9	10:28	08:43	06:57	05:56	03:57	01:28	02:07	04:20	06:07	07:44	08:34	10:27
	14:07	16:07	17:47	20:30	22:20	00:32	00:25	22:09	20:06	18:10	15:13	13:37
10	10:25	08:39	06:53	05:52	03:53		02:12	04:23	06:11	07:47	08:38	10:30
	14:10	16:11	17:50	20:34	22:24		00:19	22:05	20:03	18:06	15:10	13:35
11	10:23	08:36	06:49	05:48	03:49		02:18	04:27	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:02	15:06	13:33
12	10:20	08:32	06:45	05:45	03:45		02:23	04:31	06:17	07:54	08:45	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:58	15:02	13:31
13	10:17	08:28	06:42	05:41	03:41		02:28	04:35	06:20	07:57	08:49	10:39
	14:22	16:22	18:00	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:29
14	10:14	08:24	06:38	05:37	03:36		02:33	04:38	06:23	08:01	08:53	10:41
	14:25	16:26	18:04	20:47	22:40		23:59	21:49	19:47	17:51	14:55	13:28
15	10:11	08:21	06:34	05:33	03:32		02:38	04:42	06:27	08:04	08:57	10:43
	14:29	16:30	18:07	20:51	22:44		23:55	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:28		02:43	04:46	06:30	08:08	09:01	10:45
	14:33	16:33	18:10	20:54	22:49		23:50	21:41	19:39	17:43	14:48	13:25
17	10:04	08:13	06:26	05:25	03:24		02:48	04:49	06:33	08:11	09:05	10:47
	14:37	16:37	18:14	20:58	22:53		23:46	21:37	19:35	17:39	14:45	13:25
18	10:01	08:09	06:22	05:21	03:20		02:53	04:53	06:36	08:14	09:09	10:49
	14:41	16:41	18:17	21:01	22:57		23:41	21:33	19:31	17:36	14:41	13:24
19	09:58	08:06	06:18	05:17	03:16		02:57	04:56	06:40	08:18	09:13	10:51
	14:45	16:44	18:20	21:05	23:01		23:37	21:29	19:27	17:32	14:38	13:23
20	09:54	08:02	06:14	05:13	03:11		03:02	05:00	06:43	08:21	09:16	10:52
	14:49	16:48	18:24	21:08	23:06		23:32	21:25	19:23	17:28	14:34	13:23
21	09:51	07:58	06:11	05:09	03:07		03:02	05:03	06:46	08:25	09:20	10:53
	14:53	16:51	18:27	21:12	23:10		23:28	21:21	19:20	17:24	14:31	13:23
22	09:48	07:54	06:07	05:05	03:03		03:06	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:15		23:24	21:17	19:16	17:20	14:27	13:23
23	09:44	07:51	06:03	05:01	02:54		03:10	05:10	06:52	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:13	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24		23:15	21:09	19:08	17:13	14:21	13:25
25	09:37	07:43	05:55	04:53	02:46		03:19	05:17	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:26	23:28		23:11	21:05	19:04	16:09	14:17	13:26
26	09:34	07:39	05:51	04:49	02:41		03:23	05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:43	21:30	23:33		23:07	21:02	19:00	16:05	14:14	13:27
27	09:30	07:35	05:47	04:45	02:37		03:28	05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:56	16:01	14:11	13:29
28	09:27	07:31	05:43	04:41	02:32		03:32	05:28	07:08	07:49	09:48	10:52
	15:21	17:16	18:50	21:37	23:42		22:58	20:54	18:52	15:58	14:08	13:31
29	09:23		06:39	04:37	02:27		03:36	05:31	07:12	07:53	09:51	10:51
	15:25		19:53	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:35	04:33	02:23		03:40	05:34	07:15	07:57	09:55	10:50
	15:28		19:57	21:45	23:52		22:50	20:46	18:45	15:50	14:02	13:35
31	09:16		06:32		02:18		03:44	05:38		08:00		10:49
	15:32		20:00		23:57		22:46	20:42		15:46		13:37
Potential sun hours	139	226	362	461	601	707	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 47
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 29 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (29)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:12	07:28	06:28	04:29	02:13		03:48	05:41	07:18	08:04	09:59
	13:41	15:36	17:20	20:03	21:49	00:03		22:42	20:38	18:41	15:43	13:58
2	10:45	09:09	07:24	06:24	04:25	02:08		03:52	05:44	07:21	08:08	10:03
	13:43	15:40	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:21	02:02		03:56	05:48	07:25	08:11	10:07
	13:46	15:44	17:26	20:10	21:56	00:14		22:34	20:30	18:33	15:35	13:53
4	10:41	09:02	07:16	06:16	04:17	01:57		04:00	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:13	22:00	00:20		22:30	20:26	18:29	15:32	13:50
5	10:39	08:58	07:12	06:12	04:13	01:51	01:36	04:04	05:54	07:31	08:19	10:14
	13:53	15:52	17:33	20:17	22:04	00:27	00:54	22:26	20:22	18:25	15:28	13:47
6	10:36	08:54	07:09	06:08	04:09	01:44	01:46	04:08	05:58	07:34	08:23	10:17
	13:56	15:56	17:37	20:20	22:08	00:34	00:45	22:22	20:18	18:22	15:24	13:44
7	10:34	08:51	07:05	06:04	04:05	01:36	01:53	04:12	06:01	07:38	08:26	10:21
	13:59	16:00	17:40	20:24	22:12	00:42	00:37	22:17	20:14	18:18	15:21	13:42
8	10:31	08:47	07:01	06:00	04:01	01:26	02:00	04:16	06:04	07:41	08:30	10:24
	14:03	16:03	17:44	20:27	22:16	00:53	00:31	22:13	20:10	18:14	15:17	13:39
9	10:28	08:43	06:57	05:56	03:57	00:06	02:06	04:20	06:07	07:44	08:34	10:27
	14:07	16:07	17:47	20:30	22:20	23:42	00:25	22:09	20:06	18:10	15:13	13:37
10	10:26	08:39	06:53	05:52	03:53		02:12	04:23	06:11	07:47	08:38	10:30
	14:10	16:11	17:50	20:34	22:24		00:20	22:05	20:03	18:06	15:10	13:35
11	10:23	08:36	06:49	05:48	03:49		02:18	04:27	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:02	15:06	13:33
12	10:20	08:32	06:45	05:45	03:45		02:23	04:31	06:17	07:54	08:45	10:36
	14:18	16:18	17:57	20:41	22:32		00:09	21:57	19:55	17:58	15:02	13:31
13	10:17	08:28	06:42	05:41	03:40		02:28	04:35	06:20	07:57	08:49	10:39
	14:21	16:22	18:00	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:29
14	10:14	08:25	06:38	05:37	03:36		02:33	04:38	06:23	08:01	08:53	10:41
	14:25	16:26	18:04	20:47	22:40		00:00	21:49	19:47	17:51	14:55	13:28
15	10:11	08:21	06:34	05:33	03:32		02:38	04:42	06:27	08:04	08:57	10:44
	14:29	16:30	18:07	20:51	22:44		23:55	21:45	19:43	17:47	14:52	13:26
16	10:07	08:17	06:30	05:29	03:28		02:43	04:46	06:30	08:08	09:01	10:46
	14:33	16:33	18:10	20:54	22:49		23:50	21:41	19:39	17:43	14:48	13:25
17	10:04	08:13	06:26	05:25	03:24		02:48	04:49	06:33	08:11	09:05	10:48
	14:37	16:37	18:14	20:58	22:53		23:46	21:37	19:35	17:39	14:45	13:24
18	10:01	08:10	06:22	05:21	03:20		02:52	04:53	06:36	08:14	09:09	10:49
	14:41	16:41	18:17	21:01	22:57		23:41	21:33	19:31	17:36	14:41	13:24
19	09:58	08:06	06:18	05:17	03:16		02:57	04:56	06:40	08:18	09:13	10:51
	14:45	16:44	18:20	21:05	23:01		23:37	21:29	19:27	17:32	14:38	13:23
20	09:54	08:02	06:14	05:13	03:11		03:02	05:00	06:43	08:21	09:17	10:52
	14:49	16:48	18:24	21:08	23:06		23:32	21:25	19:24	17:28	14:34	13:23
21	09:51	07:58	06:11	05:09	03:07		03:02	05:03	06:46	08:25	09:20	10:53
	14:53	16:51	18:27	21:12	23:10		23:28	21:21	19:20	17:24	14:31	13:23
22	09:48	07:54	06:07	05:05	03:03		03:06	05:07	06:49	08:28	09:24	10:54
	14:57	16:55	18:30	21:16	23:15		23:24	21:17	19:16	17:20	14:27	13:23
23	09:44	07:51	06:03	05:01	02:54		03:10	05:10	06:52	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:13	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:25
25	09:37	07:43	05:55	04:53	02:45		03:19	05:17	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:26	23:28		23:11	21:06	19:04	16:09	14:17	13:26
26	09:34	07:39	05:51	04:49	02:41		03:23	05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:43	21:30	23:33		23:07	21:02	19:00	16:05	14:14	13:27
27	09:30	07:35	05:47	04:45	02:37		03:28	05:24	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:56	16:01	14:11	13:29
28	09:27	07:32	05:43	04:41	02:32		03:32	05:28	07:08	07:49	09:48	10:53
	15:21	17:16	18:50	21:38	23:43		22:58	20:54	18:52	15:58	14:08	13:31
29	09:23		06:39	04:37	02:27		03:36	05:31	07:12	07:53	09:52	10:52
	15:25		19:53	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:35	04:33	02:23		03:40	05:34	07:15	07:57	09:55	10:50
	15:28		19:57	21:45	23:52		22:50	20:46	18:45	15:50	14:01	13:35
31	09:16		06:32		02:18		03:44	05:38		08:00		10:49
	15:32		20:00		23:58		22:46	20:42		15:46		13:37
Potential sun hours	139	226	362	461	601	708	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 48
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 30 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (30)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:42	09:12 15:37	07:28 17:20	06:28 20:03	04:29 21:49	02:14 00:02		03:49 22:42	05:41 20:38	07:18 18:41	08:04 15:43	14:26-14:42/16 13:59
2	10:44 13:44	09:09 15:41	07:24 17:23	06:24 20:07	04:25 21:52	02:09 00:07		03:53 22:37	05:45 20:34	07:21 18:37	08:08 15:39	14:26-14:41/15 13:56
3	10:42 13:47	09:05 15:44	07:20 17:27	06:20 20:10	04:21 21:56	02:04 00:13		03:57 22:33	05:48 20:30	07:25 18:33	08:11 15:36	14:28-14:40/12 13:53
4	10:40 13:50	09:01 15:48	07:16 17:30	06:16 20:13	04:17 22:00	01:58 00:19		04:01 22:29	05:51 20:26	07:28 18:29	08:15 15:32	14:29-14:34/5 13:51
5	10:38 13:54	08:58 15:52	07:12 17:33	06:12 20:17	04:13 22:04	01:52 00:25	01:40 00:50	04:05 22:25	05:54 20:22	07:31 18:25	08:19 15:28	10:13 13:48
6	10:35 13:57	08:54 15:56	07:08 17:37	06:08 20:20	04:09 22:08	01:46 00:31	01:48 00:42	04:08 22:21	05:58 20:18	07:34 18:22	08:22 15:25	10:16 13:45
7	10:33 14:00	08:50 16:00	14:59-15:06/7 17:40	07:05 20:23	06:04 22:12	04:05 00:39	01:39 00:35	04:12 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:20 13:43
8	10:30 14:04	08:47 16:04	14:57-15:10/13 17:44	07:01 20:27	06:00 22:16	04:01 00:49	02:02 00:29	04:16 22:13	06:04 20:10	07:41 18:14	08:30 15:17	10:23 13:40
9	10:28 14:07	08:43 16:07	14:57-15:12/15 17:47	06:57 20:30	05:56 22:20	03:57 00:43	02:08 00:24	04:20 22:09	06:07 20:06	07:44 18:10	08:34 15:14	10:26 13:38
10	10:25 14:11	08:39 16:11	14:56-15:12/16 17:50	06:53 20:34	05:53 22:24	03:53 00:18	02:14 00:18	04:24 22:05	06:11 20:03	07:47 18:06	08:38 15:10	10:29 13:36
11	10:22 14:15	08:36 16:15	14:56-15:13/17 17:54	06:49 20:37	05:49 22:28	03:49 00:13	02:19 00:13	04:27 22:01	06:14 19:59	07:51 18:02	08:41 15:06	10:32 13:34
12	10:19 14:18	08:32 16:19	14:55-15:13/18 17:57	06:45 20:40	05:45 22:32	03:45 00:08	02:24 00:08	04:31 21:57	06:17 19:55	07:54 17:59	08:45 15:03	10:35 13:32
13	10:16 14:22	08:28 16:22	14:55-15:13/18 18:00	06:42 20:44	05:41 22:36	03:41 00:03	02:29 00:03	04:35 21:53	06:20 19:51	07:57 17:55	08:49 15:49	10:38 13:30
14	10:13 14:26	08:24 16:26	14:56-15:13/17 18:04	06:38 20:47	05:37 22:40	03:37 23:59	02:34 21:49	04:39 19:47	06:24 17:51	08:01 17:51	08:53 14:56	10:40 13:29
15	10:10 14:30	08:21 16:30	14:56-15:12/16 18:07	06:34 20:51	05:33 22:44	03:33 23:54	02:39 21:45	04:42 19:43	06:27 17:47	08:04 17:47	08:57 14:52	10:43 13:27
16	10:07 14:34	08:17 16:34	14:57-15:12/15 18:10	06:30 20:54	05:29 22:48	03:29 23:49	02:44 21:41	04:46 19:39	06:30 17:43	08:08 17:43	09:01 14:49	10:45 13:26
17	10:04 14:37	08:13 16:37	14:57-15:10/13 18:14	06:26 20:58	05:25 22:52	03:24 23:45	02:49 21:37	04:49 19:35	06:33 17:35	08:11 17:40	09:04 14:45	10:47 13:25
18	10:01 14:41	08:09 16:41	14:59-15:09/10 18:17	06:22 21:01	05:21 22:57	03:20 23:40	02:53 21:33	04:53 19:31	06:36 17:36	08:14 17:36	09:08 14:42	10:48 13:25
19	09:57 14:45	08:06 16:44		06:18 18:20	05:17 21:05	03:16 23:01	02:58 23:36	04:57 21:29	06:40 19:27	08:18 17:32	09:12 14:38	10:50 13:24
20	09:54 14:49	08:02 16:48		06:14 18:24	05:13 21:08	03:12 23:05	03:02 23:32	05:00 21:25	06:43 19:24	08:21 17:28	09:16 14:35	10:51 13:24
21	09:51 14:53	07:58 16:52		06:11 18:27	05:09 21:12	03:08 23:10	03:02 23:27	05:04 21:21	06:46 19:20	08:25 17:24	09:20 14:31	10:52 13:24
22	09:47 14:57	07:54 16:55		06:07 18:30	05:05 21:15	03:03 23:14	03:07 23:23	05:07 21:17	06:49 19:16	08:28 17:21	09:24 14:28	10:53 13:24
23	09:44 15:01	07:50 16:59		06:03 18:34	05:01 21:19	02:55 23:19	03:11 23:19	05:11 21:13	06:52 19:12	08:32 17:17	15:32-15:36/4 14:24	10:58 13:25
24	09:40 15:05	07:47 17:02		05:59 18:37	04:57 21:23	02:51 23:23	03:15 23:15	05:14 21:09	06:56 19:08	08:35 17:13	15:28-15:39/11 14:21	10:53 13:26
25	09:37 15:09	07:43 17:06		05:55 18:40	04:53 21:26	02:46 23:28	03:20 23:10	05:18 21:05	06:59 19:04	07:39 16:09	14:27-14:40/13 14:18	10:53 13:27
26	09:33 15:13	07:39 17:09		05:51 18:43	04:49 21:30	02:42 23:32	03:24 23:06	05:21 21:01	07:02 19:00	07:42 16:05	14:27-14:42/15 14:15	10:53 13:28
27	09:30 15:17	07:35 17:13		05:47 18:47	04:45 21:34	02:37 23:37	03:28 23:02	05:24 20:57	07:05 18:56	07:46 16:02	14:26-14:43/17 14:11	10:52 13:30
28	09:26 15:21	07:31 17:16		05:43 18:50	04:41 21:37	02:33 23:42	03:32 22:58	05:28 20:54	07:08 18:52	07:08 15:58	14:25-14:43/18 14:08	10:52 13:32
29	09:23 15:25			06:39 19:53	04:37 21:41	02:28 23:47	03:37 22:54	05:31 20:50	07:12 18:49	07:53 15:54	14:24-14:42/18 14:05	10:51 13:34
30	09:19 15:29			06:36 19:57	04:33 21:45	02:24 23:52	03:41 22:50	05:34 20:46	07:15 18:45	07:57 15:50	14:25-14:43/18 14:02	10:49 13:36
31	09:16 15:33			06:32 20:00		02:19 23:57	03:45 22:46	05:38 20:42		08:00 15:47	14:25-14:42/17 15:47	10:48 13:38
Potential sun hours	139	226		362	461	601	708	660	525	396	297	176
Sum of minutes with flicker	0	175	0	0	0	0	0	0	0	131	48	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 49
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 31 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (31)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:12 13:38-13:57/19	07:28	06:28	04:29	02:14		03:49	05:41	07:18	08:04	09:58
	13:42	15:37	17:20	20:03	21:48	00:02		22:41	20:38	18:41	15:43	13:59
2	10:44	09:09 13:39-13:57/18	07:24	06:24	04:25	02:09		03:53	05:44	07:21	08:07	10:02
	13:44	15:41	17:23	20:07	21:52	00:07		22:37	20:34	18:37	15:39	13:56
3	10:42	09:05 13:39-13:56/17	07:20	06:20	04:21	02:04		03:57	05:48	07:24	08:11	10:06
	13:47	15:44	17:27	20:10	21:56	00:13		22:33	20:30	18:33	15:36	13:53
4	10:40	09:01 13:40-13:56/16	07:16	06:16	04:17	01:58		04:01	05:51	07:28	08:15	13:14-13:22/8
	13:50	15:48	17:30	20:13	22:00	00:18		22:29	20:26	18:29	15:32	13:51
5	10:38	08:58 13:42-13:56/14	07:12	06:12	04:13	01:52	01:40	04:05	05:54	07:31	08:19	13:12-13:24/12
	13:54	15:52	17:33	20:17	22:04	00:25	00:50	22:25	20:22	18:25	15:28	13:48
6	10:35	08:54 13:43-13:54/11	07:08	06:08	04:09	01:46	01:48	04:08	05:58	07:34	08:22	13:11-13:25/14
	13:57	15:56	17:37	20:20	22:08	00:31	00:42	22:21	20:18	18:22	15:25	13:45
7	10:33	08:50 13:45-13:52/7	07:05	06:04	04:05	01:39	01:56	04:12	06:01	07:38	08:26	13:10-13:26/16
	14:00	16:00	17:40	20:23	22:12	00:39	00:35	22:17	20:14	18:18	15:21	13:43
8	10:30	08:47	07:01	06:00	04:01	01:30	02:02	04:16	06:04	07:41	08:30	13:10-13:27/17
	14:04	16:04	17:44	20:27	22:16	00:48	00:29	22:13	20:10	18:14	15:17	13:40
9	10:28	08:43	06:57	05:56	03:57	01:12	02:08	04:20	06:07	07:44	08:34	13:09-13:27/18
	14:07	16:07	17:47	20:30	22:20	01:07	00:23	22:09	20:06	18:10	15:14	13:38
10	10:25	08:39	06:53	05:53	03:53		02:14	04:24	06:11	07:47	08:37	13:09-13:27/18
	14:11	16:11	17:50	20:34	22:24		00:18	22:05	20:02	18:06	15:10	13:36
11	10:22	08:36	06:49	05:49	03:49		02:19	04:27	06:14	07:51	08:41	13:10-13:28/18
	14:15	16:15	17:54	20:37	22:28		00:13	22:01	19:59	18:02	15:06	13:34
12	10:19	08:32	06:45	05:45	03:45		02:24	04:31	06:17	07:54	08:45	13:09-13:28/19
	14:18	16:19	17:57	20:40	22:32		00:08	21:57	19:55	17:59	15:03	13:32
13	10:16	08:28	06:42	05:41	03:41		02:29	04:35	06:20	07:57	08:49	13:10-13:28/18
	14:22	16:22	18:00	20:44	22:36		00:03	21:53	19:51	17:55	14:59	13:30
14	10:13	08:24	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	13:11-13:28/17
	14:26	16:26	18:04	20:47	22:40		23:58	21:49	19:47	17:51	14:56	13:29
15	10:10	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	13:12-13:27/15
	14:30	16:30	18:07	20:51	22:44		23:54	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:29	03:22-03:24/2	02:44	04:46	06:30	08:07	09:01	13:12-13:26/14
	14:34	16:33	18:10	20:54	22:48		23:49	21:41	19:39	17:43	14:49	13:26
17	10:04	08:13	06:26	05:25	03:24	03:21-03:24/3	02:49	04:49	06:33	08:11	09:04	13:14-13:26/12
	14:37	16:37	18:14	20:58	22:52		23:45	21:37	19:35	17:39	14:45	13:25
18	10:00	08:09	06:22	05:21	03:20	03:21-03:25/4	02:53	04:53	06:36	08:14	09:08	13:15-13:20/5
	14:41	16:41	18:17	21:01	22:57		23:40	21:33	19:31	17:36	14:42	13:25
19	09:57	08:06	06:18	05:17	03:16	03:21-03:26/5	02:58	04:57	06:40	08:18	09:12	13:24
	14:45	16:44	18:20	21:05	23:01		23:36	21:29	19:27	17:32	14:38	13:24
20	09:54	08:02	06:14	05:13	03:12	03:21-03:26/5	03:02	05:00	06:43	08:21	09:16	13:24
	14:49	16:48	18:24	21:08	23:05		23:32	21:25	19:23	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08	03:21-03:26/5	03:02	05:04	06:46	08:25	09:20	13:24
	14:53	16:52	18:27	21:12	23:10		23:27	21:21	19:20	17:24	14:31	13:24
22	09:47	07:54	06:07	05:05	03:03	03:21-03:26/5	03:07	05:07	06:49	08:28	09:24	13:24
	14:57	16:55	18:30	21:15	23:14		23:23	21:17	19:16	17:20	14:28	13:24
23	09:44	07:50	06:03	05:01	02:55	03:22-03:27/5	03:11	05:11	06:52	08:32	09:28	13:25
	15:01	16:59	18:34	21:19	23:18		23:19	21:13	19:12	17:17	14:24	13:25
24	09:40 13:41-13:46/5	07:47	05:59	04:57	02:51	03:22-03:27/5	03:15	05:14	06:56	08:35	09:32	13:26
	15:05	17:02	18:37	21:23	23:23		23:15	21:09	19:08	17:13	14:21	13:26
25	09:37 13:40-13:52/12	07:43	05:55	04:53	02:46	03:23-03:27/4	03:20	05:17	06:59	07:39	09:36	13:27
	15:09	17:06	18:40	21:26	23:28		23:10	21:05	19:04	16:09	14:18	13:27
26	09:33 13:39-13:54/15	07:39	05:51	04:49	02:42	03:24-03:27/3	03:24	05:21	07:02	07:42	09:39	13:28
	15:13	17:09	18:43	21:30	23:32		23:06	21:01	19:00	16:05	14:15	13:28
27	09:30 13:39-13:55/16	07:35	05:47	04:45	02:37	03:24-03:25/1	03:28	05:24	07:05	07:46	09:43	13:30
	15:17	17:13	18:47	21:34	23:37		23:02	20:57	18:56	16:02	14:11	13:36
28	09:26 13:38-13:55/17	07:31	05:43	04:41	02:33		03:32	05:28	07:08	07:49	09:47	13:36
	15:21	17:16	18:50	21:37	23:42		22:58	20:54	18:52	15:58	14:08	13:32
29	09:23 13:38-13:56/18		06:39	04:37	02:28		03:36	05:31	07:12	07:53	09:51	13:32
	15:25		19:53	21:41	23:46		22:54	20:50	18:49	15:54	14:05	13:34
30	09:19 13:38-13:56/18		06:36	04:33	02:24		03:41	05:34	07:15	07:56	09:55	13:34
	15:29		19:57	21:45	23:51		22:50	20:46	18:45	15:50	14:02	13:36
31	09:16 13:38-13:56/18		06:32		02:19		03:45	05:38		08:00		13:38
	15:33		20:00		23:56		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	708	660	525	396	297	176	92
Sum of minutes with flicker	119	102	0	0	0	47	0	0	0	0	221	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 50
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 32** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (32)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:45 13:43	09:12 15:37	07:28 17:20	06:28 20:03	04:30 21:48	02:15 00:01		03:49 22:41	05:42 20:38	07:18 18:41	08:04 15:43	09:58 14:00
2	10:44 13:45	09:08 15:41	07:24 17:23	06:24 20:07	04:26 21:52	02:10 00:06		03:53 22:37	05:45 20:34	07:21 18:37	08:08 15:40	10:02 13:57
3	10:42 13:48	09:05 15:45	07:20 17:27	06:20 20:10	04:22 21:56	02:05 00:12		03:57 22:33	05:48 20:30	07:25 18:33	08:11 15:36	10:06 13:54
4	10:40 13:51	09:01 15:49	07:16 17:30	06:16 20:13	04:18 22:00	02:00 00:17		04:01 22:29	05:51 20:26	07:28 18:30	08:15 15:32	10:09 13:51
5	10:37 13:55	08:58 15:53	07:12 17:34	06:12 20:17	04:14 22:04	01:54 00:23	01:43	04:05 22:25	05:55 20:22	07:31 18:26	08:19 15:29	10:13 13:49
6	10:35 13:58	08:54 15:57	07:09 17:37	06:09 20:20	04:10 22:08	01:48 00:30	01:51	04:09 22:21	05:58 20:18	07:34 18:22	08:22 15:25	10:16 13:46
7	10:33 14:01	08:50 16:00	07:05 17:41	06:05 20:24	04:06 22:12	01:42 00:37	01:58	04:13 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:19 13:44
8	10:30 14:05	08:47 16:04	07:01 17:44	06:01 20:27	04:02 22:15	01:33 00:45	02:04	04:17 22:13	06:05 20:10	07:41 18:14	08:30 15:18	10:23 13:41
9	10:27 14:08	08:43 16:08	06:57 17:47	05:57 20:30	03:58 22:19	01:22 00:57	02:10	04:20 22:09	06:08 20:07	07:44 18:10	08:34 15:14	10:26 13:39
10	10:25 14:12	08:39 16:12	06:53 17:51	05:53 20:34	03:54 22:23	23:18 01:49	02:15	04:24 22:05	06:11 20:03	07:48 18:07	08:37 15:10	10:29 13:37
11	10:22 14:15	08:36 16:15	06:49 17:54	05:49 20:37	03:50 22:27		02:20	04:28 22:01	06:14 19:59	07:51 18:03	08:41 15:07	10:32 13:35
12	10:19 14:19	08:32 16:19	06:46 17:57	05:45 20:41	03:46 22:31		02:26	04:32 21:57	06:17 19:55	07:54 17:59	08:45 15:03	10:35 13:33
13	10:16 14:23	08:28 16:23	06:42 18:01	05:41 20:44	03:42 22:36		02:31	04:35 21:53	06:21 19:51	07:58 17:55	08:49 15:00	10:37 13:31
14	10:13 14:27	08:24 16:27	06:38 18:04	05:37 20:47	03:37 22:40		02:35	04:39 21:49	06:24 19:47	08:01 17:51	08:53 14:56	10:40 13:30
15	10:10 14:30	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44		02:40	04:43 21:45	06:27 19:43	08:04 17:47	08:57 14:53	10:42 13:29
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:54	03:29 22:48		02:45	04:46 21:41	06:30 19:39	08:08 17:44	09:00 14:49	10:44 13:27
17	10:04 14:38	08:13 16:38	06:26 18:14	05:25 20:58	03:25 22:52		02:50	04:50 21:37	06:33 19:35	08:11 17:40	09:04 14:46	10:46 13:27
18	10:00 14:42	08:09 16:41	06:22 18:17	05:21 21:01	03:21 22:56		02:54	04:53 21:33	06:37 19:31	08:14 17:36	09:08 14:42	10:48 13:26
19	09:57 14:46	08:06 16:45	06:19 18:21	05:17 21:05	03:17 23:01		02:59	04:57 21:29	06:40 19:28	16:26-16:29/3 17:32	09:12 14:39	10:49 13:25
20	09:54 14:50	08:02 16:48	06:15 18:24	05:14 21:08	03:13 23:05		03:03	05:01 21:25	06:43 19:24	16:23-16:32/9 17:28	09:16 14:35	10:50 13:25
21	09:50 14:54	07:58 16:52	06:11 18:27	05:10 21:12	03:09 23:09		03:03	05:04 21:21	06:46 19:20	16:22-16:32/10 17:25	09:20 14:32	10:51 13:25
22	09:47 14:58	07:54 16:56	06:07 18:30	05:06 21:15	03:04 23:14		03:08	05:08 21:17	06:49 19:16	16:22-16:33/11 17:21	09:24 14:28	10:52 13:26
23	09:44 15:02	07:51 16:59	06:03 18:34	05:02 21:19	03:00 23:18		03:12	05:11 21:13	06:53 19:12	16:22-16:28/6 17:17	09:28 14:25	10:52 13:26
24	09:40 15:06	07:47 17:03	05:59 18:37	04:58 21:23	02:52 23:23		03:16	05:14 21:09	06:56 19:08	16:22-16:24/2 17:13	09:32 14:22	10:53 13:27
25	09:37 15:10	07:43 17:06	05:55 18:40	04:54 21:26	02:47 23:27		03:21	05:18 21:05	06:59 19:04	07:39 16:10	09:35 14:19	10:53 13:28
26	09:33 15:14	07:39 17:10	05:51 18:44	04:50 21:30	02:43 23:32		03:25	05:21 21:01	07:02 19:00	07:42 16:06	09:39 14:15	10:52 13:29
27	09:30 15:18	07:35 17:13	05:48 18:47	04:46 21:34	02:38 23:36		03:29	05:25 20:58	07:05 18:57	07:46 16:02	09:43 14:12	10:52 13:31
28	09:26 15:22	07:32 17:17	05:44 18:50	04:42 21:37	02:34 23:41		03:33	05:28 20:54	07:09 18:53	07:49 15:58	09:47 14:09	10:51 13:33
29	09:23 15:25		06:40 19:54	04:38 21:41	02:29 23:46		03:37	05:32 20:50	07:12 18:49	07:53 15:55	09:51 14:06	10:50 13:35
30	09:19 15:29		06:36 19:57	04:34 21:45	02:25 23:51		03:41	05:35 20:46	07:15 18:45	07:57 15:51	09:54 14:03	10:49 13:37
31	09:16 15:33		06:32 20:00		02:20 23:56		03:45 22:45	05:38 20:42		08:00 15:47		10:47 13:39
Potential sun hours	140	227	362	461	600	685	659	525	396	297	176	93
Sum of minutes with flicker	0	38	0	0	0	0	0	0	0	41	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 51
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 33 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (33)****Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:13	07:28	06:28	04:30	02:14		03:49	05:41	07:18	08:04	09:59
	13:42	15:37	17:20	20:04	21:49	00:02		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:26	02:09		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:22	02:04		03:57	05:48	07:25	08:12	10:06
	13:47	15:45	17:27	20:10	21:56	00:13		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:16	06:16	04:18	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:14	22:00	00:19		22:30	20:26	18:30	15:32	13:51
5	10:38	08:58	07:13	06:12	04:13	01:52	01:39	04:05	05:55	07:31	08:19	10:13
	13:54	15:52	17:34	20:17	22:04	00:26	00:51	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:09	01:46	01:48	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:32	00:43	22:22	20:18	18:22	15:25	13:45
7	10:33	08:51	07:05	06:05	04:05	01:38	01:55	04:12	06:01	07:38	08:26	10:20
	14:00	16:00	17:40	20:24	22:12	00:40	00:36	22:18	20:15	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:29	02:02	04:16	06:04	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:50	00:30	22:13	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	23:15	02:08	04:20	06:08	07:44	08:34	10:27
	14:07	16:08	17:47	20:30	22:20	01:49	00:24	22:09	20:07	18:10	15:14	13:38
10	10:25	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:05	20:03	18:06	15:10	13:36
11	10:23	08:36	06:50	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:15	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:03	15:06	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:45	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:49	19:47	17:51	14:56	13:29
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:54	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:45
	14:34	16:34	18:11	20:55	22:49		23:50	21:41	19:39	17:44	14:49	13:26
17	10:04	08:13	06:26	05:25	03:25		02:49	04:50	06:33	08:11	09:05	10:47
	14:38	16:37	18:14	20:58	22:53		23:45	21:37	19:35	17:40	14:45	13:25
18	10:01	08:10	06:22	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:41	16:41	18:17	21:02	22:57		23:41	21:33	19:32	17:36	14:42	13:25
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:50
	14:45	16:45	18:21	21:05	23:01		23:37	21:29	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:21	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:25	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:20	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:25	14:31	13:24
22	09:48	07:55	06:07	05:05	03:04		03:07	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:14	19:12	17:17	14:25	13:25
24	09:41	07:47	05:59	04:57	02:51		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:23		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:53	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:49	02:42		03:24	05:21	07:02	07:42	09:40	10:54
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:06	14:15	13:28
27	09:30	07:36	05:47	04:46	02:37		03:28	05:25	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:37		23:03	20:58	18:57	16:02	14:12	13:30
28	09:27	07:32	05:44	04:42	02:33		03:32	05:28	07:09	07:50	09:48	10:52
	15:21	17:16	18:50	21:38	23:42		22:58	20:54	18:53	15:58	14:08	13:32
29	09:23		06:40	04:38	02:28		03:37	05:31	07:12	07:53	09:51	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:34
30	09:20		06:36	04:34	02:24		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:00		10:48
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	687	660	525	396	297	176	92
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project: **Taaleritehdas_Posio**
 Description: **Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa**

Printed/Page
 12.12.2012 9:17 / 52

Licensed user:
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 +358 10 33 24271
 Atte Lohman / atte.lohman@poyry.com
 Calculated:
 12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG

Calculation: Posio MurtotuuliWTG: 34 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (34)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:12	07:28	06:28	04:29	02:14		03:49	05:41	07:18	08:04	09:58
	13:42	15:37	17:20	20:03	21:48	00:01		22:41	20:38	18:41	15:43	13:59
2	10:44	09:08	07:24	06:24	04:25	02:09		03:53	05:44	07:21	08:07	10:02
	13:44	15:41	17:23	20:07	21:52	00:07		22:37	20:34	18:37	15:39	13:56
3	10:42	09:05	07:20	06:20	04:21	02:04		03:57	05:48	07:24	08:11	10:06
	13:47	15:44	17:27	20:10	21:56	00:12		22:33	20:30	18:33	15:36	13:53
4	10:40	09:01	07:16	06:16	04:17	01:58		04:01	05:51	07:28	08:15	10:09
	13:50	15:48	17:30	20:13	22:00	00:18		22:29	20:26	18:29	15:32	13:51
5	10:38	08:58	07:12	06:12	04:13	01:53	01:40	04:05	05:54	07:31	08:19	10:13
	13:54	15:52	17:33	20:17	22:04	00:24	00:50	22:25	20:22	18:25	15:28	13:48
6	10:35	08:54	07:08	06:08	04:09	01:46	01:49	04:08	05:58	07:34	08:22	10:16
	13:57	15:56	17:37	20:20	22:08	00:31	00:42	22:21	20:18	18:22	15:25	13:45
7	10:33	08:50	07:05	06:04	04:05	01:39	01:56	04:12	06:01	07:37	08:26	10:20
	14:00	16:00	17:40	20:23	22:12	00:39	00:35	22:17	20:14	18:18	15:21	13:43
8	10:30	08:47	07:01	06:00	04:01	01:30	02:02	04:16	06:04	07:41	08:30	10:23
	14:04	16:04	17:44	20:27	22:15	00:48	00:29	22:13	20:10	18:14	15:17	13:40
9	10:28	08:43	06:57	05:56	03:57	01:14	02:08	04:20	06:07	07:44	08:34	10:26
	14:07	16:07	17:47	20:30	22:19	01:04	00:23	22:09	20:06	18:10	15:14	13:38
10	10:25	08:39	06:53	05:52	03:53		02:14	04:24	06:11	07:47	08:37	10:29
	14:11	16:11	17:50	20:34	22:23		00:18	22:05	20:02	18:06	15:10	13:36
11	10:22	08:35	06:49	05:49	03:49		02:19	04:27	06:14	07:51	08:41	10:32
	14:15	16:15	17:54	20:37	22:27		00:13	22:01	19:59	18:02	15:06	13:34
12	10:19	08:32	06:45	05:45	03:45 04:36-04:37/1		02:24	04:31	06:17	07:54	08:45	10:35
	14:18	16:19	17:57	20:40	22:32		00:08	21:57	19:55	17:59	15:03	13:32
13	10:16	08:28	06:41	05:41	03:41 04:33-04:39/6		02:29	04:35	06:20	07:57	08:49	10:38
	14:22	16:22	18:00	20:44	22:36		00:03	21:53	19:51	17:55	14:59	13:30
14	10:13	08:24	06:38	05:37	03:37 04:30-04:40/10		02:34	04:39	06:24	08:01	08:53	10:40
	14:26	16:26	18:04	20:47	22:40		23:58	21:49	19:47	17:51	14:56	13:29
15	10:10	08:21	06:34	05:33	03:33 04:29-04:41/12		02:39 04:43-04:46/3	04:42	06:27	08:04	08:57 12:05-12:10/5	10:42
	14:30	16:30	18:07	20:51	22:44		23:54	21:45	19:43	17:47	14:52	13:28
16	10:07	08:17	06:30	05:29	03:29 04:28-04:42/14		02:44 04:41-04:48/7	04:46	06:30	08:07	09:00 12:03-12:12/9	10:44
	14:34	16:33	18:10	20:54	22:48		23:49	21:41	19:39	17:43	14:49	13:26
17	10:04	08:13	06:26	05:25	03:24 04:28-04:42/14		02:49 04:40-04:49/9	04:49	06:33	08:11	09:04 12:02-12:14/12	10:46
	14:38	16:37	18:14	20:58	22:52		23:45	21:37	19:35	17:39	14:45	13:25
18	10:00 12:25-12:40/15	08:09	06:22	05:21	03:20 04:27-04:42/15		02:53 04:40-04:50/10	04:53	06:36	08:14	09:08 12:01-12:14/13	10:48
	14:41	16:41	18:17	21:01	22:56		23:40	21:33	19:31	17:36	14:42	13:25
19	09:57 12:25-12:40/15	08:05	06:18	05:17	03:16 04:27-04:42/15		02:58 04:38-04:50/12	04:57	06:40	08:18	09:12 12:01-12:15/14	10:50
	14:45	16:44	18:20	21:05	23:01		23:36	21:29	19:27	17:32	14:38	13:24
20	09:54 12:25-12:41/16	08:02	06:14	05:13	03:12 04:27-04:42/15		03:02 04:38-04:51/13	05:00	06:43	08:21	09:16 12:01-12:15/14	10:51
	14:49	16:48	18:24	21:08	23:05		23:32	21:25	19:23	17:28	14:35	13:24
21	09:50 12:25-12:40/15	07:58	06:11	05:09	03:08 04:27-04:42/15		03:02 04:38-04:52/14	05:04	06:46	08:25	09:20 12:01-12:16/15	10:52
	14:53	16:52	18:27	21:12	23:09		23:27	21:21	19:20	17:24	14:31	13:24
22	09:47 12:26-12:40/14	07:54	06:07	05:05	03:04 04:27-04:42/15		03:07 04:38-04:52/14	05:07	06:49	08:28	09:24 12:02-12:17/15	10:52
	14:57	16:55	18:30	21:15	23:14		23:23	21:17	19:16	17:20	14:28	13:25
23	09:44 12:27-12:41/14	07:50	06:03	05:01	02:55 04:28-04:42/14		03:11 04:38-04:53/15	05:11	06:52	08:31	09:28 12:01-12:16/15	10:53
	15:01	16:59	18:33	21:19	23:18		23:19	21:13	19:12	17:17	14:24	13:25
24	09:40 12:27-12:40/13	07:47	05:59	04:57	02:51 04:29-04:41/12		03:15 04:38-04:53/15	05:14	06:55	08:35	09:32 12:02-12:17/15	10:53
	15:05	17:02	18:37	21:23	23:23		23:14	21:09	19:08	17:13	14:21	13:26
25	09:37 12:28-12:40/12	07:43	05:55	04:53	02:46 04:29-04:40/11		03:20 04:38-04:53/15	05:17	06:59	07:39	09:35	10:53
	15:09	17:06	18:40	21:26	23:27		23:10	21:05	19:04	16:09	14:18	13:27
26	09:33 12:30-12:39/9	07:39	05:51	04:49	02:42 04:30-04:40/10		03:24 04:38-04:53/15	05:21	07:02	07:42	09:39	10:53
	15:13	17:09	18:43	21:30	23:32		23:06	21:01	19:00	16:05	14:15	13:28
27	09:30 12:32-12:37/5	07:35	05:47	04:45	02:37 04:31-04:39/8		03:28 04:39-04:53/14	05:24	07:05	07:46	09:43	10:52
	15:17	17:13	18:47	21:34	23:37		23:02	20:57	18:56	16:02	14:11	13:30
28	09:26	07:31	05:43	04:41	02:33 04:33-04:38/5		03:32 04:39-04:52/13	05:28	07:08	07:49	09:47	10:51
	15:21	17:16	18:50	21:37	23:41		22:58	20:53	18:52	15:58	14:08	13:32
29	09:23		06:39	04:37	02:28		03:37 04:40-04:52/12	05:31	07:12	07:53	09:51	10:50
	15:25		19:53	21:41	23:46		22:54	20:50	18:49	15:54	14:05	13:34
30	09:19		06:36	04:33	02:24		03:41 04:42-04:51/9	05:34	07:15	07:56	09:55	10:49
	15:29		19:57	21:45	23:51		22:50	20:46	18:45	15:50	14:02	13:36
31	09:16		06:32		02:19		03:45 04:45-04:49/4	05:38		08:00		10:48
	15:33		20:00		23:56		22:45	20:42		15:47		13:38
Potential sun hours	140	126	136	146	160	178	166	125	136	129	176	92
Sum of minutes with flicker	128	0	0	0	192	0	194	0	0	0	127	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 53
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 35 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (35)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:30	02:13		03:49	05:41	07:19	08:05	10:00
	13:41	15:37	17:20	20:04	21:49	00:04		22:42	20:38	18:41	15:43	13:59
2	10:46	09:09	07:24	06:24	04:26	02:08		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:24	20:07	21:53	00:09		22:38	20:34	18:37	15:39	13:56
3	10:44	09:06	07:21	06:20	04:21	02:03		03:57	05:48	07:25	08:12	10:07
	13:47	15:45	17:27	20:11	21:57	00:15		22:34	20:31	18:34	15:36	13:53
4	10:41	09:02	07:17	06:16	04:17	01:57		04:01	05:51	07:28	08:16	10:11
	13:50	15:48	17:30	20:14	22:01	00:21		22:30	20:27	18:30	15:32	13:50
5	10:39	08:58	07:13	06:12	04:13	01:51	01:36	04:05	05:55	07:32	08:19	10:14
	13:53	15:52	17:34	20:17	22:05	00:27	00:55	22:26	20:23	18:26	15:28	13:47
6	10:37	08:55	07:09	06:09	04:09	01:44	01:46	04:08	05:58	07:35	08:23	10:18
	13:56	15:56	17:37	20:21	22:09	00:34	00:45	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:05	01:36	01:54	04:12	06:01	07:38	08:27	10:21
	14:00	16:00	17:41	20:24	22:13	00:43	00:38	22:18	20:15	18:18	15:21	13:42
8	10:32	08:47	07:01	06:01	04:01	01:25	02:00	04:16	06:05	07:41	08:31	10:25
	14:03	16:04	17:44	20:27	22:17	00:54	00:32	22:14	20:11	18:14	15:17	13:40
9	10:29	08:44	06:57	05:57	03:57	02:47	02:07	04:20	06:08	07:45	08:35	10:28
	14:07	16:08	17:47	20:31	22:20	01:20	00:26	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:54	05:53	03:53	02:12	04:24	04:24	06:11	07:48	08:38	10:31
	14:11	16:11	17:51	20:34	22:25	00:20	22:06	22:06	20:03	18:07	15:10	13:35
11	10:23	08:36	06:50	05:49	03:49	02:18	04:28	04:28	06:14	07:51	08:42	10:34
	14:14	16:15	17:54	20:38	22:29	00:15	22:02	22:02	19:59	18:03	15:06	13:33
12	10:20	08:33	06:46	05:45	03:45	02:23	04:31	04:31	06:18	07:55	08:46	10:37
	14:18	16:19	17:58	20:41	22:33	00:10	21:58	21:58	19:55	17:59	15:03	13:31
13	10:17	08:29	06:42	05:41	03:41	02:29	04:35	04:35	06:21	07:58	08:50	10:39
	14:22	16:23	18:01	20:45	22:37	00:05	21:54	21:54	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37	02:34	04:39	04:39	06:24	08:01	08:54	10:42
	14:26	16:26	18:04	20:48	22:41	00:00	21:50	21:50	19:47	17:51	14:56	13:28
15	10:11	08:21	06:34	05:33	03:33	02:39	04:42	04:42	06:27	08:05	08:58	10:44
	14:30	16:30	18:08	20:51	22:45	23:55	21:46	21:46	19:44	17:47	14:52	13:27
16	10:08	08:18	06:30	05:29	03:28	02:43	04:46	04:46	06:30	08:08	09:01	10:46
	14:33	16:34	18:11	20:55	22:49	23:51	21:42	21:42	19:40	17:44	14:49	13:26
17	10:05	08:14	06:27	05:25	03:24	02:48	04:50	04:50	06:34	08:11	09:05	10:48
	14:37	16:37	18:14	20:58	22:53	23:46	21:38	21:38	19:36	17:40	14:45	13:25
18	10:02	08:10	06:23	05:21	03:20	02:53	04:53	04:53	06:37	08:15	09:09	10:50
	14:41	16:41	18:17	21:02	22:58	23:42	21:34	21:34	19:32	17:36	14:42	13:24
19	09:58	08:06	06:19	05:17	03:16	02:57	04:57	04:57	06:40	08:18	09:13	10:51
	14:45	16:45	18:21	21:05	23:02	23:37	21:30	21:30	19:28	17:32	14:38	13:24
20	09:55	08:02	06:15	05:13	03:12	03:02	05:00	06:14-06:20/6	06:43	08:22	09:17	10:53
	14:49	16:48	18:24	21:09	23:06	23:33	21:26	21:26	19:24	17:28	14:35	13:23
21	09:52	07:59	06:11	05:09	03:07	03:02	05:04	06:12-06:21/9	06:46	08:25	09:21	10:54
	14:53	16:52	18:27	21:13	23:11	23:29	21:22	21:22	19:20	17:25	14:31	13:23
22	09:48	07:55	06:07	05:05	03:03	03:06	05:07	06:11-06:22/11	06:50	08:29	09:25	10:54
	14:57	16:55	18:31	21:16	23:15	23:24	21:18	21:18	19:16	17:21	14:28	13:24
23	09:45	07:51	06:03	05:01	03:00	03:11	05:11	06:11-06:22/11	06:53	08:32	09:29	10:55
	15:01	16:59	18:34	21:20	23:20	23:20	21:14	21:14	19:12	17:17	14:24	13:24
24	09:41	07:47	05:59	04:57	02:50	03:15	05:14	06:11-06:22/11	06:56	08:36	09:33	10:55
	15:05	17:03	18:37	21:23	23:24	23:16	21:10	21:10	19:08	17:13	14:21	13:25
25	09:38	07:43	05:55	04:54	02:46	03:20	05:18	06:12-06:21/9	06:59	07:39	09:37	10:55
	15:09	17:06	18:41	21:27	23:29	23:12	21:06	21:06	19:05	17:09	14:18	13:26
26	09:34	07:40	05:52	04:50	02:41	03:24	05:21	06:12-06:20/8	07:02	18:11-18:15/4	07:43	09:41
	15:13	17:10	18:44	21:31	23:34	23:07	21:02	21:02	19:01	16:06	14:14	13:28
27	09:31	07:36	05:48	04:46	02:37	03:28	05:25	06:14-06:17/3	07:06	18:09-18:15/6	07:46	09:44
	15:17	17:13	18:47	21:34	23:38	23:03	20:58	20:58	18:57	16:02	14:11	13:29
28	09:27	07:32	05:44	04:42	02:32	03:32	05:28	05:28	07:09	18:08-18:12/4	07:50	09:48
	15:21	17:17	18:51	21:38	23:43	22:59	20:54	20:54	18:53	15:58	14:08	13:31
29	09:24		06:40	04:38	02:28	03:36	05:31	05:31	07:12	07:54	09:52	10:52
	15:25		19:54	21:42	23:48	22:55	20:50	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:34	02:23	03:41	05:35	05:35	07:15	07:57	09:56	10:51
	15:29		19:57	21:46	23:53	22:51	20:46	20:46	18:45	15:51	14:02	13:35
31	09:17		06:32		02:18	03:45	05:38	05:38		08:01		10:49
	15:33		20:01		23:58	22:47	20:42	20:42		15:47		13:38
Potential sun hours	139	226	362	461	602	688	661	525	396	297	176	91
Sum of minutes with flicker	0	0	13	68	0	0	0	68	14	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 54
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 36 - NORDEX N117** hub: 120.0 m (TOT: 178.5 m) (36)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:42	09:12 15:37	07:28 17:20	06:28 20:03	04:29 21:49	02:14 00:02		03:49 22:42	05:41 20:38	07:18 18:41	08:04 15:43	09:59 13:59
2	10:44 13:44	09:09 15:41	07:24 17:23	06:24 20:07	04:25 21:52	02:09 00:07		03:53 22:37	05:45 20:34	07:21 18:37	08:08 15:39	10:02 13:56
3	10:42 13:47	09:05 15:44	07:20 17:27	06:20 20:10	04:21 21:56	02:04 00:13		03:57 22:33	05:48 20:30	07:25 18:33	08:11 15:36	10:06 13:53
4	10:40 13:50	09:01 15:48	07:16 17:30	06:16 20:13	04:17 22:00	01:58 00:19		04:01 22:29	05:51 20:26	07:28 18:29	08:15 15:32	10:10 13:51
5	10:38 13:54	08:58 15:52	07:12 17:34	06:12 20:17	04:13 22:04	01:52 00:25	01:40	04:05 22:25	05:54 20:22	07:31 18:26	08:19 15:28	10:13 13:48
6	10:36 13:57	08:54 15:56	07:09 17:37	06:08 20:20	04:09 22:08	01:46 00:32	01:48	04:08 22:21	05:58 20:18	07:34 18:22	08:22 15:25	10:17 13:45
7	10:33 14:00	08:50 16:00	07:05 17:40	06:04 20:23	04:05 22:12	01:39 00:39	01:55	04:12 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:20 13:43
8	10:30 14:04	08:47 16:04	07:01 17:44	06:00 20:27	04:01 22:16	01:30 00:49	02:02	04:16 22:13	06:04 20:10	07:41 18:14	08:30 15:17	10:23 13:40
9	10:28 14:07	08:43 16:08	06:57 17:47	05:57 20:30	03:57 22:20	01:00 01:01	02:08	04:20 22:09	06:08 20:06	07:44 18:10	08:34 15:14	10:26 13:38
10	10:25 14:11	08:39 16:11	06:53 17:50	05:53 20:34	03:53 22:24		02:14	04:24 22:05	06:11 20:03	07:47 18:06	08:38 15:10	10:29 13:36
11	10:22 14:15	08:36 16:15	06:49 17:54	05:49 20:37	03:49 22:28		02:19	04:27 22:01	06:14 19:59	07:51 18:02	08:41 15:06	10:32 13:34
12	10:19 14:18	08:32 16:19	06:45 17:57	05:45 20:40	03:45 22:32		02:24	04:31 21:57	06:17 19:55	07:54 17:59	08:45 15:03	10:35 13:32
13	10:16 14:22	08:28 16:23	06:42 18:00	05:41 20:44	03:41 22:36		02:29	04:35 21:53	06:20 19:51	07:57 17:55	08:49 14:59	10:38 13:30
14	10:13 14:26	08:24 16:26	06:38 18:04	05:37 20:47	03:37 22:40		02:34	04:39 21:49	06:24 19:47	08:01 17:51	08:53 14:56	10:40 13:29
15	10:10 14:30	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44		02:39	04:42 21:45	06:27 19:43	08:04 17:47	08:57 14:52	10:43 13:27
16	10:07 14:34	08:17 16:34	06:30 18:10	05:29 20:54	03:29 22:48		02:44	04:46 21:41	06:30 19:39	08:08 17:43	09:01 14:49	10:45 13:26
17	10:04 14:38	08:13 16:37	06:26 18:14	05:25 20:58	03:24 22:52		02:49	04:49 21:37	06:33 19:35	08:11 17:40	09:05 14:45	10:47 13:25
18	10:01 14:41	08:09 16:41	06:22 18:17	05:21 21:01	03:20 22:57		02:53	04:53 21:33	06:36 19:31	08:14 17:36	09:08 14:42	10:48 13:25
19	09:57 14:45	08:06 16:44	06:18 18:20	05:17 21:05	03:16 23:01		02:58	04:57 21:29	06:40 19:27	08:18 17:32	16:10-16:18/8	09:12 14:38
20	09:54 14:49	08:02 16:48	06:15 18:24	05:13 21:08	03:12 23:05		03:02	05:00 21:25	06:43 19:24	08:21 17:28	16:08-16:19/11	09:16 14:35
21	09:51 14:53	07:58 16:52	06:11 18:27	05:09 21:12	03:08 23:10		03:02	05:04 21:21	06:46 19:20	08:25 17:24	16:07-16:20/13	09:20 14:31
22	09:47 14:57	07:54 16:55	06:07 18:30	05:05 21:16	03:04 23:14		03:07	05:07 21:17	06:49 19:16	08:28 17:21	16:06-16:21/15	09:24 14:28
23	09:44 15:01	07:51 16:59	06:03 18:34	05:01 21:19	02:55 23:19		03:11	05:11 21:13	06:52 19:12	08:32 17:17	16:06-16:21/15	09:28 14:25
24	09:40 15:05	07:47 17:02	05:59 18:37	04:57 21:23	02:51 23:23		03:15	05:14 21:09	06:56 19:08	08:35 17:13	16:06-16:21/15	09:32 14:21
25	09:37 15:09	07:43 17:06	05:55 18:40	04:53 21:26	02:46 23:28		03:20	05:18 21:05	06:59 19:04	07:39 16:09	15:06-15:19/13	09:36 14:18
26	09:34 15:13	07:39 17:09	05:51 18:43	04:49 21:30	02:42 23:32		03:24	05:21 21:01	07:02 19:00	07:42 16:05	15:07-15:16/9	09:40 14:15
27	09:30 15:17	07:35 17:13	05:47 18:47	04:45 21:34	02:37 23:37		03:28	05:24 20:58	07:05 18:56	07:46 16:02	15:08-15:11/3	09:43 14:11
28	09:26 15:21	07:31 17:16	05:43 18:50	04:41 21:37	02:33 23:42		03:32	05:28 20:54	07:08 18:53	07:49 15:58		09:47 14:08
29	09:23 15:25		06:40 19:53	04:37 21:41	02:28 23:47		03:37	05:31 20:50	07:12 18:49	07:53 15:54		09:51 14:05
30	09:19 15:29		06:36 19:57	04:33 21:45	02:24 23:52		03:41	05:35 20:46	07:15 18:45	07:57 15:50		09:55 14:02
31	09:16 15:33		06:32 20:00		02:19 23:57		03:45 22:46	05:38 20:42		08:00 15:47		10:48 13:38
Potential sun hours	139	226	362	461	601	684	660	525	396	297	176	92
Sum of minutes with flicker	0	99	0	0	0	0	0	0	0	102	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 55
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 37 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (37)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:48	09:13	07:28	06:28	04:30	05:28-05:40/12	02:13	03:49	05:42	07:19	08:05	10:00
	13:41	15:37	17:20	20:04	21:49	00:04	22:43	20:38	18:41	15:43	13:59	
2	10:46	09:09	07:24	06:24	04:26	05:28-05:40/12	02:08	03:53	05:45	07:22	08:08	10:04
	13:44	15:41	17:24	20:07	21:53	00:09	22:38	20:35	18:37	15:39	13:56	
3	10:44	09:06	07:21	06:20	04:22	05:28-05:40/12	02:02	03:57	05:48	07:25	08:12	10:07
	13:47	15:45	17:27	20:11	21:57	00:15	22:34	20:31	18:34	15:36	13:53	
4	10:42	09:02	07:17	06:16	04:17	05:29-05:40/11	01:57	04:01	05:51	07:28	08:16	10:11
	13:50	15:48	17:30	20:14	22:01	00:21	22:30	20:27	18:30	15:32	13:50	
5	10:39	08:59	07:13	06:13	04:13	05:29-05:38/9	01:51	04:05	05:55	07:32	08:19	10:14
	13:53	15:52	17:34	20:17	22:05	00:28	22:26	20:23	18:26	15:28	13:47	
6	10:37	08:55	07:09	06:09	04:09	05:30-05:38/8	01:44	04:08	05:58	07:35	08:23	10:18
	13:56	15:56	17:37	20:21	22:09	00:35	22:22	20:19	18:22	15:25	13:45	
7	10:34	08:51	07:05	06:05	04:05	05:32-05:35/3	01:36	04:12	05:39-05:48/9	06:01	07:38	08:27
	14:00	16:00	17:41	20:24	22:13	00:43	22:18	20:15	18:18	15:21	13:42	
8	10:32	08:47	07:01	06:01	04:01	01:25	02:00	04:16	05:38-05:49/11	06:05	07:41	08:31
	14:03	16:04	17:44	20:27	22:17	00:54	00:32	22:14	20:11	18:14	15:17	13:40
9	10:29	08:44	06:58	05:57	03:57	04:01	02:06	04:20	05:37-05:49/12	06:08	07:45	08:35
	14:07	16:08	17:47	20:31	22:21	04:15	00:26	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:54	05:53	03:53	02:12	04:24	05:37-05:49/12	06:11	07:48	08:38	10:31
	14:11	16:11	17:51	20:34	22:25	00:20	22:06	20:03	18:07	15:10	13:35	
11	10:23	08:36	06:50	05:49	03:49	02:18	04:28	05:37-05:49/12	06:14	07:51	08:42	10:34
	14:14	16:15	17:54	20:38	22:29	00:15	22:02	19:59	18:03	15:06	13:33	
12	10:20	08:33	06:46	05:45	03:45	02:23	04:31	05:37-05:48/11	06:18	07:55	08:46	10:37
	14:18	16:19	17:58	20:41	22:33	00:10	21:58	19:55	17:59	15:03	13:31	
13	10:17	08:29	06:42	05:41	03:41	02:28	04:35	05:37-05:48/11	06:21	07:58	08:50	10:39
	14:22	16:23	18:01	20:45	22:37	00:05	21:54	19:51	17:55	14:59	13:30	
14	10:14	08:25	06:38	05:37	03:37	02:34	04:39	05:37-05:46/9	06:24	08:01	08:54	10:42
	14:26	16:26	18:04	20:48	22:41	00:00	21:50	19:47	17:51	14:56	13:28	
15	10:11	08:21	06:34	05:33	03:33	02:38	04:42	05:40-05:45/5	06:27	08:05	08:58	10:44
	14:30	16:30	18:08	20:51	22:45	23:56	21:46	19:44	17:47	14:52	13:27	
16	10:08	08:18	06:30	05:29	03:28	02:43	04:46	06:30	08:08	09:02	10:46	
	14:33	16:34	18:11	20:55	22:49	23:51	21:42	19:40	17:44	14:49	13:26	
17	10:05	08:14	06:27	05:25	03:24	02:48	04:50	06:34	08:12	09:05	10:48	
	14:37	16:37	18:14	20:58	22:54	23:46	21:38	19:36	17:40	14:45	13:25	
18	10:02	08:10	06:23	05:21	03:20	02:53	04:53	06:37	08:15	09:09	10:50	
	14:41	16:41	18:18	21:02	22:58	23:42	21:34	19:32	17:36	14:42	13:24	
19	09:58	08:06	06:19	05:17	03:16	02:57	04:57	06:40	08:18	09:13	10:52	
	14:45	16:45	18:21	21:06	23:02	23:37	21:30	19:28	17:32	14:38	13:23	
20	09:55	08:03	06:15	05:13	03:12	03:02	05:00	06:43	08:22	09:17	10:53	
	14:49	16:48	18:24	21:09	23:07	23:33	21:26	19:24	17:28	14:35	13:23	
21	09:52	07:59	06:11	05:09	03:07	03:02	05:04	06:46	08:25	09:21	10:54	
	14:53	16:52	18:27	21:13	23:11	23:29	21:22	19:20	17:25	14:31	13:23	
22	09:48	07:55	06:07	05:05	03:03	03:06	05:07	06:50	08:29	09:25	10:54	
	14:57	16:55	18:31	21:16	23:15	23:24	21:18	19:16	17:21	14:28	13:24	
23	09:45	07:51	06:03	05:01	02:55	03:11	05:11	06:53	08:32	09:29	10:55	
	15:01	16:59	18:34	21:20	23:20	23:20	21:14	19:12	17:17	14:24	13:24	
24	09:41	07:47	05:59	04:58	02:50	03:15	05:14	06:56	08:36	09:33	10:55	
	15:05	17:03	18:37	21:23	23:24	23:16	21:10	19:08	17:13	14:21	13:25	
25	09:38	07:44	05:56	04:54	02:46	03:19	05:18	06:59	07:39	09:37	10:55	
	15:09	17:06	18:41	21:27	23:29	23:12	21:06	19:05	16:09	14:18	13:26	
26	09:34	07:40	05:52	04:50	02:41	03:24	05:21	07:02	07:43	09:41	10:55	
	15:13	17:10	18:44	21:31	23:34	23:07	21:02	19:01	16:06	14:14	13:27	
27	09:31	07:36	05:48	04:46	02:37	03:28	05:25	07:06	07:46	09:45	10:54	
	15:17	17:13	18:47	21:34	23:38	23:03	20:58	18:57	16:02	14:11	13:29	
28	09:27	07:32	05:44	04:42	05:31-05:38/7	03:32	05:28	07:09	07:50	09:48	10:53	
	15:21	17:17	18:51	21:38	23:43	22:59	20:54	18:53	15:58	14:08	13:31	
29	09:24	07:30	05:40	04:38	05:30-05:40/10	03:36	05:31	07:12	07:54	09:52	10:52	
	15:25	17:21	18:54	21:42	23:48	22:55	20:50	18:49	15:54	14:05	13:33	
30	09:20	07:26	05:36	04:34	05:28-05:40/12	03:41	05:35	07:15	07:57	09:56	10:51	
	15:29	17:25	18:57	21:46	23:53	22:51	20:46	18:45	15:51	14:02	13:35	
31	09:17	07:22	05:32	04:30	02:18	03:45	05:38	07:18	07:59	09:58	10:51	
	15:33	17:29	18:59	21:46	23:58	22:47	20:42	18:42	15:47	13:38	13:38	
Potential sun hours	139	226	362	461	602	685	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	29	67	0	0	97	0	0	0	0

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

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

Project: **Taaleritehdas_Posio**
 Description: **Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa**

Printed/Page
 12.12.2012 9:17 / 56

Licensed user:
Pöyry Finland Oy
 P.O. Box 93
 FI-02151 Espoo
 +358 10 33 24271
 Atte Lohman / atte.lohman@poyry.com
 Calculated:
 12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG

Calculation: Posio MurtotuuliWTG: 38 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (38)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:42	09:12 15:37	07:28 17:20	06:28 20:04	04:30 21:49	02:15 00:02		03:49 22:42	05:42 20:38	07:18 18:41	08:04 15:43	09:59 14:00
2	10:44 13:45	09:09 15:41	07:24 17:23	06:24 20:07	04:26 21:52	02:10 00:07		03:53 22:38	05:45 06:36-06:42/6 20:34 19:38-19:43/5	07:22 18:37	08:08 15:40	10:02 13:57
3	10:42 13:48	09:05 15:45	07:20 17:27	06:20 20:10	04:22 21:56	02:05 00:12		03:57 22:33	05:48 06:34-06:42/8 20:30 19:36-19:45/9	07:25 18:33	08:11 15:36	10:06 13:54
4	10:40 13:51	09:01 15:49	07:16 17:30	06:16 20:14	04:18 22:00	01:59 00:18		04:01 22:29	05:51 06:33-06:42/9 20:26 19:35-19:44/9	07:28 18:30	08:15 15:32	10:09 13:51
5	10:38 13:54	08:58 15:53	07:13 17:34	06:12 20:17	04:14 22:04	01:53 00:24	01:41 00:49	04:05 22:25	05:55 06:37-06:43/6 20:22 19:34-19:40/6	07:31 18:26	08:19 15:29	10:13 13:48
6	10:35 13:57	08:54 15:56	07:09 17:37	06:09 06:44-06:46/2 20:20 19:38-19:40/2	04:10 22:08	01:47 00:31	01:50 00:41	04:09 22:21	05:58 06:40-06:42/2 20:18 19:34-19:37/3	07:35 18:22	08:23 15:25	10:16 13:46
7	10:33 14:01	08:50 16:00	07:05 17:41	06:05 06:40-06:46/6 20:24 19:38-19:44/6	04:06 22:12	01:40 00:38	01:57 00:35	04:13 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:20 13:43
8	10:30 14:04	08:47 16:04	07:01 17:44	06:01 06:36-06:45/9 20:27 19:38-19:47/9	04:02 22:16	01:32 00:47	02:03 00:29	04:17 22:13	06:05 20:11	07:41 18:14	08:30 15:18	10:23 13:41
9	10:28 14:08	08:43 16:08	06:57 17:47	05:57 06:37-06:45/8 20:30 19:38-19:47/9	03:58 22:20	01:18 01:02	02:09 00:23	04:20 22:09	06:08 20:07	07:44 18:10	08:34 15:14	10:26 13:39
10	10:25 14:11	08:39 16:12	06:53 17:51	05:53 06:38-06:44/6 20:34 19:39-19:44/5	03:54 22:24	01:38 23:45	02:14 00:18	04:24 22:05	06:11 20:03	07:48 18:07	08:38 15:10	10:29 13:36
11	10:22 14:15	08:36 16:15	06:50 17:54	05:49 20:37	03:50 22:28	01:30 00:13	02:20 00:13	04:28 22:01	06:14 19:59	07:51 18:03	08:41 15:07	10:32 13:34
12	10:19 14:19	08:32 16:19	06:46 17:57	05:45 20:41	03:45 22:32	01:25 00:08	02:25 21:57	04:32 19:55	06:17 17:59	07:54 15:03	08:45 13:33	10:35 13:33
13	10:16 14:23	08:28 16:23	06:42 18:01	05:41 20:44	03:41 22:36	01:20 00:03	02:30 21:53	04:35 19:51	06:21 17:55	07:58 15:00	08:49 13:31	10:38 13:31
14	10:13 14:26	08:25 16:27	06:38 18:04	05:37 20:48	03:37 22:40	01:15 23:58	02:35 21:49	04:39 19:47	06:24 17:51	08:01 14:56	08:53 13:29	10:40 13:29
15	10:10 14:30	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44	01:10 23:54	02:40 21:45	04:43 19:43	06:27 17:47	08:04 14:52	08:57 13:28	10:42 13:28
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:54	03:29 22:48	01:05 23:49	02:45 21:41	04:46 19:39	06:30 17:44	08:08 14:49	09:01 13:27	10:45 13:27
17	10:04 14:38	08:13 16:38	06:26 18:14	05:25 20:58	03:25 22:52	01:00 23:45	02:49 21:37	04:50 19:35	06:33 17:40	08:11 14:45	09:05 13:26	10:46 13:26
18	10:01 14:42	08:10 16:41	06:22 18:17	05:21 21:01	03:21 22:57	01:00 23:40	02:54 21:33	04:53 19:32	06:37 17:36	08:15 14:42	09:08 13:25	10:48 13:25
19	09:57 14:46	08:06 16:45	06:19 18:21	05:17 21:05	03:17 23:01	01:00 23:36	02:58 21:29	04:57 19:28	06:40 17:32	08:18 14:39	09:12 13:25	10:50 13:25
20	09:54 14:50	08:02 16:48	06:15 18:24	05:13 21:09	03:12 23:05	01:00 23:32	03:03 21:25	05:00 19:24	06:43 17:28	08:21 14:35	09:16 13:25	10:51 13:25
21	09:51 14:54	07:58 16:52	06:11 18:27	05:10 21:12	03:08 23:10	01:00 23:27	03:03 21:21	05:04 19:20	06:46 17:25	08:25 14:32	09:20 13:25	10:52 13:25
22	09:47 14:58	07:54 16:56	06:07 18:31	05:06 21:16	03:04 23:14	01:00 23:23	03:07 21:17	05:07 19:16	06:49 17:21	08:28 14:28	09:24 13:25	10:53 13:25
23	09:44 15:02	07:51 16:59	06:03 18:34	05:02 21:19	03:00 23:19	01:00 23:19	03:12 21:13	05:11 19:12	06:53 17:17	08:32 14:25	09:28 13:26	10:53 13:26
24	09:41 15:06	07:47 17:03	05:59 18:37	04:58 21:23	02:51 23:23	01:00 23:15	03:16 21:10	05:14 19:08	06:56 17:13	08:35 14:22	09:32 13:27	10:53 13:27
25	09:37 15:10	07:43 17:06	05:55 18:40	04:54 21:26	02:47 23:28	01:00 23:10	03:20 21:06	05:18 19:04	06:59 16:10	07:39 14:18	09:36 13:28	10:53 13:28
26	09:34 15:13	07:39 17:10	05:51 18:44	04:50 21:30	02:42 23:32	01:00 23:06	03:24 21:02	05:21 19:00	07:02 16:06	07:42 14:15	09:40 13:29	10:53 13:29
27	09:30 15:17	07:35 17:13	05:48 18:47	04:46 21:34	02:38 23:37	01:00 23:02	03:29 20:58	05:25 18:57	07:05 16:02	07:46 14:12	09:43 13:30	10:52 13:30
28	09:27 15:21	07:32 17:17	05:44 18:50	04:42 21:37	02:34 23:42	01:00 22:58	03:33 20:54	05:28 18:53	07:09 15:58	07:50 14:09	09:47 13:32	10:51 13:32
29	09:23 15:25		06:40 19:54	04:38 21:41	02:29 23:46	01:00 22:54	03:37 20:50	05:31 18:49	07:12 15:55	07:53 14:06	09:51 13:34	10:50 13:34
30	09:19 15:29		06:36 19:57	04:34 21:45	02:24 23:51	01:00 22:50	03:41 20:46	05:35 18:45	07:15 15:51	07:57 14:03	09:55 13:37	10:49 13:37
31	09:16 15:33		06:32 20:00		02:20 23:56	01:00 22:46	03:45 20:42	05:38 15:47	08:00 15:47			10:48 13:39
Potential sun hours	140	227	362	461	601	685	660	525	396	297	176	92
Sum of minutes with flicker	0	0	0	62	0	0	0	0	63	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 57
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 39 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (39)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:12	07:28	06:28	19:08-19:21/13	04:30	02:15	03:49	05:41	07:18	08:04	09:58
	13:42	15:37	17:20	20:04		21:49	00:01	22:42	20:38	18:41	15:43	14:00
2	10:44	09:09	07:24	06:24	19:09-19:21/12	04:26	02:10	03:53	05:45	07:22	08:08	10:02
	13:45	15:41	17:23	20:07		21:52	00:07	22:37	20:34	18:37	15:40	13:57
3	10:42	09:05	07:20	06:20	19:09-19:19/10	04:22	02:05	03:57	05:48	07:25	08:11	10:06
	13:48	15:45	17:27	20:10		21:56	00:12	22:33	20:30	18:33	15:36	13:54
4	10:40	09:01	07:16	06:16	19:11-19:17/6	04:18	01:59	04:01	05:51	07:28	08:15	10:09
	13:51	15:49	17:30	20:14		22:00	00:18	22:29	20:26	18:30	15:32	13:51
5	10:38	08:58	07:13	06:12		04:14	01:54	04:05	05:55	07:31	08:19	10:13
	13:54	15:53	17:34	20:17		22:04	00:24	22:25	20:22	18:26	15:29	13:48
6	10:35	08:54	07:09	06:09		04:10	01:47	04:09	05:58	07:34	08:22	10:16
	13:57	15:56	17:37	20:20		22:08	00:31	00:41	22:21	18:22	15:25	13:46
7	10:33	08:50	07:05	06:05		04:06	01:40	01:57	04:13	06:01	07:38	08:26
	14:01	16:00	17:41	20:24		22:12	00:38	00:35	22:17	20:14	18:18	15:21
8	10:30	08:47	07:01	06:01		04:02	01:32	02:03	04:17	06:05	19:05-19:11/6	07:41
	14:04	16:04	17:44	20:27		22:16	00:47	00:29	22:13	20:11	18:14	15:18
9	10:28	08:43	06:57	05:57		03:58	01:19	02:09	04:20	06:08	19:03-19:12/9	07:44
	14:08	16:08	17:47	20:30		22:20	01:01	00:23	22:09	20:07	18:10	15:14
10	10:25	08:39	06:53	05:53		03:54	02:52	02:14	04:24	06:11	19:01-19:13/12	07:48
	14:11	16:12	17:51	20:34		22:24	19:41	00:18	22:05	20:03	18:07	15:10
11	10:22	08:36	06:49	05:49		03:50		02:20	04:28	06:14	19:01-19:14/13	07:51
	14:15	16:15	17:54	20:37		22:28		00:13	22:01	19:59	18:03	15:07
12	10:19	08:32	06:46	05:45		03:45		02:25	04:32	06:17	19:01-19:14/13	07:54
	14:19	16:19	17:57	20:41		22:32		00:08	21:57	19:55	17:59	15:03
13	10:16	08:28	06:42	05:41		03:41		02:30	04:35	06:21	19:00-19:10/10	07:58
	14:23	16:23	18:01	20:44		22:36		00:03	21:53	19:51	17:55	15:00
14	10:13	08:25	06:38	05:37		03:37		02:35	04:39	06:24	19:01-19:06/5	08:01
	14:26	16:27	18:04	20:47		22:40		23:58	21:49	19:47	17:51	14:56
15	10:10	08:21	06:34	05:33		03:33		02:40	04:43	06:27	19:01-19:02/1	08:04
	14:30	16:30	18:07	20:51		22:44		23:54	21:45	19:43	17:47	14:52
16	10:07	08:17	06:30	05:29		03:29		02:45	04:46	06:30	08:08	09:01
	14:34	16:34	18:11	20:54		22:48		23:49	21:41	19:39	17:44	14:49
17	10:04	08:13	06:26	05:25		03:25		02:49	04:50	06:33	08:11	09:05
	14:38	16:38	18:14	20:58		22:52		23:45	21:37	19:35	17:40	14:45
18	10:01	08:10	06:22	05:21		03:21		02:54	04:53	06:37	08:14	09:08
	14:42	16:41	18:17	21:01		22:57		23:40	21:33	19:32	17:36	14:42
19	09:57	08:06	06:19	05:17		03:17		02:58	04:57	06:40	08:18	09:12
	14:46	16:45	18:21	21:05		23:01		23:36	21:29	19:28	17:32	14:39
20	09:54	08:02	06:15	05:13		03:12		03:03	05:00	06:43	08:21	09:16
	14:50	16:48	18:24	21:08		23:05		23:32	21:25	19:24	17:28	14:35
21	09:51	07:58	06:11	05:10		03:08		03:03	05:04	06:46	08:25	09:20
	14:54	16:52	18:27	21:12		23:10		23:27	21:21	19:20	17:25	14:32
22	09:47	07:54	06:07	05:06		03:04		03:07	05:07	06:49	08:28	09:24
	14:58	16:55	18:30	21:16		23:14		23:23	21:17	19:16	17:21	14:28
23	09:44	07:51	06:03	05:02		03:00		03:12	05:11	06:53	08:32	09:28
	15:02	16:59	18:34	21:19		23:18		23:19	21:13	19:12	17:17	14:25
24	09:40	07:47	05:59	04:58		02:51		03:16	05:14	06:56	08:35	09:32
	15:06	17:03	18:37	21:23		23:23		23:15	21:09	19:08	17:13	14:22
25	09:37	07:43	05:55	04:54		02:47		03:20	05:18	06:59	07:39	09:36
	15:10	17:06	18:40	21:26		23:27		23:10	21:06	19:04	16:10	14:18
26	09:34	07:39	05:51	04:50		02:42		03:25	05:21	07:02	07:42	09:40
	15:13	17:10	18:44	21:30		23:32		23:06	21:02	19:00	16:06	14:15
27	09:30	07:35	05:48	04:46		02:38		03:29	05:25	07:05	07:46	09:43
	15:17	17:13	18:47	21:34		23:37		23:02	20:58	18:57	16:02	14:12
28	09:26	07:32	05:44	04:42		02:34		03:33	05:28	07:09	07:49	09:47
	15:21	17:17	18:50	21:37		23:41		22:58	20:54	18:53	15:58	14:09
29	09:23		06:40	19:10-19:15/5	04:38	02:29		03:37	05:31	07:12	07:53	09:51
	15:25		19:54		21:41	23:46		22:54	20:50	18:49	15:55	14:06
30	09:19		06:36	19:09-19:18/9	04:34	02:24		03:41	05:35	07:15	07:57	09:55
	15:29		19:57		21:45	23:51		22:50	20:46	18:45	15:51	14:03
31	09:16		06:32	19:08-19:21/13		02:20		03:45	05:38		08:00	
	15:33		20:00			23:56		22:46	20:42		15:47	
Potential sun hours	140	227	362	461	601	700	660	525	396	297	176	92
Sum of minutes with flicker	0	0	27	41	0	0	0	0	69	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 58
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 40 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (40)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:12	07:28	06:28	04:30	02:14		03:49	05:41	07:18	08:04	09:59
	13:42	15:37	17:20	20:04	21:49	00:02		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:26	02:09		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:22	02:04		03:57	05:48	07:25	08:11	10:06
	13:47	15:45	17:27	20:10	21:56	00:13		22:34	20:30	18:33	15:36	13:53
4	10:40	09:02	07:16	06:16	04:18	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:14	22:00	00:19		22:30	20:26	18:30	15:32	13:51
5	10:38	08:58	07:13	06:12	04:14	01:52	01:40	04:05	05:55	07:31	08:19	10:13
	13:54	15:52	17:34	20:17	22:04	00:25	00:51	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:09	01:46	01:48	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:32	00:43	22:21	20:18	18:22	15:25	13:45
7	10:33	08:51	07:05	06:05	04:05	01:39	01:55	04:12	06:01	07:38	08:26	10:20
	14:00	16:00	17:40	20:24	22:12	00:40	00:36	22:17	20:14	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:29	02:02	04:16	06:04	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:49	00:30	22:13	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	00:34	02:08	04:20	06:08	07:44	08:34	10:27
	14:07	16:08	17:47	20:30	22:20	00:52	00:24	22:09	20:07	18:10	15:14	13:38
10	10:25	08:40	06:53	05:53	03:53		02:14	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:05	20:03	18:06	15:10	13:36
11	10:22	08:36	06:49	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:15	16:15	17:54	20:37	22:28		00:14	22:01	19:59	18:03	15:06	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:45	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:57	19:55	17:59	15:03	13:32
13	10:17	08:28	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:04	21:53	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:49	19:47	17:51	14:56	13:29
15	10:10	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:44		23:54	21:45	19:43	17:47	14:52	13:27
16	10:07	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:45
	14:34	16:34	18:11	20:55	22:49		23:50	21:41	19:39	17:44	14:49	13:26
17	10:04	08:13	06:26	05:25	03:25		02:49	04:50	06:33	08:11	09:05	10:47
	14:38	16:37	18:14	20:58	22:53		23:45	21:37	19:35	17:40	14:45	13:25
18	10:01	08:10	06:22	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:42	16:41	18:17	21:02	22:57		23:41	21:33	19:32	17:36	14:42	13:25
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:50
	14:45	16:45	18:21	21:05	23:01		23:36	21:29	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:21	09:16	10:51
	14:49	16:48	18:24	21:09	23:06		23:32	21:25	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:20	10:52
	14:53	16:52	18:27	21:12	23:10		23:28	21:21	19:20	17:24	14:31	13:24
22	09:48	07:54	06:07	05:05	03:04		03:07	05:07	06:49	08:28	09:24	10:53
	14:57	16:55	18:30	21:16	23:14		23:23	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:14	19:12	17:17	14:25	13:25
24	09:41	07:47	05:59	04:57	02:51		03:16	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:23		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:53	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:50	02:42		03:24	05:21	07:02	07:42	09:40	10:53
	15:13	17:09	18:44	21:30	23:33		23:07	21:02	19:00	16:06	14:15	13:28
27	09:30	07:35	05:47	04:46	02:37		03:28	05:25	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:37		23:02	20:58	18:57	16:02	14:12	13:30
28	09:27	07:32	05:44	04:42	02:33		03:32	05:28	07:09	07:50	09:48	10:52
	15:21	17:16	18:50	21:38	23:42		22:58	20:54	18:53	15:58	14:08	13:32
29	09:23		06:40	04:38	02:28		03:37	05:31	07:12	07:53	09:51	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:34
30	09:20		06:36	04:34	02:24		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:00		10:48
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	684	660	525	396	297	176	92
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 59
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 41 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (41)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:42	09:12 15:37	07:28 17:20	06:28 20:03	04:30 21:49	02:15 00:01		03:49 22:41	05:41 20:38	07:18 17:50-17:59/9 18:41	08:04 15:43	09:58 14:00
2	10:44 13:45	09:09 15:41	07:24 17:23	06:24 20:07	04:26 21:52	02:10 00:07		03:53 22:37	05:45 20:34	07:21 17:52-17:56/4 18:37	08:08 15:40	10:02 13:57
3	10:42 13:48	09:05 15:45	07:20 17:27	06:20 20:10	04:22 21:56	02:05 00:12		03:57 22:33	05:48 20:30	07:25 18:33	08:11 15:36	10:06 13:54
4	10:40 13:51	09:01 15:49	07:16 17:30	06:16 20:13	04:18 22:00	01:59 00:18		04:01 22:29	05:51 20:26	07:28 18:30	08:15 15:32	10:09 13:51
5	10:38 13:54	08:58 15:53	07:12 17:34	06:12 20:17	04:14 22:04	01:54 00:24	01:42 00:48	04:05 22:25	05:55 20:22	07:31 18:26	08:19 15:29	10:13 13:48
6	10:35 13:58	08:54 15:56	07:09 17:37	06:08 20:20	04:10 22:08	01:48 00:30	01:50 00:41	04:09 22:21	05:58 20:18	07:34 18:22	08:22 15:25	10:16 13:46
7	10:33 14:01	08:50 16:00	07:05 17:41	06:05 20:24	04:06 22:12	01:41 00:38	01:57 00:34	04:13 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:20 13:43
8	10:30 14:04	08:47 16:04	07:01 17:44	06:01 20:27	04:02 22:16	01:32 00:46	02:03 00:28	04:17 22:13	06:04 20:10	07:41 18:14	08:30 15:18	10:23 13:41
9	10:27 14:08	08:43 16:08	06:57 17:47	05:57 20:30	03:58 22:20	01:20 00:59	02:09 00:23	04:20 22:09	06:08 20:07	07:44 18:10	08:34 15:14	10:26 13:39
10	10:25 14:12	08:39 16:12	06:53 17:51	05:53 20:34	03:54 22:24	23:56 02:31	02:15 00:18	04:24 22:05	06:11 20:03	07:48 18:07	08:37 15:10	10:29 13:37
11	10:22 14:15	08:36 16:15	06:49 17:54	17:14-17:15/1 20:37	05:49 22:28	03:50	02:20 00:12	04:28 22:01	06:14 19:59	07:51 18:03	08:41 15:07	10:32 13:35
12	10:19 14:19	08:32 16:19	06:46 17:57	17:12-17:19/7 20:41	05:45 22:32	03:45	02:25 00:08	04:32 21:57	06:17 19:55	07:54 17:59	08:45 15:03	10:35 13:33
13	10:16 14:23	08:28 16:23	06:42 18:01	17:10-17:22/12 20:44	05:41 22:36	03:41	02:30 00:03	04:35 21:53	06:21 19:51	07:58 17:55	08:49 15:00	10:37 13:31
14	10:13 14:26	08:24 16:27	06:38 18:04	17:09-17:24/15 20:47	05:37 22:40	03:37	02:35 23:58	04:39 21:49	06:24 19:47	08:01 17:51	08:53 14:56	10:40 13:30
15	10:10 14:30	08:21 16:30	06:34 18:07	17:08-17:24/16 20:51	05:33 22:44	03:33	02:40 23:54	04:43 21:45	06:27 19:43	08:04 17:47	08:57 14:52	10:42 13:28
16	10:07 14:34	08:17 16:34	06:30 18:11	17:08-17:23/15 20:54	05:29 22:48	03:29	02:45 23:49	04:46 21:41	06:30 19:39	08:08 17:44	09:01 14:49	10:44 13:27
17	10:04 14:38	08:13 16:37	06:26 18:14	17:08-17:23/15 20:58	05:25 22:52	03:25	02:49 23:45	04:50 21:37	06:33 19:35	08:11 17:40	09:04 14:45	10:46 13:26
18	10:00 14:42	08:09 16:41	06:22 18:17	17:08-17:22/14 21:01	05:21 22:57	03:21	02:54 23:40	04:53 21:33	06:37 19:31	08:14 17:36	09:08 14:42	10:48 13:26
19	09:57 14:46	08:06 16:45	06:19 18:21	17:09-17:20/11 21:05	05:17 23:01	03:17	02:58 23:36	04:57 21:29	06:40 19:28	08:18 17:32	09:12 14:39	10:49 13:25
20	09:54 14:50	08:02 16:48	06:15 18:24	17:11-17:18/7 21:08	05:13 23:05	03:13	03:03 23:31	05:00 21:25	06:43 19:24	08:21 17:28	09:16 14:35	10:51 13:25
21	09:51 14:54	07:58 16:52	06:11 18:27	05:10 21:12	03:08 23:09	03:08	03:03 23:27	05:04 21:21	06:46 19:20	08:25 17:25	09:20 14:32	10:51 13:25
22	09:47 14:58	07:54 16:55	06:07 18:30	05:06 21:16	03:04 23:14	03:04	03:07 23:23	05:07 21:17	06:49 19:16	08:28 17:21	09:24 14:28	10:52 13:25
23	09:44 15:02	07:51 16:59	06:03 18:34	05:02 21:19	03:00 23:18	03:00	03:12 23:19	05:11 21:13	06:53 17:57-18:00/3 19:12	08:32 17:17	09:28 14:25	10:53 13:26
24	09:40 15:06	07:47 17:03	05:59 18:37	04:58 21:23	02:51 23:23	02:51	03:16 23:14	05:14 21:09	06:56 17:53-18:03/10 19:08	08:35 17:13	09:32 14:22	10:53 13:27
25	09:37 15:10	07:43 17:06	05:55 18:40	04:54 21:26	02:47 23:27	02:47	03:20 23:10	05:18 21:05	06:59 17:52-18:05/13 19:04	07:39 16:10	09:36 14:18	10:53 13:28
26	09:33 15:13	07:39 17:10	05:51 18:44	04:50 21:30	02:43 23:32	02:43	03:25 23:06	05:21 21:02	07:02 17:50-18:05/15 19:00	07:42 16:06	09:39 14:15	10:52 13:29
27	09:30 15:17	07:35 17:13	05:48 18:47	04:46 21:34	02:38 23:37	02:38	03:29 23:02	05:25 20:58	07:05 17:49-18:05/16 18:57	07:46 16:02	09:43 14:12	10:52 13:31
28	09:26 15:21	07:32 17:17	05:44 18:50	04:42 21:37	02:34 23:41	02:34	03:33 22:58	05:28 20:54	07:09 17:49-18:04/15 18:53	07:49 15:58	09:47 14:09	10:51 13:32
29	09:23 15:25		06:40 19:54	04:38 21:41	02:29 23:46	02:29	03:37 22:54	05:31 20:50	07:12 17:49-18:04/15 18:49	07:53 15:55	09:51 14:06	10:50 13:34
30	09:19 15:29		06:36 19:57	04:34 21:45	02:24 23:51	02:24	03:41 22:50	05:35 20:46	07:15 17:49-18:03/14 18:45	07:57 15:51	09:55 14:03	10:49 13:37
31	09:16 15:33		06:32 20:00		02:20 23:56	02:20	03:45 22:46	05:38 20:42		08:00 15:47		10:48 13:39
Potential sun hours	140	227	362	461	600	686	660	525	396	297	176	92
Sum of minutes with flicker	0	0	113	0	0	0	0	0	101	13	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 60
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 42 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (42)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:30	02:14		03:49	05:42	07:18	08:04	09:59
	13:42	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:26	02:09		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:24	20:07	21:53	00:08		22:38	20:34	18:37	15:40	13:56
3	10:43	09:06	07:20	06:20	04:22	02:03		03:57	05:48	07:25	08:12	10:07
	13:47	15:45	17:27	20:10	21:57	00:14		22:34	20:30	18:34	15:36	13:53
4	10:41	09:02	07:17	06:16	04:18	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:49	17:30	20:14	22:01	00:20		22:30	20:26	18:30	15:32	13:51
5	10:39	08:58	07:13	06:12	04:14	01:52	01:39	04:05	05:55	07:31	08:19	10:14
	13:54	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:23	18:26	15:28	13:48
6	10:36	08:55	07:09	06:09	04:10	01:45	01:47	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:21	22:08	00:33	00:44	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:06	01:38	01:55	04:13	06:01	07:38	08:27	10:21
	14:00	16:00	17:41	20:24	22:12	00:41	00:37	22:18	20:15	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:28	02:01	04:16	06:05	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:51	00:31	22:14	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	00:09	02:07	04:20	06:08	07:45	08:34	10:27
	14:07	16:08	17:47	20:31	22:20	00:28	00:25	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:54	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:12	17:51	20:34	22:24		00:19	22:06	20:03	18:07	15:10	13:36
11	10:23	08:36	06:50	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:15	16:15	17:54	20:37	22:28		00:14	22:02	19:59	18:03	15:07	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:18	07:55	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:58	19:55	17:59	15:03	13:32
13	10:17	08:29	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:50	10:39
	14:22	16:23	18:01	20:44	22:36		00:04	21:54	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:41		23:59	21:50	19:47	17:51	14:56	13:29
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:05	08:57	10:44
	14:30	16:30	18:07	20:51	22:45		23:55	21:46	19:43	17:47	14:52	13:27
16	10:08	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:46
	14:34	16:34	18:11	20:55	22:49		23:50	21:42	19:40	17:44	14:49	13:26
17	10:04	08:14	06:27	05:25	03:25		02:49	04:50	06:34	08:11	09:05	10:48
	14:38	16:37	18:14	20:58	22:53		23:46	21:38	19:36	17:40	14:45	13:25
18	10:01	08:10	06:23	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:42	16:41	18:17	21:02	22:57		23:41	21:34	19:32	17:36	14:42	13:25
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:51
	14:45	16:45	18:21	21:05	23:02		23:37	21:30	19:28	17:32	14:38	13:24
20	09:55	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:22	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:33	21:26	19:24	17:28	14:35	13:24
21	09:51	07:59	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:21	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:25	14:31	13:24
22	09:48	07:55	06:07	05:06	03:04		03:07	05:07	06:50	08:29	09:25	10:54
	14:57	16:56	18:31	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:02	02:55		03:11	05:11	06:53	08:32	09:29	10:54
	15:01	16:59	18:34	21:20	23:19		23:20	21:14	19:12	17:17	14:25	13:25
24	09:41	07:47	05:59	04:58	02:51		03:16	05:14	06:56	08:36	09:32	10:54
	15:05	17:03	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:26
25	09:38	07:43	05:55	04:54	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:41	21:27	23:28		23:11	21:06	19:04	16:10	14:18	13:27
26	09:34	07:40	05:52	04:50	02:42		03:24	05:21	07:02	07:43	09:40	10:54
	15:13	17:10	18:44	21:30	23:33		23:07	21:02	19:01	16:06	14:15	13:28
27	09:31	07:36	05:48	04:46	02:37		03:28	05:25	07:06	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:12	13:30
28	09:27	07:32	05:44	04:42	02:33		03:32	05:28	07:09	07:50	09:48	10:53
	15:21	17:17	18:50	21:38	23:43		22:59	20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:38	02:28		03:37	05:31	07:12	07:53	09:52	10:52
	15:25		19:54	21:42	23:47		22:54	20:50	18:49	15:54	14:05	13:34
30	09:20		06:36	04:34	02:23		03:41	05:35	07:15	07:57	09:56	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:01		10:49
	15:33		20:00		23:58		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	684	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 61
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 43 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (43)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:45	09:12	07:28	16:29-16:38/9	06:28	04:30	02:15	03:49	05:42	07:18	08:04	09:58
	13:43	15:37	17:20	20:04	21:49	00:01	22:41	20:38	18:41	15:43	14:00	
2	10:44	09:09	07:24	16:29-16:37/8	06:24	04:26	02:10	03:53	05:45	07:22	08:08	10:02
	13:45	15:41	17:24	20:07	21:52	00:06	22:37	20:34	18:37	15:40	13:57	
3	10:42	09:05	07:20	16:32-16:35/3	06:20	04:22	02:05	03:57	05:48	07:25	08:11	10:06
	13:48	15:45	17:27	20:10	21:56	00:12	22:33	20:30	18:33	15:36	13:54	
4	10:40	09:01	07:16	06:16	04:18	02:00	04:01	05:51	07:28	08:15	10:09	
	13:51	15:49	17:30	20:14	22:00	00:17	22:29	20:26	18:30	15:32	13:51	
5	10:37	08:58	07:13	06:12	04:14	01:54	01:43	04:05	05:55	07:31	08:19	10:13
	13:54	15:53	17:34	20:17	22:04	00:23	00:48	22:25	20:22	18:26	15:29	13:49
6	10:35	08:54	07:09	06:09	04:10	01:48	01:51	04:09	05:58	07:34	08:22	10:16
	13:58	15:57	17:37	20:20	22:08	00:30	00:40	22:21	20:18	18:22	15:25	13:46
7	10:33	08:50	07:05	06:05	04:06	01:41	01:57	04:13	06:01	07:38	08:26	10:19
	14:01	16:00	17:41	20:24	22:12	00:37	00:34	22:17	20:14	18:18	15:21	13:44
8	10:30	08:47	07:01	06:01	04:02	01:33	02:04	04:17	06:05	07:41	08:30	10:23
	14:05	16:04	17:44	20:27	22:16	00:46	00:28	22:13	20:11	18:14	15:18	13:41
9	10:27	08:43	06:57	05:57	03:58	01:21	02:09	04:20	06:08	07:44	08:34	10:26
	14:08	16:08	17:47	20:30	22:19	00:58	00:23	22:09	20:07	18:10	15:14	13:39
10	10:25	08:39	06:53	05:53	03:54	01:40	02:15	04:24	06:11	07:48	08:37	10:29
	14:12	16:12	17:51	20:34	22:23	23:18	00:17	22:05	20:03	18:07	15:10	13:37
11	10:22	08:36	06:49	05:49	03:50	02:20	04:28	06:14	07:51	17:04-17:10/6	08:41	10:32
	14:15	16:15	17:54	20:37	22:27	00:12	22:01	19:59	18:03		15:07	13:35
12	10:19	08:32	06:46	05:45	03:46	02:25	04:32	06:17	07:54	17:02-17:11/9	08:45	10:35
	14:19	16:19	17:57	20:41	22:32	00:07	21:57	19:55	17:59		15:03	13:33
13	10:16	08:28	06:42	05:41	03:42	02:30	04:35	06:21	07:58	17:02-17:11/9	08:49	10:37
	14:23	16:23	18:01	20:44	22:36	00:03	21:53	19:51	17:55		15:00	13:31
14	10:13	08:24	06:38	05:37	03:37	02:35	04:39	06:24	08:01	17:02-17:07/5	08:53	10:40
	14:27	16:27	18:04	20:47	22:40	23:58	21:49	19:47	17:51		14:56	13:30
15	10:10	08:21	06:34	05:33	03:33	02:40	04:43	06:27	08:04	17:01-17:02/1	08:57	10:42
	14:30	16:30	18:07	20:51	22:44	23:53	21:45	19:43	17:47		14:53	13:28
16	10:07	08:17	06:30	05:29	03:29	02:45	04:46	06:30	08:08		09:01	10:44
	14:34	16:34	18:11	20:54	22:48	23:49	21:41	19:39	17:44		14:49	13:27
17	10:04	08:13	06:26	05:25	03:25	02:50	04:50	06:34	08:11		09:04	10:46
	14:38	16:38	18:14	20:58	22:52	23:44	21:37	19:35	17:40		14:46	13:26
18	10:00	08:09	06:22	05:21	03:21	02:54	04:53	06:37	08:14		09:08	10:48
	14:42	16:41	18:17	21:01	22:56	23:40	21:33	19:32	17:36		14:42	13:26
19	09:57	08:06	06:19	05:18	03:17	02:59	04:57	06:40	08:18		09:12	10:49
	14:46	16:45	18:21	21:05	23:01	23:36	21:29	19:28	17:32		14:39	13:25
20	09:54	08:02	06:15	05:14	03:13	03:03	05:01	06:43	08:21		09:16	10:50
	14:50	16:48	18:24	21:08	23:05	23:31	21:25	19:24	17:28		14:35	13:25
21	09:50	07:58	06:11	05:10	03:08	03:03	05:04	06:46	08:25		09:20	10:51
	14:54	16:52	18:27	21:12	23:09	23:27	21:21	19:20	17:25		14:32	13:25
22	09:47	07:54	06:07	05:06	03:04	03:08	05:08	06:49	08:28		09:24	10:52
	14:58	16:56	18:30	21:16	23:14	23:23	21:17	19:16	17:21		14:28	13:26
23	09:44	07:51	06:03	05:02	03:00	03:12	05:11	06:53	08:32		09:28	10:52
	15:02	16:59	18:34	21:19	23:18	23:19	21:13	19:12	17:17		14:25	13:26
24	09:40	07:47	05:59	04:58	02:51	03:16	05:14	06:56	08:35		09:32	10:53
	15:06	17:03	18:37	21:23	23:23	23:14	21:09	19:08	17:13		14:22	13:27
25	09:37	07:43	05:55	04:54	02:47	03:20	05:18	06:59	07:39		09:35	10:53
	15:10	17:06	18:40	21:26	23:27	23:10	21:05	19:04	16:10		14:19	13:28
26	09:33	07:39	05:51	04:50	02:43	03:25	05:21	07:02	07:42		09:39	10:52
	15:14	17:10	18:44	21:30	23:32	23:06	21:02	19:00	16:06		14:15	13:29
27	09:30	07:35	16:28-16:31/3	04:46	02:38	03:29	05:25	07:05	07:46		09:43	10:52
	15:18	17:13	18:47	21:34	23:36	23:02	20:58	18:57	16:02		14:12	13:31
28	09:26	07:32	16:28-16:35/7	04:42	02:34	03:33	05:28	07:09	07:49		09:47	10:51
	15:22	17:17	18:50	21:37	23:41	22:58	20:54	18:53	15:58		14:09	13:33
29	09:23		06:40	04:38	02:29	03:37	05:32	07:12	07:53		09:51	10:50
	15:25		19:54	21:41	23:46	22:54	20:50	18:49	15:55		14:06	13:35
30	09:19		06:36	04:34	02:25	03:41	05:35	07:15	07:57		09:55	10:49
	15:29		19:57	21:45	23:51	22:50	20:46	18:45	15:51		14:03	13:37
31	09:16		06:32		02:20		03:45	05:38				10:47
	15:33		20:00		23:56		22:45	20:42				13:39
Potential sun hours	140	227	362	461	600	705	659	525	396	297	176	93
Sum of minutes with flicker	0	10	20	0	0	0	0	0	0	30	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 62
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio MurtotuuliWTG: 44 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (44)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:45 13:43	09:12 15:37	07:28 17:20	06:28 20:03	04:30 21:48	02:15 00:01		03:49 22:41	05:42 20:38	07:18 18:41	08:04 15:43	14:43-14:49/6 14:00
2	10:43 13:46	09:08 15:41	07:24 17:23	06:24 20:07	04:26 21:52	02:11 00:06		03:53 22:37	05:45 20:34	07:21 18:37	08:07 15:40	14:43-14:45/2 13:57
3	10:42 13:48	09:05 15:45	07:20 17:27	06:20 20:10	04:22 21:56	02:05 00:11		03:57 22:33	05:48 20:30	07:25 18:33	08:11 15:36	13:05 13:54
4	10:39 13:51	09:01 15:49	07:16 17:30	06:16 20:13	04:18 22:00	02:00 00:17		04:01 22:29	05:51 20:26	07:28 18:30	08:15 15:32	10:09 13:51
5	10:37 13:55	08:58 15:53	07:12 17:34	06:12 20:17	04:14 22:04	01:55 00:23	01:43 00:47	04:05 22:25	05:55 20:22	07:31 18:26	08:19 15:29	10:12 13:49
6	10:35 13:58	08:54 15:57	07:09 17:37	06:09 20:20	04:10 22:08	01:49 00:29	01:51 00:40	04:09 22:21	05:58 20:18	07:34 18:22	08:22 15:25	10:16 13:46
7	10:32 14:01	08:50 16:00	07:05 17:41	06:05 20:24	04:06 22:11	01:42 00:37	01:58 00:33	04:13 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:19 13:44
8	10:30 14:05	08:47 16:04	07:01 17:44	06:01 20:27	04:02 22:15	01:34 00:45	02:04 00:28	04:17 22:13	06:05 20:10	07:41 18:14	08:30 15:18	10:23 13:41
9	10:27 14:08	08:43 16:08	15:14-15:16/2 17:47	06:57 20:30	03:58 22:19	01:23 00:57	02:10 00:22	04:21 22:09	06:08 20:07	07:44 18:10	08:34 15:14	10:26 13:39
10	10:24 14:12	08:39 16:12	15:14-15:20/6 17:51	06:53 20:34	03:54 22:23	00:45 02:37	02:15 00:17	04:24 22:05	06:11 20:03	07:48 18:07	08:37 15:11	10:29 13:37
11	10:22 14:15	08:36 16:15	15:15-15:24/9 17:54	06:49 20:37	03:50 22:27		02:21 00:12	04:28 22:01	06:14 19:59	07:51 18:03	08:41 15:07	10:32 13:35
12	10:19 14:19	08:32 16:19	15:16-15:22/6 17:57	06:46 20:41	03:46 22:31		02:26 00:07	04:32 21:57	06:17 19:55	07:54 17:59	08:45 15:03	10:34 13:33
13	10:16 14:23	08:28 16:23	06:42 18:01	05:41 20:44	03:42 22:35		02:31 00:02	04:35 21:53	06:21 19:51	07:58 17:55	08:49 15:00	10:37 13:31
14	10:13 14:27	08:24 16:27	06:38 18:04	05:37 20:47	03:38 22:40		02:36 23:58	04:39 21:49	06:24 19:47	08:01 17:51	08:53 14:56	10:40 13:30
15	10:10 14:31	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44		02:40 23:53	04:43 21:45	06:27 19:43	08:04 17:47	08:57 14:53	10:42 13:29
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:54	03:29 22:48		02:45 23:49	04:46 21:41	06:30 19:39	08:08 17:44	09:00 14:49	10:44 13:28
17	10:03 14:38	08:13 16:38	06:26 18:14	05:25 20:58	03:25 22:52		02:50 23:44	04:50 21:37	06:33 19:35	08:11 17:40	09:04 14:46	10:46 13:27
18	10:00 14:42	08:09 16:41	06:22 18:17	05:21 21:01	03:21 22:56		02:54 23:40	04:53 21:33	06:37 19:31	08:14 17:36	09:08 14:42	10:47 13:26
19	09:57 14:46	08:06 16:45	06:19 18:21	05:17 21:05	03:17 23:01		02:59 23:35	04:57 21:29	06:40 19:28	08:18 17:32	09:12 14:39	10:49 13:26
20	09:54 14:50	08:02 16:48	06:15 18:24	05:14 21:08	03:13 23:05		03:03 23:31	05:01 21:25	06:43 19:24	08:21 17:28	09:16 14:35	10:50 13:25
21	09:50 14:54	07:58 16:52	06:11 18:27	05:10 21:12	03:09 23:09		03:03 23:27	05:04 21:21	06:46 19:20	08:25 17:25	09:20 14:32	10:51 13:25
22	09:47 14:58	07:54 16:56	06:07 18:30	05:06 21:15	03:04 23:14		03:08 23:23	05:08 21:17	06:49 19:16	08:28 17:21	09:24 14:29	10:52 13:26
23	09:44 15:02	07:51 16:59	06:03 18:34	05:02 21:19	03:00 23:18		03:12 23:18	05:11 21:13	06:53 19:12	08:32 17:17	09:28 14:25	10:52 13:26
24	09:40 15:06	07:47 17:03	05:59 18:37	04:58 21:23	02:52 23:22		03:16 23:14	05:14 21:09	06:56 19:08	08:35 17:13	09:31 14:22	10:52 13:27
25	09:37 15:10	07:43 17:06	05:55 18:40	04:54 21:26	02:47 23:27		03:21 23:10	05:18 21:05	06:59 19:04	07:39 16:10	09:35 14:19	10:52 13:28
26	09:33 15:14	07:39 17:10	05:51 18:44	04:50 21:30	02:43 23:32		03:25 23:06	05:21 21:01	07:02 19:00	07:42 16:06	09:39 14:15	10:52 13:30
27	09:30 15:18	07:35 17:13	05:48 18:47	04:46 21:34	02:39 23:36		03:29 23:02	05:25 20:58	07:05 18:57	07:46 16:02	09:43 14:12	10:52 13:31
28	09:26 15:22	07:32 17:17	05:44 18:50	04:42 21:37	02:34 23:41		03:33 22:58	05:28 20:54	07:09 18:53	07:49 15:58	09:47 14:09	10:51 13:33
29	09:23 15:25		06:40 19:54	04:38 21:41	02:30 23:46		03:37 22:54	05:32 20:50	07:12 18:49	07:53 15:55	09:51 14:06	10:50 13:35
30	09:19 15:29		06:36 19:57	04:34 21:45	02:25 23:51		03:41 22:49	05:35 20:46	07:15 18:45	07:57 15:51	14:46-14:53/7 14:03	10:49 13:37
31	09:16 15:33		06:32 20:00		02:20 23:56		03:45 22:45	05:38 20:42		08:00 15:47	14:44-14:53/9	10:47 13:39
Potential sun hours	140	227	362	461	600	685	659	525	396	297	176	93
Sum of minutes with flicker	0	23	0	0	0	0	0	0	0	16	8	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 63
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 45 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (45)****Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:13	07:28	06:28	04:30	02:15		03:50	05:42 19:30-19:50/20	07:19	08:04	09:59
13:43	15:37	17:20	20:04		21:49	00:02		22:42	20:38	18:42	15:44	14:00
2	10:44	09:09	07:24	06:25	04:26	02:10		03:54	05:45 19:31-19:48/17	07:22	08:08	10:03
13:45	15:41	17:24	20:07		21:53	00:07		22:38	20:34	18:38	15:40	13:57
3	10:42	09:05	07:21	06:21	04:22	02:05		03:58	05:49 19:33-19:45/12	07:25	08:12	10:06
13:48	15:45	17:27	20:11		21:57	00:13		22:34	20:30	18:34	15:36	13:54
4	10:40	09:02	07:17	06:17	04:18	02:00		04:01	05:52 19:37-19:40/3	07:28	08:15	10:10
13:51	15:49	17:31	20:14		22:00	00:18		22:30	20:27	18:30	15:33	13:51
5	10:38	08:58	07:13	06:13	04:14	01:54	01:42	04:05	05:55	07:32	08:19	10:13
13:55	15:53	17:34	20:17		22:04	00:24	00:49	22:26	20:23	18:26	15:29	13:49
6	10:36	08:54	07:09	06:09	04:10	01:48	01:50	04:09	05:58	07:35	08:23	10:17
13:58	15:57	17:38	20:21		22:08	00:31	00:42	22:22	20:19	18:22	15:25	13:46
7	10:33	08:51	07:05	06:05	04:06	01:41	01:57	04:13	06:02	07:38	08:27	10:20
14:01	16:01	17:41	20:24		22:12	00:38	00:35	22:18	20:15	18:18	15:22	13:44
8	10:31	08:47	07:01	06:01 19:40-19:43/3	04:02	01:32	02:03	04:17	06:05	07:41	08:30	10:23
14:05	16:04	17:44	20:27		22:16	00:47	00:29	22:14	20:11	18:15	15:18	13:41
9	10:28	08:43	06:58	05:57 19:36-19:48/12	03:58	01:19	02:09	04:21	06:08	07:45	08:34	10:27
14:08	16:08	17:48	20:31		22:20	01:01	00:23	22:10	20:07	18:11	15:14	13:39
10	10:25	08:40	06:54	05:53 19:33-19:50/17	03:54	02:36	02:15	04:24	06:11	07:48	08:38	10:30
14:12	16:12	17:51	20:34		22:24	22:15	00:18	22:06	20:03	18:07	15:11	13:37
11	10:22	08:36	06:50	05:49 19:31-19:51/20	03:50		02:20	04:28	06:15	07:51	08:42	10:33
14:15	16:16	17:54	20:38		22:28		00:13	22:02	19:59	18:03	15:07	13:35
12	10:20	08:32	06:46	05:45 19:30-19:52/22	03:46		02:25	04:32	06:18	07:55	08:46	10:35
14:19	16:19	17:58	20:41		22:32		00:08	21:58	19:55	17:59	15:04	13:33
13	10:17	08:29	06:42	05:41 19:29-19:53/24	03:42		02:30	04:36	06:21	07:58	08:49	10:38
14:23	16:23	18:01	20:44		22:36		00:03	21:54	19:51	17:55	15:00	13:31
14	10:14	08:25	06:38	05:37 19:28-19:53/25	03:38		02:35	04:39	06:24	08:01	08:53	10:40
14:27	16:27	18:04	20:48		22:40		23:59	21:50	19:47	17:52	14:56	13:30
15	10:10	08:21	06:34	05:34 19:27-19:53/26	03:34		02:40	04:43	06:27	08:05	08:57	10:43
14:31	16:31	18:08	20:51		22:44		23:54	21:46	19:44	17:48	14:53	13:29
16	10:07	08:17	06:31	05:30 19:27-19:52/25	03:29		02:45	04:47	06:31	08:08	09:01	10:45
14:34	16:34	18:11	20:55		22:49		23:50	21:42	19:40	17:44	14:49	13:27
17	10:04	08:14	06:27	05:26 19:27-19:53/26	03:25		02:50	04:50 19:44-19:46/2	06:34	08:11	09:05	10:47
14:38	16:38	18:14	20:58		22:53		23:45	21:38	19:36	17:40	14:46	13:26
18	10:01	08:10	06:23	05:22 19:27-19:52/25	03:21		02:54	04:54 19:39-19:50/11	06:37	08:15	09:09	10:48
14:42	16:42	18:18	21:02		22:57		23:41	21:34	19:32	17:36	14:42	13:26
19	09:58	08:06	06:19	05:18 19:27-19:52/25	03:17		02:59	04:57 19:36-19:52/16	06:40	08:18	09:13	10:50
14:46	16:45	18:21	21:05		23:01		23:36	21:30	19:28	17:33	14:39	13:25
20	09:54	08:02	06:15	05:14 19:27-19:51/24	03:13		03:03	05:01 19:34-19:53/19	06:43	08:22	09:17	10:51
14:50	16:49	18:24	21:09		23:06		23:32	21:26	19:24	17:29	14:35	13:25
21	09:51	07:59	06:11	05:10 19:27-19:50/23	03:09		03:03	05:04 19:33-19:54/21	06:47	08:25	09:20	10:52
14:54	16:52	18:28	21:12		23:10		23:28	21:22	19:20	17:25	14:32	13:25
22	09:48	07:55	06:07	05:06 19:29-19:49/20	03:04		03:08	05:08 19:32-19:54/22	06:50	08:29	09:24	10:53
14:58	16:56	18:31	21:16		23:14		23:23	21:18	19:16	17:21	14:29	13:26
23	09:44	07:51	06:03	05:02 19:29-19:47/18	03:00		03:12	05:11 19:31-19:55/24	06:53	08:32	09:28	10:53
15:02	16:59	18:34	21:20		23:19		23:19	21:14	19:12	17:17	14:25	13:26
24	09:41	07:47	06:00	04:58 19:31-19:46/15	02:52		03:16	05:15 19:31-19:56/25	06:56	08:36	09:32	10:53
15:06	17:03	18:37	21:23		23:23		23:15	21:10	19:09	17:14	14:22	13:27
25	09:37	07:43	05:56	04:54 19:33-19:43/10	02:47		03:21	05:18 19:30-19:56/26	06:59	07:39	09:36	10:53
15:10	17:06	18:41	21:27		23:28		23:11	21:06	19:05	16:10	14:19	13:28
26	09:34	07:40	05:52	04:50	02:43		03:25	05:22 19:30-19:55/25	07:03	07:43	09:40	10:53
15:14	17:10	18:44	21:30		23:32		23:07	21:02	19:01	16:06	14:16	13:29
27	09:30	07:36	05:48	04:46	02:38		03:29	05:25 19:29-19:55/26	07:06	07:46	09:44	10:53
15:18	17:13	18:47	21:34		23:37		23:02	20:58	18:57	16:02	14:12	13:31
28	09:27	07:32	05:44	04:42	02:34		03:33	05:28 19:29-19:54/25	07:09	07:50	09:48	10:52
15:22	17:17	18:51	21:38		23:42		22:58	20:54	18:53	15:59	14:09	13:33
29	09:23		06:40	04:38	02:29		03:37	05:32 19:29-19:54/25	07:12	07:53	09:51	10:51
15:26		19:54	21:42		23:47		22:54	20:50	18:49	15:55	14:06	13:35
30	09:20		06:36	04:34	02:25		03:41	05:35 19:29-19:53/24	07:15	07:57	09:55	10:50
15:30		19:57	21:45		23:52		22:50	20:46	18:45	15:51	14:03	13:37
31	09:16		06:32		02:20		03:46	05:39 19:30-19:51/21		08:01		10:48
15:34		20:01			23:57		22:46	20:42		15:47		13:39
Potential sun hours	140	227	362	461	601	703	660	525	396	297	176	92
Sum of minutes with flicker	0	0	0	360	0	0	0	312	52	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 64
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 46 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (46)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1 472	1 235	617	489	483	8 422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46	09:13	07:28	06:28 18:41-18:53/12	04:30 18:25-18:56/31	02:15		03:50	05:42 18:20-19:06/46	07:19	08:04	09:59
	13:43	15:37	17:20	20:04	21:49	00:02		22:42	20:38	18:41	15:44	14:00
2	10:44	09:09	07:24	06:24 18:36-18:57/21	04:26 18:28-18:55/27	02:10		03:54	05:45 18:20-19:05/45	07:22	08:08	10:02
	13:45	15:41	17:24	20:07	21:53	00:07		22:38	20:34	18:38	15:40	13:57
3	10:42	09:05	07:21	06:21 18:33-19:00/27	04:22 18:29-18:52/23	02:05		03:58	05:48 18:20-19:04/44	07:25	08:12	10:06
	13:48	15:45	17:27	20:11	21:57	00:12		22:34	20:30	18:34	15:36	13:54
4	10:40	09:02	07:17	06:17 18:30-19:01/31	04:18 18:33-18:49/16	02:00		04:01	05:52 18:21-19:03/42	07:28	08:15	10:10
	13:51	15:49	17:31	20:14	22:00	00:18		22:30	20:27	18:30	15:33	13:51
5	10:38	08:58	07:13	06:13 18:29-19:03/34	04:14 18:37-18:43/6	01:54	01:42	04:05	05:55 18:22-19:02/40	07:32	08:19	10:13
	13:55	15:53	17:34	20:17	22:04	00:24	00:49	22:26	20:23	18:26	15:29	13:49
6	10:36	08:54	07:09	06:09 18:27-19:04/37	04:10	01:48	01:50	04:09	05:58 18:23-19:01/38	07:35	08:23	10:17
	13:58	15:57	17:37	20:21	22:08	00:31	00:41	22:22	20:19	18:22	15:25	13:46
7	10:33	08:51	07:05	06:05 18:25-19:05/40	04:06	01:41	01:57	04:13	06:02 18:24-18:59/35	07:38	08:27	10:20
	14:01	16:01	17:41	20:24	22:12	00:38	00:35	22:18	20:15	18:18	15:22	13:44
8	10:31	08:47	07:01	06:01 18:24-19:06/42	04:02	01:33	02:03	04:17 18:45-18:56/11	06:05 18:25-18:57/32	07:41	08:30	10:23
	14:05	16:04	17:44	20:27	22:16	00:47	00:29	22:14	20:11	18:15	15:18	13:41
9	10:28	08:43	06:58	05:57 18:23-19:07/44	03:58	01:19	02:09	04:21 18:41-18:59/18	06:08 18:27-18:54/27	07:45	08:34	10:26
	14:08	16:08	17:48	20:31	22:20	01:01	00:23	22:09	20:07	18:11	15:14	13:39
10	10:25	08:40	06:54	05:53 18:22-19:07/45	03:54	12:05	02:15	04:24 18:38-19:01/23	06:11 18:29-18:51/22	07:48	08:38	10:30
	14:12	16:12	17:51	20:34	22:24	04:04	00:18	22:05	20:03	18:07	15:11	13:37
11	10:22	08:36	06:50	05:49 18:21-19:07/46	03:50		02:20	04:28 18:35-19:03/28	06:15 18:33-18:46/13	07:51	08:42	10:32
	14:15	16:16	17:54	20:38	22:28		00:13	22:01	19:59	18:03	15:07	13:35
12	10:19	08:32	06:46	05:45 18:20-19:07/47	03:46		02:25	04:32 18:33-19:04/31	06:18	07:55	08:46	10:35
	14:19	16:19	17:58	20:41	22:32		00:08	21:57	19:55	17:59	15:03	13:33
13	10:16	08:29	06:42	05:41 18:20-19:08/48	03:42		02:30	04:36 18:31-19:06/35	06:21	07:58	08:49	10:38
	14:23	16:23	18:01	20:44	22:36		00:03	21:53	19:51	17:55	15:00	13:31
14	10:13	08:25	06:38	05:37 18:19-19:08/49	03:38		02:35	04:39 18:31-19:07/36	06:24	08:01	08:53	10:40
	14:27	16:27	18:04	20:48	22:40		02:39	21:49	19:47	17:52	14:56	13:30
15	10:10	08:21	06:34	05:34 18:18-19:08/50	03:34		02:40	04:43 18:29-19:08/39	06:27	08:05	08:57	10:43
	14:31	16:31	18:08	20:51	22:44		02:54	21:46	19:44	17:48	14:53	13:29
16	10:07	08:17	06:31	05:30 18:17-19:07/50	03:29		02:45	04:47 18:28-19:09/41	06:31	08:08	09:01	10:45
	14:34	16:34	18:11	20:55	22:48		02:49	21:42	19:40	17:44	14:49	13:27
17	10:04	08:14	06:27	05:26 18:18-19:08/50	03:25		02:50	04:50 18:27-19:09/42	06:34	08:11	09:05	10:47
	14:38	16:38	18:14	20:58	22:53		02:45	21:38	19:36	17:40	14:46	13:26
18	10:01	08:10	06:23	05:22 18:17-19:07/50	03:21		02:54	04:54 18:25-19:10/45	06:37	08:15	09:09	10:48
	14:42	16:41	18:18	21:02	22:57		02:41	21:34	19:32	17:36	14:42	13:26
19	09:58	08:06	06:19	05:18 18:18-19:07/49	03:17		02:59	04:57 18:24-19:10/46	06:40	08:18	09:13	10:50
	14:46	16:45	18:21	21:05	23:01		02:36	21:30	19:28	17:33	14:39	13:25
20	09:54	08:02	06:15	05:14 18:18-19:06/48	03:13		03:03	05:01 18:23-19:10/47	06:43	08:22	09:17	10:51
	14:50	16:49	18:24	21:09	23:06		02:32	21:26	19:24	17:29	14:35	13:25
21	09:51	07:59	06:11	05:10 18:17-19:06/49	03:09		03:03	05:04 18:23-19:10/47	06:47	08:25	09:20	10:52
	14:54	16:52	18:28	21:12	23:10		02:28	21:22	19:20	17:25	14:32	13:25
22	09:48	07:55	06:07	05:06 18:18-19:06/48	03:04		03:08	05:08 18:22-19:10/48	06:50	08:29	09:24	10:53
	14:58	16:56	18:31	21:16	23:14		02:23	21:18	19:16	17:21	14:29	13:26
23	09:44	07:51	06:03	05:02 18:18-19:05/47	03:00		03:12	05:11 18:21-19:10/49	06:53	08:32	09:28	10:53
	15:02	16:59	18:34	21:20	23:19		02:19	21:14	19:12	17:17	14:25	13:26
24	09:41	07:47	06:00	04:58 18:19-19:04/45	02:52		03:16	05:15 18:21-19:11/50	06:56	08:36	09:32	10:53
	15:06	17:03	18:37	21:23	23:23		02:15	21:10	19:09	17:14	14:22	13:27
25	09:37	07:43	05:56	04:54 18:19-19:03/44	02:47		03:21	05:18 18:21-19:11/50	06:59	07:39	09:36	10:53
	15:10	17:06	18:41	21:27	23:28		02:11	21:06	19:05	16:10	14:19	13:28
26	09:34	07:40	05:52	04:50 18:19-19:02/43	02:43		03:25	05:22 18:21-19:10/49	07:03	07:43	09:40	10:53
	15:14	17:10	18:44	21:30	23:32		02:07	21:02	19:01	16:06	14:15	13:29
27	09:30	07:36	05:48	04:46 18:21-19:01/40	02:38		03:29	05:25 18:20-19:10/50	07:06	07:46	09:44	10:52
	15:18	17:13	18:47	21:34	23:37		02:02	20:58	18:57	16:02	14:12	13:31
28	09:27	07:32	05:44	04:42 18:21-19:00/39	02:34		03:33	05:28 18:20-19:09/49	07:09	07:50	09:47	10:52
	15:22	17:17	18:51	21:38	23:42		02:58	20:54	18:53	15:59	14:09	13:33
29	09:23		06:40	04:38 18:23-18:59/36	02:29		03:37	05:32 18:20-19:09/49	07:12	07:53	09:51	10:51
	15:26		19:54	21:41	23:47		02:54	20:50	18:49	15:55	14:06	13:35
30	09:20		06:36	04:34 18:24-18:57/33	02:25		03:41	05:35 18:20-19:08/48	07:15	07:57	09:55	10:49
	15:30		19:57	21:45	23:52		02:50	20:46	18:45	15:51	14:03	13:37
31	09:16		06:32		02:20		03:46	05:39 18:20-19:07/47		08:01		10:48
	15:34		20:01		23:57		02:46	20:42		15:47		13:39
Potential sun hours	140	227	362	461	601	699	660	525	396	297	176	92
Sum of minutes with flicker	0	0	0	1244	103	0	0	978	384	0	0	0

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

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

Project: **Taaleritehdas_Posio**
 Description: **Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa**

Printed/Page
 12.12.2012 9:17 / 65

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 Calculated:
 12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG

Calculation: Posio MurtotuuliWTG: 47 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (47)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10:46 13:43	09:12 15:37	07:28 17:20	06:28 20:04	04:30 21:49	02:15 00:01		03:49 22:42	05:42 20:38	07:18 18:41	08:04-08:19/15	08:04 15:44	09:59 14:00
2	10:44 13:45	09:09 15:41	07:24 17:24	06:24 20:07	04:26 21:53	02:10 00:07		03:53 22:38	05:45 20:34	07:22 18:37	08:05-08:16/11	08:08 15:40	10:02 13:57
3	10:42 13:48	09:05 15:45	07:20 17:27	06:20 20:10	04:22 21:56	02:05 00:12		03:57 22:34	05:48 20:30	07:25 18:34	08:08-08:11/3	08:11 15:36	10:06 13:54
4	10:40 13:51	09:02 15:49	07:17 17:31	06:17 20:14	04:18 22:00	02:00 00:18		04:01 22:29	05:52 20:26	07:28 18:30		08:15 15:32	10:09 13:51
5	10:38 13:54	08:58 15:53	07:13 17:34	06:13 20:17	04:14 22:04	01:54 00:24	01:42 00:49	04:05 22:25	05:55 20:22	07:31 18:26		08:19 15:29	10:13 13:49
6	10:35 13:58	08:54 15:57	07:09 17:37	06:09 20:20	04:10 22:08	01:48 00:30	01:50 00:41	04:09 22:21	05:58 20:19	07:35 18:22		08:23 15:25	10:16 13:46
7	10:33 14:01	08:51 16:00	07:05 17:41	06:05 20:24	04:06 22:12	01:41 00:38	01:57 00:34	04:13 22:17	06:01 20:15	07:38 18:18		08:26 15:21	10:20 13:44
8	10:30 14:05	08:47 16:04	07:01 17:44	06:01 20:27	04:02 22:16	01:33 00:46	02:03 00:29	04:17 22:13	06:05 20:11	07:41 18:14		08:30 15:18	10:23 13:41
9	10:28 14:08	08:43 16:08	06:57 17:47	05:57 20:31	03:58 22:20	01:20 01:00	02:09 00:23	04:21 22:09	06:08 20:07	07:44 18:11		08:34 15:14	10:26 13:39
10	10:25 14:12	08:40 16:12	06:53 17:51	05:53 20:34	03:54 22:24	23:58 02:36	00:23 00:18	04:24 22:05	06:11 20:03	07:48 18:07		08:38 15:11	10:29 13:37
11	10:22 14:15	08:36 16:16	06:50 17:54	05:49 20:37	03:50 22:28		02:20 00:13	04:28 22:01	06:14 19:59	07:51 18:03		08:42 15:07	10:32 13:35
12	10:19 14:19	08:32 16:19	06:46 17:58	05:45 20:41	03:46 22:32		02:25 00:08	04:32 21:57	06:18 19:55	07:54 17:59		08:45 15:03	10:35 13:33
13	10:16 14:23	08:28 16:23	06:42 18:01	05:41 20:44	03:42 22:36		02:30 00:03	04:35 21:53	06:21 19:51	07:58 17:55		08:49 15:00	10:38 13:31
14	10:13 14:27	08:25 16:27	06:38 18:04	05:37 20:48	03:38 22:40		02:35 23:58	04:39 21:49	06:24 19:47	08:01 17:51		08:53 14:56	10:40 13:30
15	10:10 14:30	08:21 16:30	06:34 18:08	05:33 20:51	03:33 22:44		02:40 23:54	04:43 21:45	06:27 19:43	08:04 17:48		08:57 14:53	10:42 13:28
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:55	03:29 22:48		02:45 23:49	04:46 21:41	06:30 19:39	08:08 17:44		09:01 14:49	10:45 13:27
17	10:04 14:38	08:13 16:38	06:26 18:14	05:26 20:58	03:25 22:52		02:50 23:45	04:50 21:37	06:34 19:36	08:11 17:40		09:05 14:46	10:46 13:26
18	10:01 14:42	08:10 16:41	06:23 18:17	05:22 21:02	03:21 22:57		02:54 23:40	04:54 21:33	06:37 19:32	08:15 17:36		09:09 14:42	10:48 13:26
19	09:57 14:46	08:06 16:45	06:19 18:21	05:18 21:05	03:17 23:01		02:59 23:36	04:57 21:29	06:40 19:28	08:18 17:32		09:12 14:39	10:50 13:25
20	09:54 14:50	08:02 16:49	06:15 18:24	05:14 21:09	03:13 23:05		03:03 23:32	05:01 21:25	06:43 19:24	08:21 17:29		09:16 14:35	10:51 13:25
21	09:51 14:54	07:58 16:52	06:11 18:27	05:10 21:12	03:09 23:10		03:03 23:27	05:04 21:21	06:46 19:20	08:09-08:19/10		08:25 17:25	10:52 13:25
22	09:47 14:58	07:55 16:56	06:07 18:31	05:06 21:16	03:04 23:14		03:08 23:23	05:08 21:18	06:50 19:16	08:07-08:21/14		08:28 17:21	10:52 14:29
23	09:44 15:02	07:51 16:59	06:03 18:34	05:02 21:19	03:00 23:18		03:12 23:19	05:11 21:14	06:53 19:12	08:06-08:22/16		08:32 17:17	10:53 13:26
24	09:41 15:06	07:47 17:03	05:59 18:37	04:58 21:23	02:51 23:23		03:16 23:15	05:15 21:10	06:56 19:08	08:04-08:23/19		08:35 17:13	10:53 13:27
25	09:37 15:10	07:43 17:06	05:55 18:41	04:54 21:27	02:47 23:28		03:21 23:11	05:18 21:06	06:59 19:05	08:03-08:23/20		07:39 16:10	10:53 13:28
26	09:34 15:14	07:39 17:10	05:52 18:44	04:50 21:30	02:43 23:32		03:25 23:06	05:21 21:02	07:02 19:01	08:02-08:22/20		07:42 16:06	10:53 13:29
27	09:30 15:18	07:36 17:13	05:48 18:47	04:46 21:34	02:38 23:37		03:29 23:02	05:25 20:58	07:06 18:57	08:03-08:23/20		07:46 16:02	10:52 13:31
28	09:27 15:22	07:32 17:17	05:44 18:50	04:42 21:38	02:34 23:42		03:33 22:58	05:28 20:54	07:09 18:53	08:02-08:22/20		07:50 15:58	10:51 13:33
29	09:23 15:26		06:40 19:54	04:38 21:41	02:29 23:46		03:37 22:54	05:32 20:50	07:12 18:49	08:02-08:21/19		07:53 15:55	10:50 13:35
30	09:20 15:29		06:36 19:57	04:34 21:45	02:25 23:51		03:41 22:50	05:35 20:46	07:15 18:45	08:02-08:19/17		07:57 15:51	10:49 13:37
31	09:16 15:33		06:32 20:00		02:20 23:56		03:45 22:46	05:38 20:42		08:00 15:47			10:48 13:39
Potential sun hours	140	227	362	461	600	686	660	525	396	297		176	92
Sum of minutes with flicker	0	0	201	0	0	0	0	0	175	29		0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 66
		Licensed user:
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		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 48 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (48)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:43	09:12 15:37	07:28 17:20	06:28 20:04	08:00-08:33/33 21:49	04:30 00:02	02:15 00:02	03:49 22:42	05:42 20:38	07:58-08:26/28 18:41	07:18 15:44	09:59 14:00
2	10:44 13:45	09:09 15:41	07:24 17:24	06:24 20:07	07:59-08:33/34 21:53	04:26 00:07	02:10 00:07	03:53 22:38	05:45 20:34	07:56-08:27/31 18:38	07:22 15:40	08:08 13:57
3	10:42 13:48	09:05 15:45	07:20 17:27	06:20 20:10	07:58-08:33/35 21:56	04:22 00:12	02:05 00:12	03:57 22:34	05:48 20:30	07:55-08:27/32 18:34	07:25 15:36	08:12 13:54
4	10:40 13:51	09:02 15:49	07:17 17:31	06:17 20:14	07:58-08:33/35 22:00	04:18 00:18	02:00 00:18	04:01 22:30	05:52 20:26	07:54-08:28/34 18:30	07:28 15:33	08:15 13:51
5	10:38 13:54	08:58 15:53	07:13 17:34	06:13 20:17	07:58-08:33/35 22:04	04:14 00:24	01:54 00:49	04:05 22:25	05:55 20:22	07:55-08:29/34 18:26	07:31 15:29	08:19 13:49
6	10:35 13:58	08:54 15:57	07:09 17:37	06:09 20:20	07:58-08:32/34 22:08	04:10 00:31	01:48 00:41	04:09 22:21	05:58 20:19	07:54-08:29/35 18:22	07:35 15:25	08:23 13:46
7	10:33 14:01	08:51 16:00	07:05 17:41	06:05 20:24	07:57-08:32/35 22:12	04:06 00:38	01:41 00:35	04:13 22:17	06:01 20:15	07:53-08:28/35 18:18	07:38 15:21	08:26 13:44
8	10:30 14:05	08:47 16:04	07:01 17:44	06:01 20:27	07:57-08:31/34 22:16	04:02 00:47	01:33 00:29	04:17 22:13	06:05 20:11	07:53-08:28/35 18:14	07:41 15:18	08:30 13:41
9	10:28 14:08	08:43 16:08	06:57 17:48	05:57 20:31	07:58-08:30/32 22:20	03:58 01:19	01:09 00:23	04:21 22:09	06:08 20:07	07:53-08:27/34 18:11	07:45 15:14	08:34 13:39
10	10:25 14:12	08:40 16:12	06:54 17:51	05:53 20:34	07:58-08:29/31 22:24	03:54 02:36	01:15 00:18	04:24 22:05	06:11 20:03	07:52-08:27/35 18:07	07:48 15:11	08:38 13:37
11	10:22 14:15	08:36 16:16	06:50 17:54	05:49 20:37	07:59-08:28/29 22:28	03:50 00:13	02:20 00:13	04:28 22:01	06:14 19:59	07:52-08:26/34 18:03	07:51 15:07	08:42 13:32
12	10:19 14:19	08:32 16:19	06:46 17:58	05:45 20:41	07:59-08:26/27 22:32	03:46 00:08	02:25 00:08	04:32 21:57	06:18 19:55	07:52-08:25/33 17:59	07:54 15:03	08:45 13:33
13	10:16 14:23	08:28 16:23	06:42 18:01	05:41 20:44	08:01-08:25/24 22:36	03:42 00:03	02:30 00:03	04:36 21:53	06:21 19:51	07:53-08:24/31 17:55	07:58 15:00	08:49 13:31
14	10:13 14:27	08:25 16:27	06:38 18:04	05:37 20:48	08:03-08:22/19 22:40	03:38 02:38	02:35 23:58	04:39 21:49	06:24 19:47	07:53-08:22/29 17:51	08:01 14:56	08:53 13:30
15	10:10 14:31	08:21 16:30	06:34 18:08	05:33 20:51	08:05-08:18/13 22:44	03:33 02:44	02:40 23:54	04:43 21:45	06:27 19:43	07:54-08:21/27 17:48	08:05 14:53	08:57 13:28
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:55	03:29 22:48	02:45 23:49	04:46 21:41	04:46 21:41	06:30 19:40	07:56-08:20/24 17:44	08:08 14:49	09:01 13:27
17	10:04 14:38	08:13 16:38	06:27 18:14	05:26 20:58	03:25 22:53	02:50 23:45	04:50 21:37	04:50 21:37	06:34 19:36	07:57-08:17/20 17:40	08:11 14:46	09:05 13:26
18	10:01 14:42	08:10 16:41	06:23 18:17	05:22 21:02	03:21 22:57	02:54 23:40	04:54 21:33	04:54 21:33	06:37 19:32	08:00-08:14/14 17:36	08:15 14:42	09:09 13:26
19	09:57 14:46	08:06 16:45	06:19 18:21	05:18 21:05	03:17 23:01	02:59 23:36	04:57 21:29	04:57 21:29	06:40 19:28	08:18 17:32	09:12 14:39	10:50 13:25
20	09:54 14:50	08:02 16:49	06:15 18:24	05:14 21:09	03:13 23:05	03:03 23:32	05:01 21:26	05:01 21:26	06:43 19:24	08:22 17:29	09:16 14:35	10:51 13:25
21	09:51 14:54	07:58 16:52	06:11 18:27	05:10 21:12	03:09 23:10	03:03 23:27	05:04 21:22	05:04 21:22	06:46 19:20	08:25 17:25	09:20 14:32	10:52 13:25
22	09:47 14:58	07:55 16:56	06:07 18:31	05:06 21:16	03:04 23:14	03:08 23:23	05:08 21:18	05:08 21:18	06:50 19:16	08:28 17:21	09:24 14:29	10:53 13:25
23	09:44 15:02	07:51 16:59	06:03 18:34	05:02 21:19	03:00 23:19	03:12 23:19	05:11 21:14	05:11 21:14	06:53 19:12	08:32 17:17	09:28 14:25	10:53 13:26
24	09:41 15:06	07:47 17:03	05:59 18:37	04:58 21:23	02:51 23:23	03:16 23:15	05:15 21:10	05:15 21:10	06:56 19:08	08:35 17:14	09:32 14:22	10:53 13:27
25	09:37 15:10	07:43 17:06	05:56 18:41	07:13-07:25/12 21:27	04:54 23:28	02:47 23:11	05:18 21:06	05:18 21:06	06:59 19:05	07:39 16:10	09:36 14:19	10:53 13:28
26	09:34 15:14	07:39 17:10	05:52 18:44	07:09-07:28/19 21:30	04:50 23:32	02:43 23:06	05:22 21:02	05:22 21:02	07:02 19:01	07:43 16:06	09:40 14:15	10:53 13:29
27	09:30 15:18	07:36 17:13	05:48 18:47	07:07-07:30/23 21:34	04:46 23:37	03:29 23:02	05:25 20:58	08:12-08:15/3 18:57	07:06 18:57	07:46 16:02	09:44 14:12	10:52 13:31
28	09:27 15:22	07:32 17:17	05:44 18:50	07:04-07:31/27 21:38	04:42 23:42	03:33 22:58	05:28 20:54	08:06-08:20/14 18:53	07:09 18:53	07:50 15:59	09:47 14:09	10:51 13:33
29	09:23 15:26		06:40 19:54	08:03-08:32/29 21:41	04:38 23:46	03:37 22:54	05:32 20:50	08:03-08:23/20 18:49	07:12 18:49	07:53 15:55	09:51 14:06	10:50 13:35
30	09:20 15:29		06:36 19:57	08:02-08:33/31 21:45	04:34 23:51	03:41 22:50	05:35 20:46	08:01-08:24/23 18:45	07:15 18:45	07:57 15:51	09:55 14:03	10:49 13:37
31	09:16 15:33		06:32 20:00	08:01-08:33/32	04:32 23:56	03:45 22:46	05:38 20:42	07:59-08:26/27		08:01 15:47		10:48 13:39
Potential sun hours	140	227	362	461	601	688	660	525	396	297	176	92
Sum of minutes with flicker	0	0	173	450	601	0	0	87	545	0	0	0

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

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

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

Printed/Page

12.12.2012 9:17 / 67

Licensed user:

Pöyry Finland Oy

P.O. Box 93

FI-02151 Espoo

+358 10 33 24271

Atte Lohman / atte.lohman@poyry.com

Calculated:

12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 49 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (49)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:30	02:14		03:49	05:41	07:18	08:04	09:59
	13:41	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:25	02:08		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:23	20:07	21:53	00:08		22:38	20:34	18:37	15:39	13:56
3	10:43	09:05	07:20	06:20	04:21	02:03		03:57	05:48	07:25	08:12	10:07
	13:47	15:45	17:27	20:10	21:57	00:14		22:34	20:30	18:33	15:36	13:53
4	10:41	09:02	07:16	06:16	04:17	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:48	17:30	20:14	22:00	00:20		22:30	20:26	18:30	15:32	13:50
5	10:39	08:58	07:13	06:12	04:13	01:52	01:38	04:05	05:55	07:31	08:19	10:14
	13:53	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:08	04:09	01:45	01:47	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:33	00:44	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:05	01:38	01:55	04:12	06:01	07:38	08:27	10:21
	14:00	16:00	17:41	20:24	22:12	00:41	00:37	22:18	20:15	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:28	02:01	04:16	06:04	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:51	00:31	22:14	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	00:54	02:07	04:20	06:08	07:44	08:34	10:27
	14:07	16:08	17:47	20:31	22:20	02:02	00:25	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:11	17:51	20:34	22:24		00:19	22:06	20:03	18:06	15:10	13:36
11	10:23	08:36	06:50	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:14	16:15	17:54	20:37	22:28		00:14	22:02	19:59	18:03	15:06	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:58	19:55	17:59	15:03	13:32
13	10:17	08:29	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:39
	14:22	16:23	18:01	20:44	22:36		00:04	21:54	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:50	19:47	17:51	14:56	13:28
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:04	08:57	10:43
	14:30	16:30	18:07	20:51	22:45		23:55	21:46	19:43	17:47	14:52	13:27
16	10:08	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:46
	14:34	16:34	18:11	20:55	22:49		23:50	21:42	19:39	17:44	14:49	13:26
17	10:04	08:14	06:26	05:25	03:24		02:48	04:50	06:33	08:11	09:05	10:47
	14:37	16:37	18:14	20:58	22:53		23:46	21:38	19:35	17:40	14:45	13:25
18	10:01	08:10	06:23	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:41	16:41	18:17	21:02	22:57		23:41	21:34	19:32	17:36	14:42	13:24
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:51
	14:45	16:45	18:21	21:05	23:02		23:37	21:30	19:28	17:32	14:38	13:24
20	09:55	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:22	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:26	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:21	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:25	14:31	13:24
22	09:48	07:55	06:07	05:05	03:03		03:07	05:07	06:49	08:28	09:25	10:54
	14:57	16:55	18:31	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:01	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:20	21:14	19:12	17:17	14:24	13:25
24	09:41	07:47	05:59	04:57	02:50		03:15	05:14	06:56	08:35	09:32	10:54
	15:05	17:02	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:25
25	09:37	07:43	05:55	04:53	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:40	21:27	23:28		23:11	21:06	19:04	16:09	14:18	13:27
26	09:34	07:39	05:51	04:49	02:42		03:24	05:21	07:02	07:43	09:40	10:54
	15:13	17:10	18:44	21:30	23:33		23:07	21:02	19:00	16:06	14:15	13:28
27	09:30	07:36	05:48	04:45	02:37		03:28	05:25	07:05	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:11	13:29
28	09:27	07:32	05:44	04:42	02:33		03:32	05:28	07:09	07:50	09:48	10:52
	15:21	17:16	18:50	21:38	23:43		22:59	20:54	18:53	15:58	14:08	13:31
29	09:23		06:40	04:38	02:28		03:36	05:31	07:12	07:53	09:52	10:51
	15:25		19:54	21:41	23:47		22:54	20:50	18:49	15:54	14:05	13:33
30	09:20		06:36	04:34	02:23		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:01		10:49
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	685	661	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 68
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG:** 50 - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (50)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:46 13:41	09:12 15:37	07:28 17:20	06:28 20:04	04:29 21:49	02:14 00:02		03:49 22:42	05:41 20:38	07:18 18:41	08:04 15:43	09:59 13:59
2	10:45 13:44	09:09 15:41	07:24 17:23	06:24 20:07	04:25 21:53	02:09 00:08		03:53 22:38	05:45 20:34	07:21 18:37	08:08 15:39	10:03 13:56
3	10:43 13:47	09:05 15:45	07:20 17:27	06:20 20:10	04:21 21:56	02:03 00:13		03:57 22:34	05:48 20:30	07:25 18:33	08:11 15:36	10:06 13:53
4	10:40 13:50	09:02 15:48	07:16 17:30	06:16 20:14	04:17 22:00	01:58 00:19		04:01 22:30	05:51 20:26	07:28 18:29	08:15 15:32	10:10 13:51
5	10:38 13:54	08:58 15:52	07:13 17:34	06:12 20:17	04:13 22:04	01:52 00:25	01:39 00:51	04:05 22:26	05:55 20:22	07:31 18:26	08:19 15:28	10:13 13:48
6	10:36 13:57	08:54 15:56	07:09 17:37	06:08 20:20	04:09 22:08	01:46 00:32	01:48 00:43	04:09 22:21	05:58 20:18	07:34 18:22	08:23 15:25	10:17 13:45
7	10:33 14:00	08:51 16:00	07:05 17:40	06:04 20:24	04:05 22:12	01:38 00:40	01:55 00:36	04:12 22:17	06:01 20:14	07:38 18:18	08:26 15:21	10:20 13:43
8	10:31 14:04	08:47 16:04	07:01 17:44	06:01 20:27	04:01 22:16	01:29 00:50	02:02 00:30	04:16 22:13	06:04 20:11	07:41 18:14	08:30 15:17	10:24 13:40
9	10:28 14:07	08:43 16:08	06:57 17:47	05:57 20:30	03:57 22:20	00:01 01:43	02:08 00:24	04:20 22:09	06:08 20:07	07:44 18:10	08:34 15:14	10:27 13:38
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11	10:22 14:15	08:36 16:15	06:49 17:54	05:49 20:37	03:49 22:28		02:19 00:14	04:28 22:01	06:14 19:59	07:51 18:03	08:42 15:06	10:33 13:34
12	10:20 14:18	08:32 16:19	06:46 17:57	05:45 20:41	03:45 22:32		02:24 00:09	04:31 21:57	06:17 19:55	07:54 17:59	08:45 15:03	10:36 13:32
13	10:17 14:22	08:28 16:23	06:42 18:01	05:41 20:44	03:41 22:36		02:29 00:04	04:35 21:53	06:21 19:51	07:58 17:55	08:49 14:59	10:38 13:30
14	10:14 14:26	08:25 16:26	06:38 18:04	05:37 20:48	03:37 22:40		02:34 23:59	04:39 21:49	06:24 19:47	08:01 17:51	08:53 14:56	10:41 13:29
15	10:10 14:30	08:21 16:30	06:34 18:07	05:33 20:51	03:33 22:44		02:39 23:54	04:42 21:45	06:27 19:43	08:04 17:47	08:57 14:52	10:43 13:27
16	10:07 14:34	08:17 16:34	06:30 18:11	05:29 20:54	03:29 22:49		02:44 23:50	04:46 21:41	06:30 19:39	18:41-18:48/7	08:08 17:43	09:01 14:49
17	10:04 14:38	08:13 16:37	06:26 18:14	05:25 20:58	03:24 22:53		02:49 23:45	04:50 21:37	06:33 19:35	18:40-18:48/8	08:11 17:40	09:05 14:45
18	10:01 14:41	08:10 16:41	06:22 18:17	05:21 21:01	03:20 22:57		02:53 23:41	04:53 21:33	06:37 19:31	18:39-18:48/9	08:15 17:36	09:09 14:42
19	09:58 14:45	08:06 16:45	06:19 18:21	05:17 21:05	03:16 23:01		02:58 23:36	04:57 21:29	06:40 19:28	18:38-18:46/8	08:18 17:32	09:13 14:38
20	09:54 14:49	08:02 16:48	06:15 18:24	05:13 21:09	03:12 23:06		03:02 23:32	05:00 21:25	06:43 19:24	18:39-18:43/4	08:21 17:28	09:16 14:35
21	09:51 14:53	07:58 16:52	06:11 18:27	05:09 21:12	03:08 23:10		03:02 23:28	05:04 21:21	06:46 19:20		08:25 17:24	09:20 14:31
22	09:48 14:57	07:54 16:55	06:07 18:30	05:05 21:16	03:03 23:14		03:07 23:24	05:07 21:17	06:49 19:16		08:28 17:21	09:24 14:28
23	09:44 15:01	07:51 16:59	06:03 18:34	05:01 21:19	02:55 23:19		03:11 23:19	05:11 21:14	06:53 19:12		08:32 17:17	09:28 14:25
24	09:41 15:05	07:47 17:02	05:59 18:37	04:57 21:23	02:51 23:23		03:15 23:15	05:14 21:10	06:56 19:08		08:35 17:13	09:32 14:21
25	09:37 15:09	07:43 17:06	05:55 18:40	04:53 21:27	02:46 23:28		03:20 23:11	05:18 21:06	06:59 19:04		07:39 16:09	09:36 14:18
26	09:34 15:13	07:39 17:09	05:51 18:44	04:49 21:30	02:42 23:33		03:24 23:07	05:21 21:02	07:02 19:00		07:42 16:06	09:40 14:15
27	09:30 15:17	07:35 17:13	05:47 18:47	04:45 21:34	02:37 23:37		03:28 23:02	05:24 20:58	07:05 18:57		07:46 16:02	09:44 14:11
28	09:27 15:21	07:32 17:16	05:44 18:50	04:41 21:38	02:33 23:42		03:32 22:58	05:28 20:54	07:09 18:53		07:50 15:58	09:48 14:08
29	09:23 15:25		06:40 19:54	04:37 21:41	02:28 23:47		03:37 22:54	05:31 20:50	07:12 18:49		07:53 15:54	09:51 14:05
30	09:20 15:29		06:36 19:57	04:33 21:45	02:23 23:52		03:41 22:50	05:35 20:46	07:15 18:45		07:57 15:51	09:55 14:02
31	09:16 15:33		06:32 20:00		02:19 23:57		03:45 22:46	05:38 20:42			08:00 15:47	
Potential sun hours	139	226	362	461	601	686	660	525	396	297	176	92
Sum of minutes with flicker	0	0	33	0	0	0	0	0	36	0	0	0

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

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

Project	Description:	Printed/Page
Taaleritehdas_Posio	Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa	12.12.2012 9:17 / 69
		Licensed user:
		Pöyry Finland Oy
		P.O. Box 93
		FI-02151 Espoo
		+358 10 33 24271
		Atte Lohman / atte.lohman@poyry.com
		Calculated:
		12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG**Calculation:** Posio Murtotuuli**WTG: 51** - NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (51)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.48	2.02	4.26	6.77	7.65	9.03	8.39	5.87	3.73	1.94	0.60	0.10

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
601	418	359	507	762	604	876	1472	1235	617	489	483	8422

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10:47	09:13	07:28	06:28	04:30	02:14		03:49	05:41	07:18	08:04	09:59
	13:42	15:37	17:20	20:04	21:49	00:03		22:42	20:38	18:41	15:43	13:59
2	10:45	09:09	07:24	06:24	04:26	02:09		03:53	05:45	07:22	08:08	10:03
	13:44	15:41	17:24	20:07	21:53	00:08		22:38	20:34	18:37	15:40	13:56
3	10:43	09:05	07:20	06:20	04:22	02:04		03:57	05:48	07:25	08:12	10:06
	13:47	15:45	17:27	20:10	21:57	00:14		22:34	20:30	18:34	15:36	13:53
4	10:41	09:02	07:17	06:16	04:18	01:58		04:01	05:51	07:28	08:15	10:10
	13:50	15:49	17:30	20:14	22:00	00:19		22:30	20:26	18:30	15:32	13:51
5	10:38	08:58	07:13	06:12	04:14	01:52	01:39	04:05	05:55	07:31	08:19	10:14
	13:54	15:52	17:34	20:17	22:04	00:26	00:52	22:26	20:22	18:26	15:28	13:48
6	10:36	08:54	07:09	06:09	04:10	01:46	01:48	04:09	05:58	07:35	08:23	10:17
	13:57	15:56	17:37	20:20	22:08	00:33	00:43	22:22	20:19	18:22	15:25	13:45
7	10:34	08:51	07:05	06:05	04:06	01:38	01:55	04:13	06:01	07:38	08:27	10:20
	14:00	16:00	17:41	20:24	22:12	00:40	00:36	22:18	20:15	18:18	15:21	13:43
8	10:31	08:47	07:01	06:01	04:01	01:29	02:02	04:16	06:05	07:41	08:30	10:24
	14:04	16:04	17:44	20:27	22:16	00:50	00:30	22:14	20:11	18:14	15:17	13:40
9	10:28	08:43	06:57	05:57	03:57	03:16	02:08	04:20	06:08	07:45	08:34	10:27
	14:07	16:08	17:47	20:31	22:20	02:50	00:24	22:10	20:07	18:10	15:14	13:38
10	10:26	08:40	06:53	05:53	03:53		02:13	04:24	06:11	07:48	08:38	10:30
	14:11	16:12	17:51	20:34	22:24		00:19	22:06	20:03	18:07	15:10	13:36
11	10:23	08:36	06:50	05:49	03:49		02:19	04:28	06:14	07:51	08:42	10:33
	14:15	16:15	17:54	20:37	22:28		00:14	22:02	19:59	18:03	15:07	13:34
12	10:20	08:32	06:46	05:45	03:45		02:24	04:31	06:17	07:54	08:46	10:36
	14:18	16:19	17:57	20:41	22:32		00:09	21:58	19:55	17:59	15:03	13:32
13	10:17	08:29	06:42	05:41	03:41		02:29	04:35	06:21	07:58	08:49	10:38
	14:22	16:23	18:01	20:44	22:36		00:04	21:54	19:51	17:55	14:59	13:30
14	10:14	08:25	06:38	05:37	03:37		02:34	04:39	06:24	08:01	08:53	10:41
	14:26	16:26	18:04	20:48	22:40		23:59	21:50	19:47	17:51	14:56	13:29
15	10:11	08:21	06:34	05:33	03:33		02:39	04:42	06:27	08:05	08:57	10:43
	14:30	16:30	18:07	20:51	22:45		23:55	21:46	19:43	17:47	14:52	13:27
16	10:08	08:17	06:30	05:29	03:29		02:44	04:46	06:30	08:08	09:01	10:45
	14:34	16:34	18:11	20:55	22:49		23:50	21:42	19:39	17:44	14:49	13:26
17	10:04	08:14	06:26	05:25	03:25		02:49	04:50	06:34	08:11	09:05	10:47
	14:38	16:37	18:14	20:58	22:53		23:46	21:38	19:36	17:40	14:45	13:25
18	10:01	08:10	06:23	05:21	03:20		02:53	04:53	06:37	08:15	09:09	10:49
	14:42	16:41	18:17	21:02	22:57		23:41	21:34	19:32	17:36	14:42	13:25
19	09:58	08:06	06:19	05:17	03:16		02:58	04:57	06:40	08:18	09:13	10:50
	14:46	16:45	18:21	21:05	23:02		23:37	21:30	19:28	17:32	14:38	13:24
20	09:54	08:02	06:15	05:13	03:12		03:02	05:00	06:43	08:22	09:17	10:52
	14:49	16:48	18:24	21:09	23:06		23:32	21:26	19:24	17:28	14:35	13:24
21	09:51	07:58	06:11	05:09	03:08		03:02	05:04	06:46	08:25	09:21	10:53
	14:53	16:52	18:27	21:12	23:10		23:28	21:22	19:20	17:25	14:31	13:24
22	09:48	07:55	06:07	05:06	03:04		03:07	05:07	06:50	08:29	09:25	10:53
	14:57	16:55	18:31	21:16	23:15		23:24	21:18	19:16	17:21	14:28	13:24
23	09:44	07:51	06:03	05:02	02:55		03:11	05:11	06:53	08:32	09:28	10:54
	15:01	16:59	18:34	21:19	23:19		23:19	21:14	19:12	17:17	14:25	13:25
24	09:41	07:47	05:59	04:58	02:51		03:16	05:14	06:56	08:36	09:32	10:54
	15:05	17:03	18:37	21:23	23:24		23:15	21:10	19:08	17:13	14:21	13:26
25	09:37	07:43	05:55	04:54	02:46		03:20	05:18	06:59	07:39	09:36	10:54
	15:09	17:06	18:41	21:27	23:28		23:11	21:06	19:04	16:10	14:18	13:27
26	09:34	07:39	05:52	04:50	02:42		03:24	05:21	07:02	07:43	09:40	10:54
	15:13	17:10	18:44	21:30	23:33		23:07	21:02	19:01	16:06	14:15	13:28
27	09:30	07:36	05:48	04:46	02:37		03:28	05:25	07:06	07:46	09:44	10:53
	15:17	17:13	18:47	21:34	23:38		23:03	20:58	18:57	16:02	14:12	13:30
28	09:27	07:32	05:44	04:42	02:33		03:33	05:28	07:09	07:50	09:48	10:52
	15:21	17:17	18:50	21:38	23:42		22:59	20:54	18:53	15:58	14:08	13:32
29	09:23		06:40	04:38	02:28		03:37	05:31	07:12	07:53	09:52	10:51
	15:25		19:54	21:42	23:47		22:54	20:50	18:49	15:54	14:05	13:34
30	09:20		06:36	04:34	02:24		03:41	05:35	07:15	07:57	09:55	10:50
	15:29		19:57	21:45	23:52		22:50	20:46	18:45	15:51	14:02	13:36
31	09:16		06:32		02:19		03:45	05:38		08:01		10:49
	15:33		20:00		23:57		22:46	20:42		15:47		13:38
Potential sun hours	139	226	362	461	601	708	660	525	396	297	176	91
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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12.12.2012 9:17 / 70

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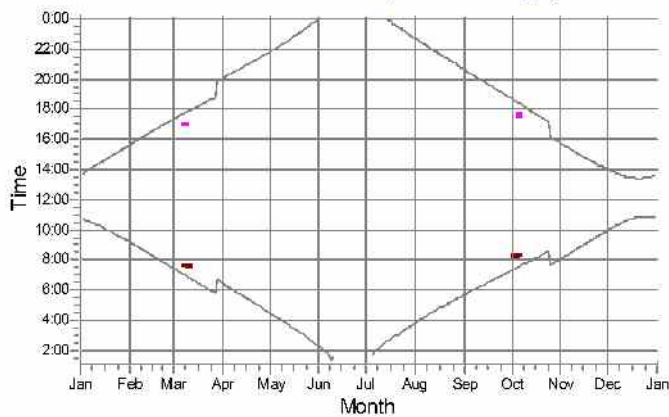
Atte Lohman / atte.lohman@poyry.com

Calculated:

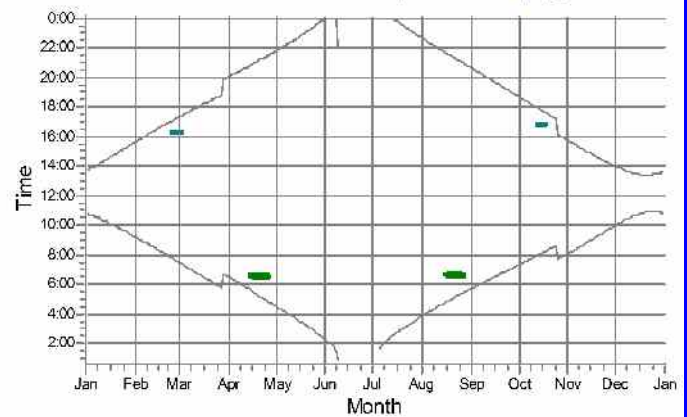
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

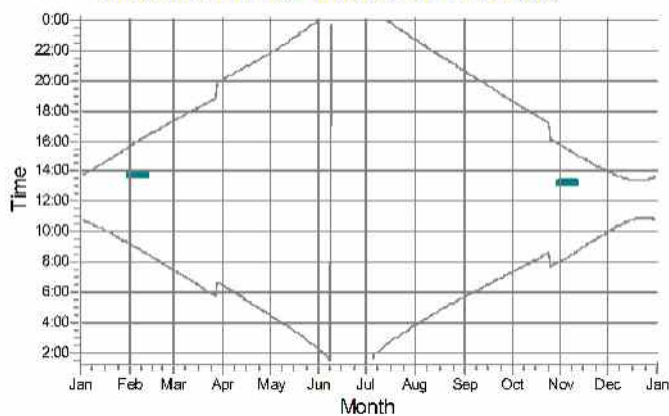
1: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (1)



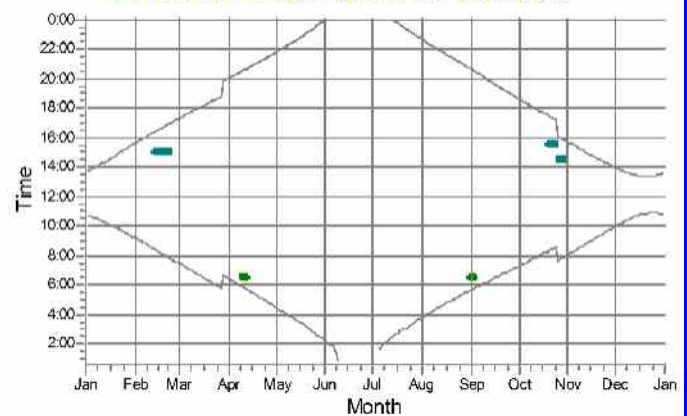
2: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (2)



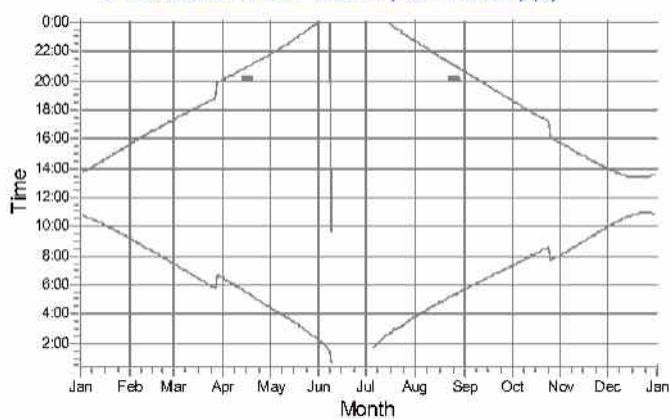
3: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (3)



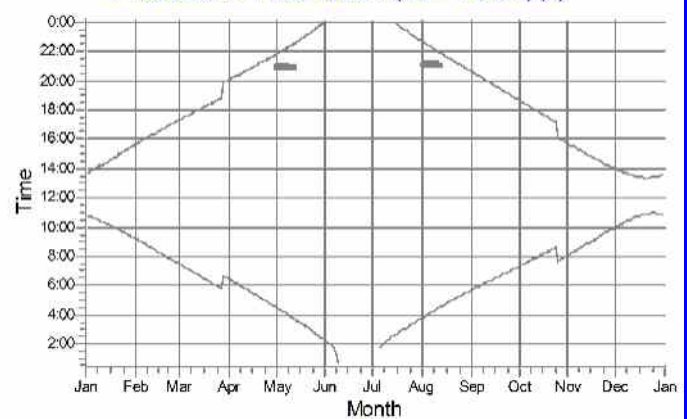
4: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (4)



5: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (5)



6: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (6)



Shadow receptors



A: Kangas



E: Poksamo



H: Tie 81

D: Lemmonlammit



F: Peilijänkä

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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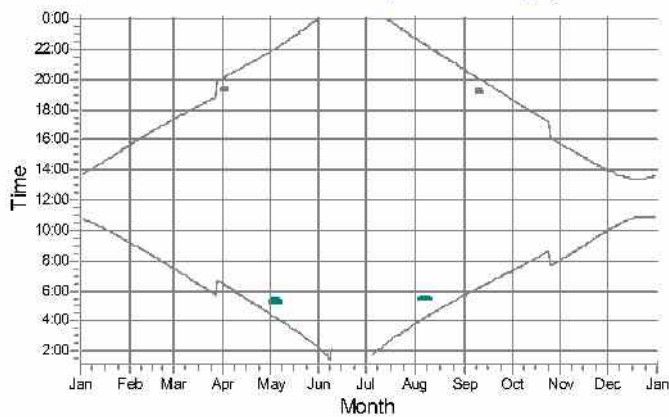
Atte Lohman / atte.lohman@poyry.com

Calculated:

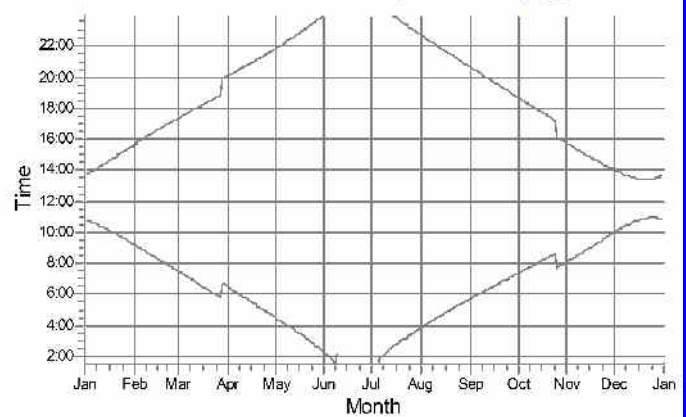
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

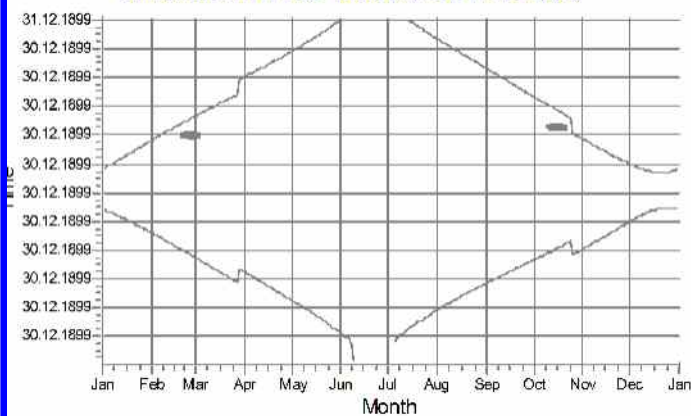
7: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (7)



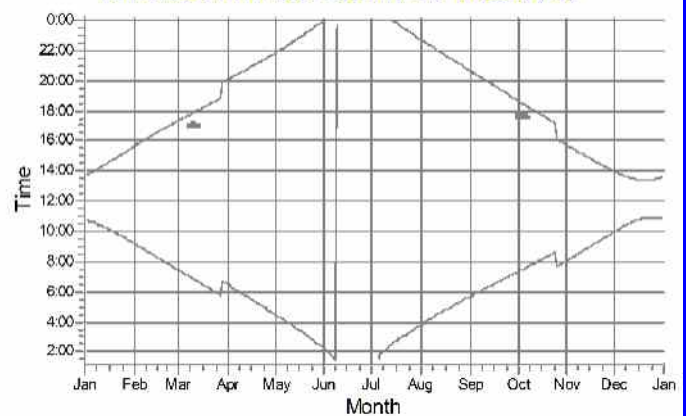
8: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (8)



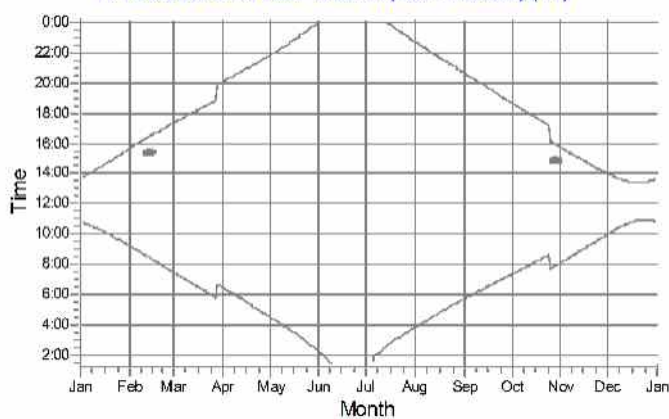
9: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (9)



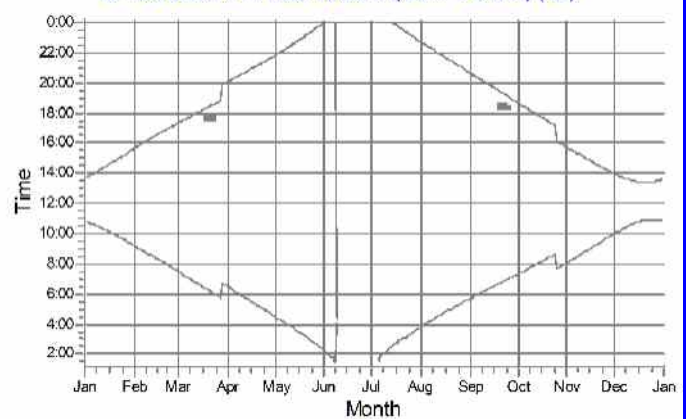
10: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (10)



11: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (11)



12: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (12)



Shadow receptors

 D: Lemmonlammit
 F: Peilijänkä

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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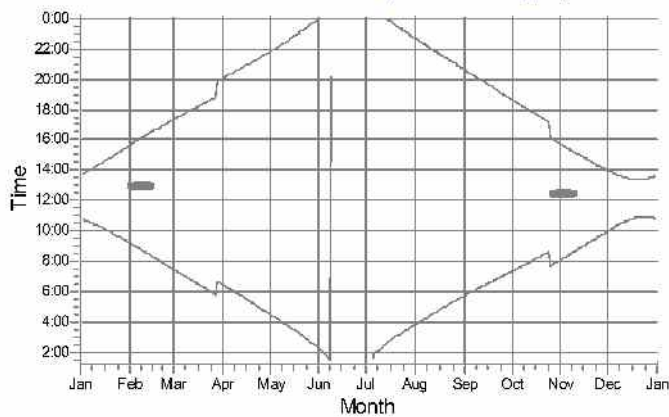
Atte Lohman / atte.lohman@poyry.com

Calculated:

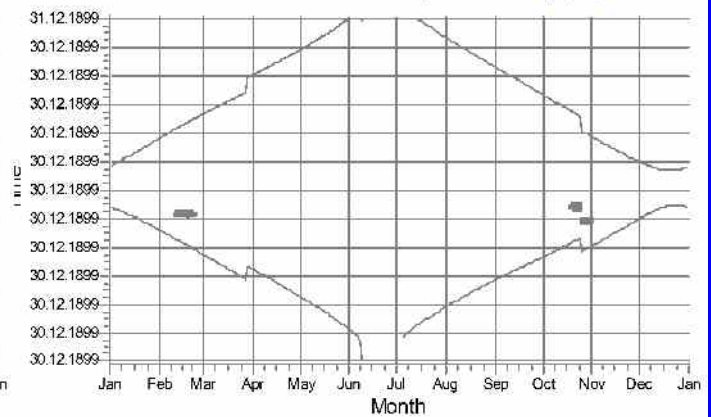
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

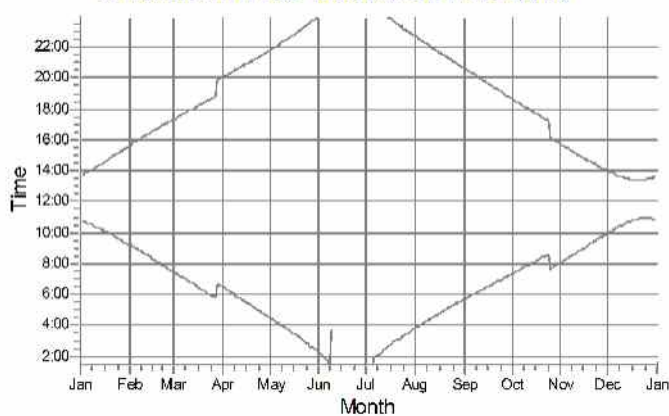
13: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (13)



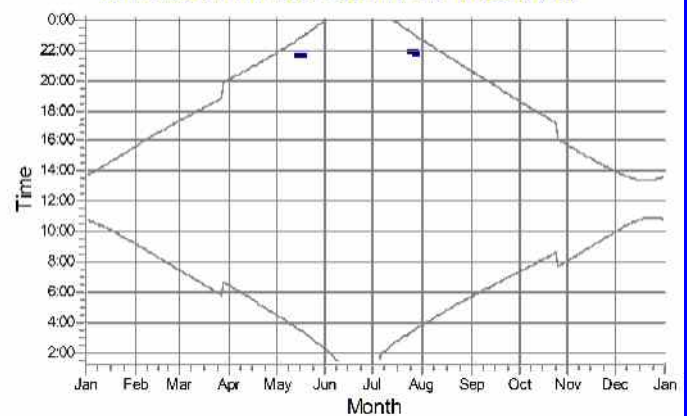
14: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (14)



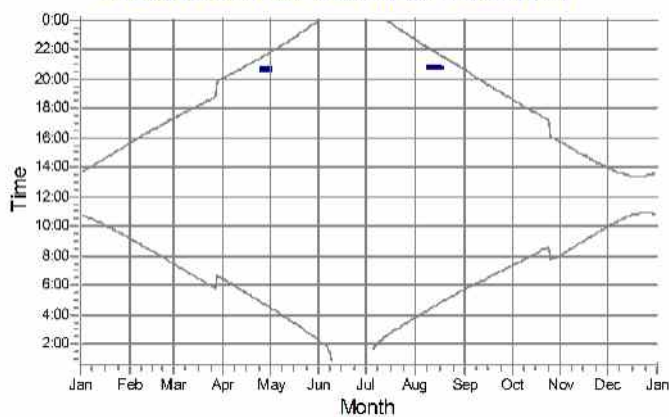
15: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (15)



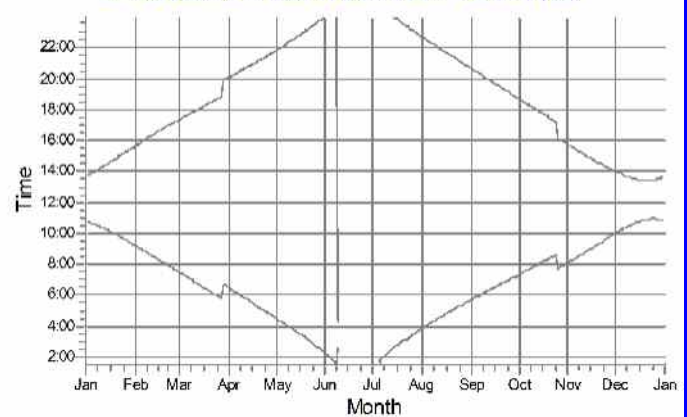
16: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (16)



17: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (17)



18: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (18)



Shadow receptors



D: Lemmonlammit



G: Pyytölampi

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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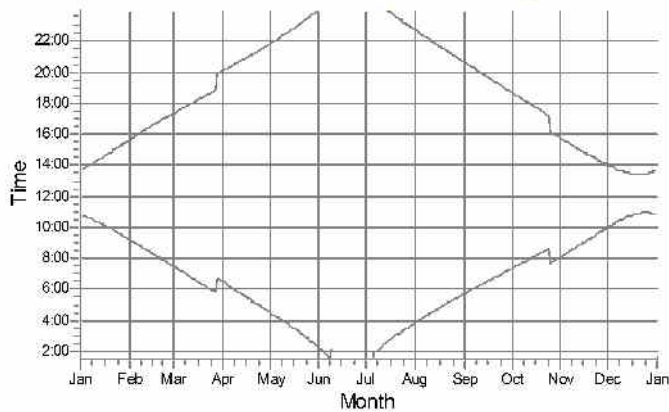
Atte Lohman / atte.lohman@poyry.com

Calculated:

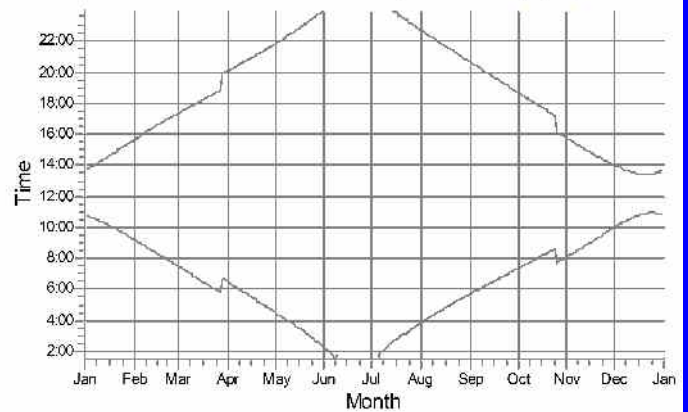
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

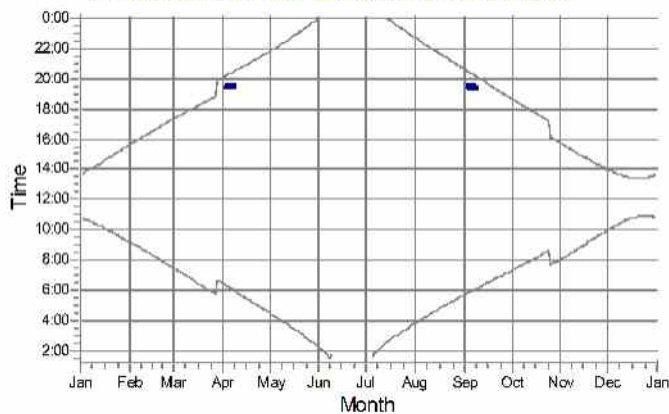
19: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (19)



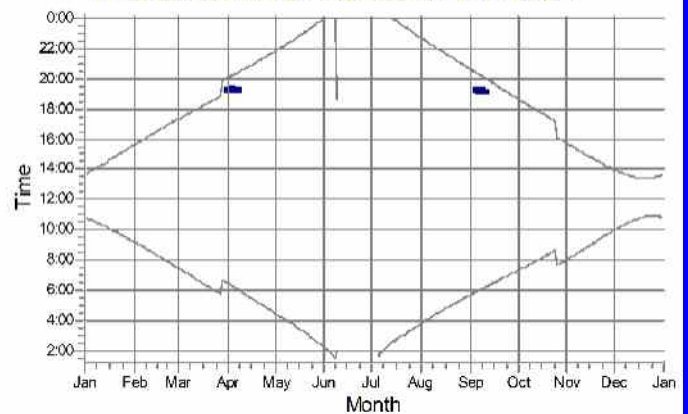
20: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (20)



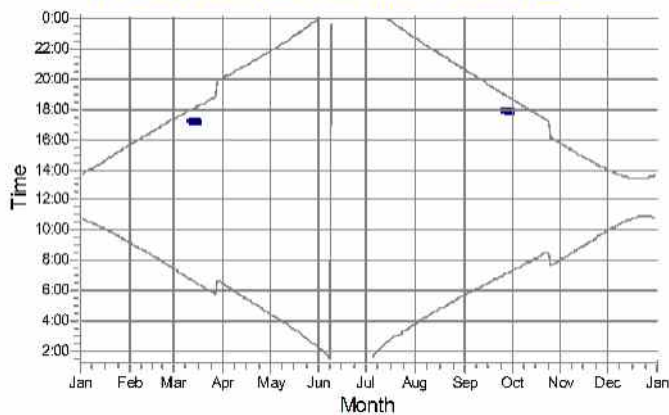
21: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (21)



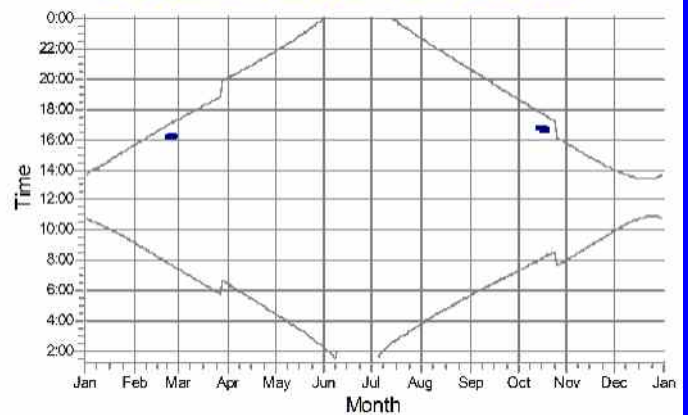
22: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (22)



23: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (23)



24: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (24)



Shadow receptors



G: Pyytölampi

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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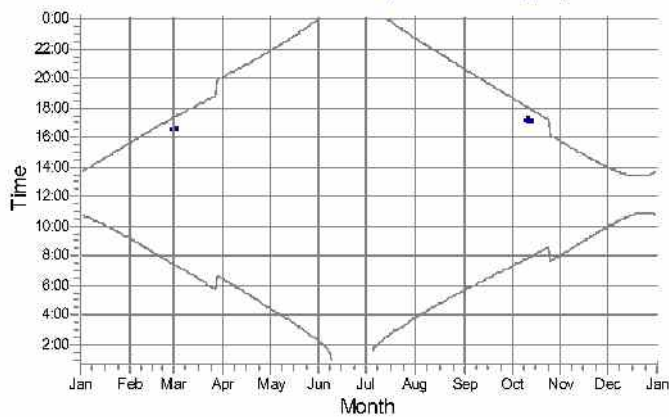
Atte Lohman / atte.lohman@poyry.com

Calculated:

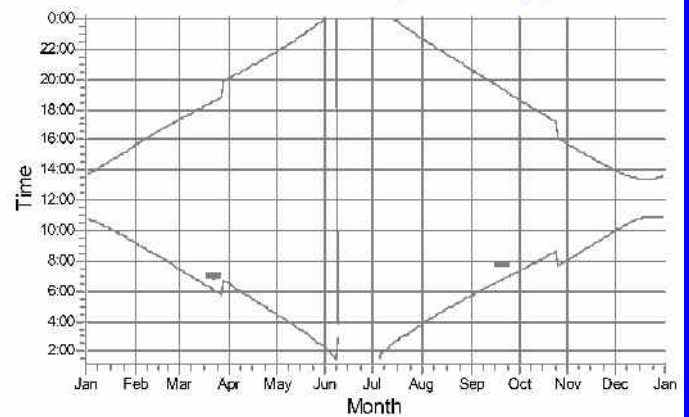
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

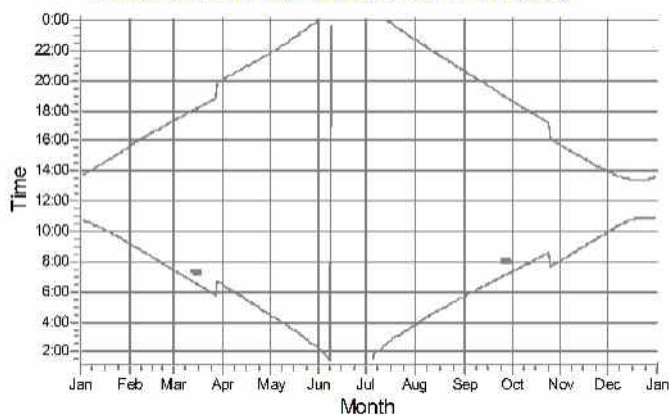
25: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (25)



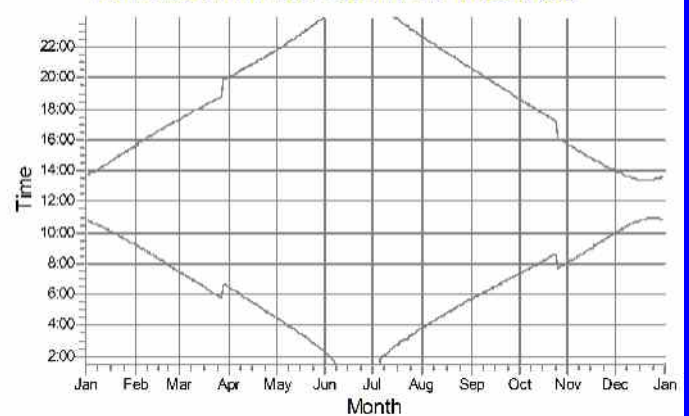
26: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (26)



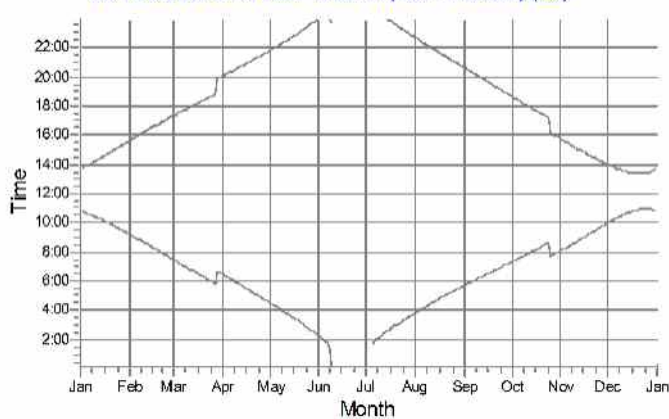
27: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (27)



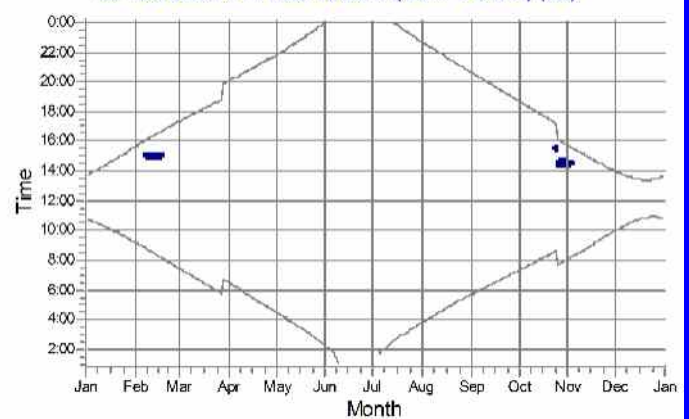
28: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (28)



29: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (29)



30: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (30)



Shadow receptors



D: Lemmonlammit



G: Pyytölampi

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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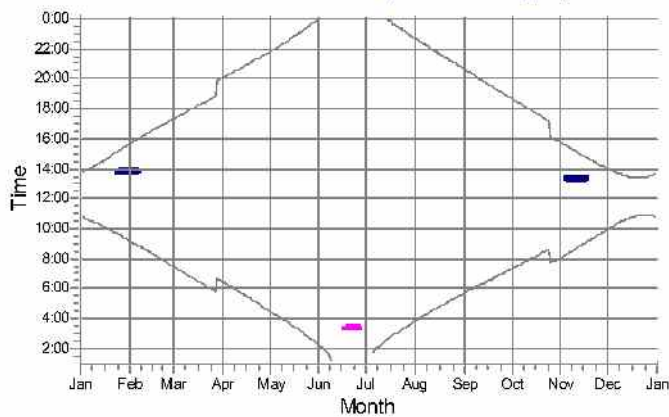
Atte Lohman / atte.lohman@poyry.com

Calculated:

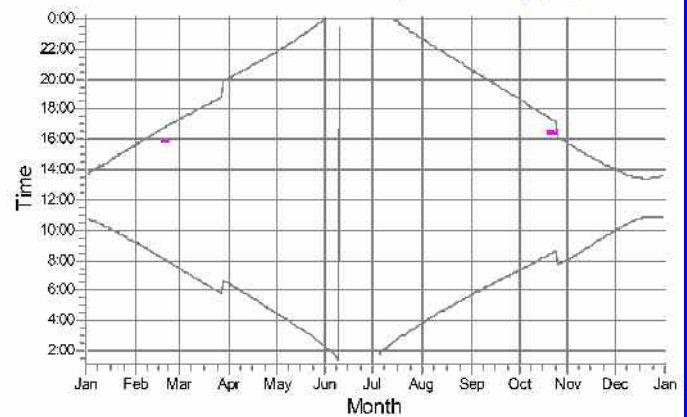
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

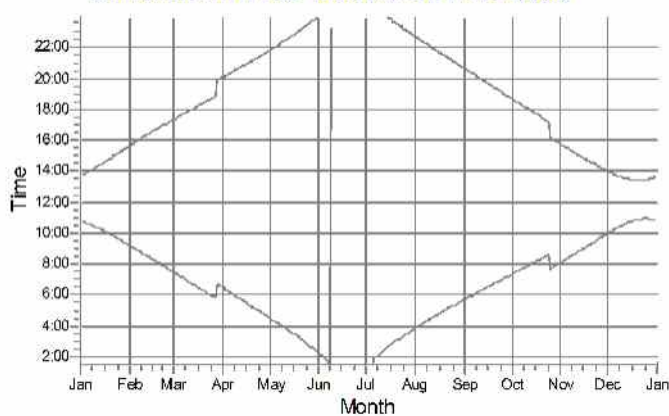
31: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (31)



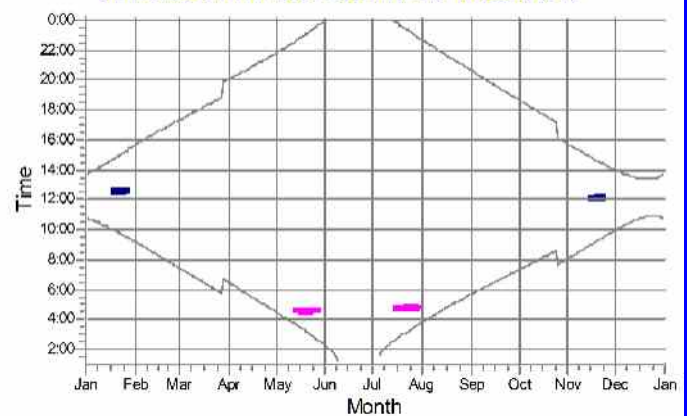
32: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (32)



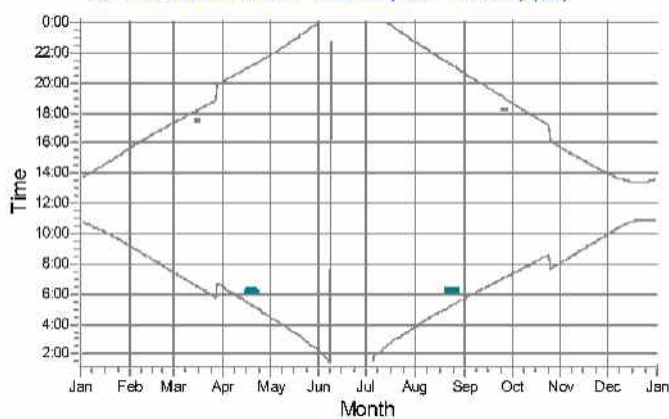
33: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (33)



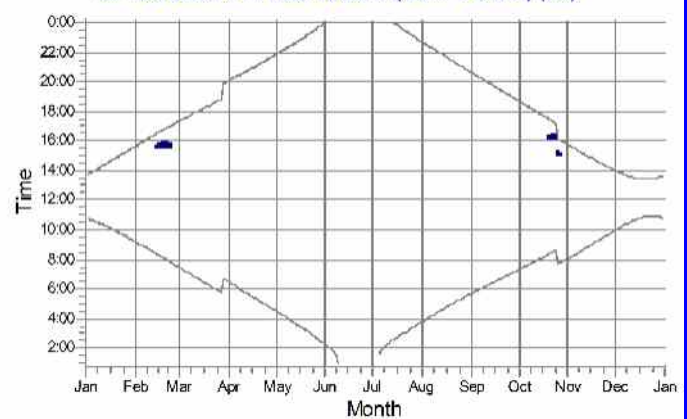
34: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (34)



35: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (35)



36: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (36)



Shadow receptors

	D: Lemmonlammit		E: Poksamo		F: Peilijänkä		G: Pyytölampi
--	-----------------	--	------------	--	---------------	--	---------------

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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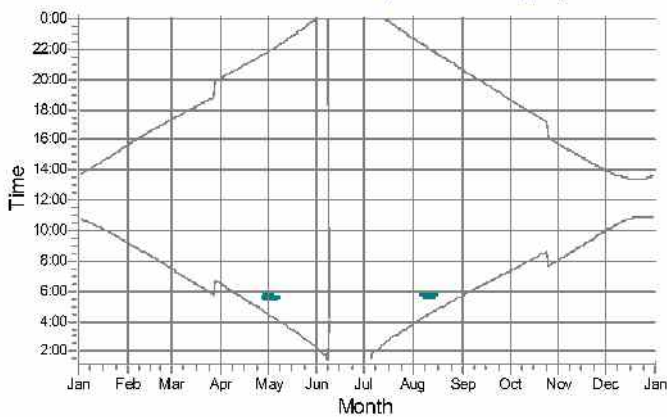
Atte Lohman / atte.lohman@poyry.com

Calculated:

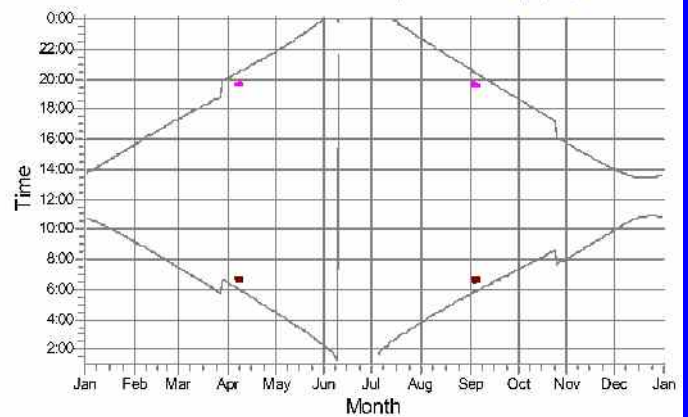
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

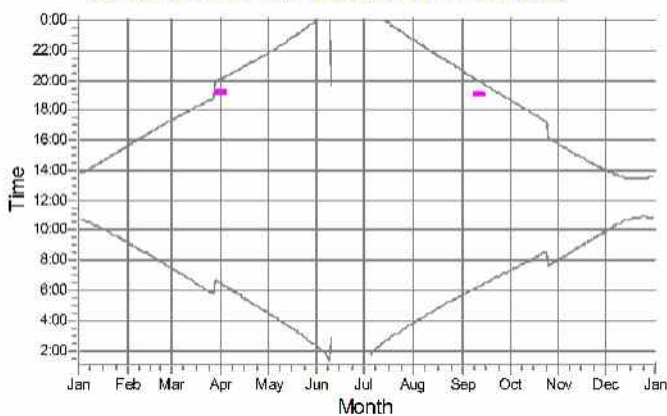
37: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (37)



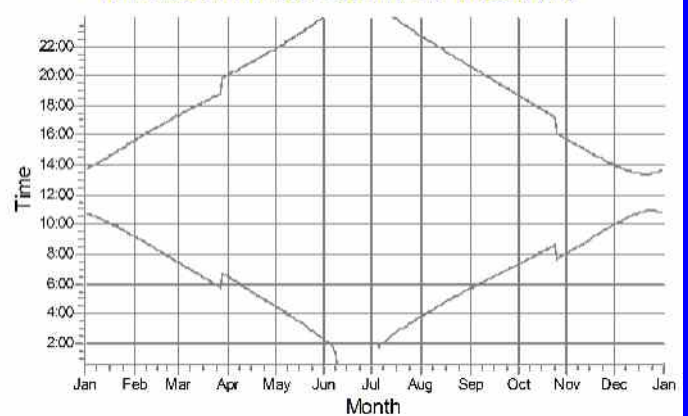
38: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (38)



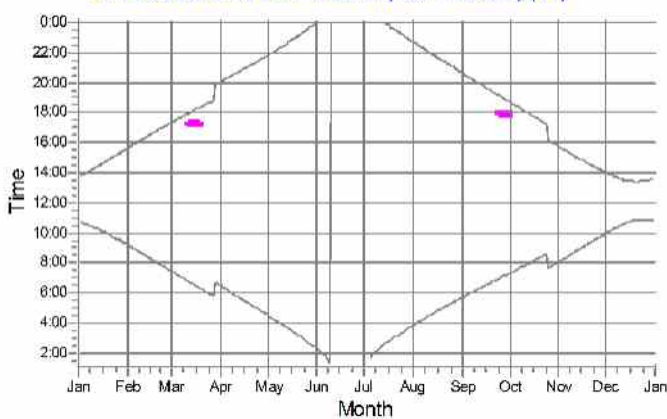
39: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (39)



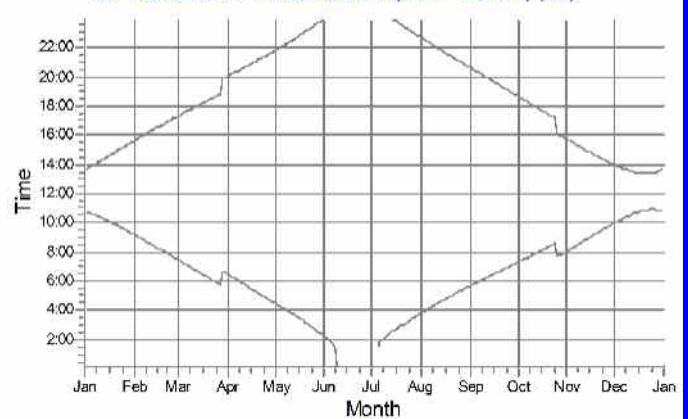
40: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (40)



41: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (41)



42: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (42)



Shadow receptors



E: Poksamo



F: Peilijänkä



H: Tie 81

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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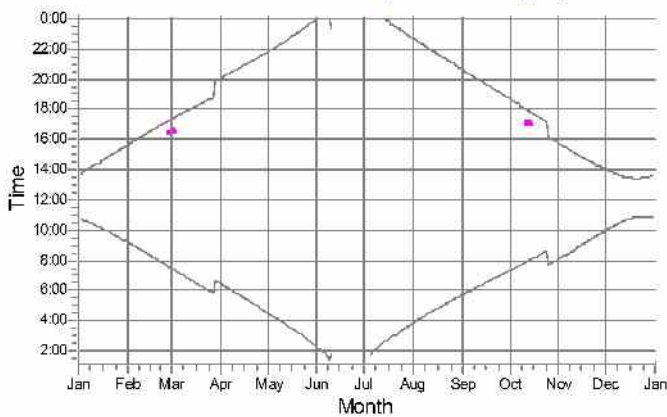
Atte Lohman / atte.lohman@poyry.com

Calculated:

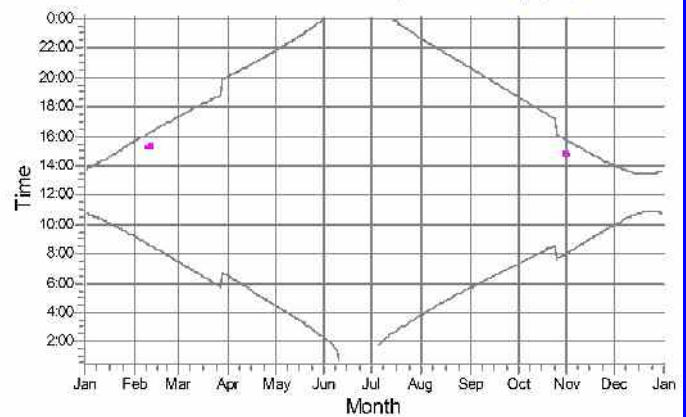
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

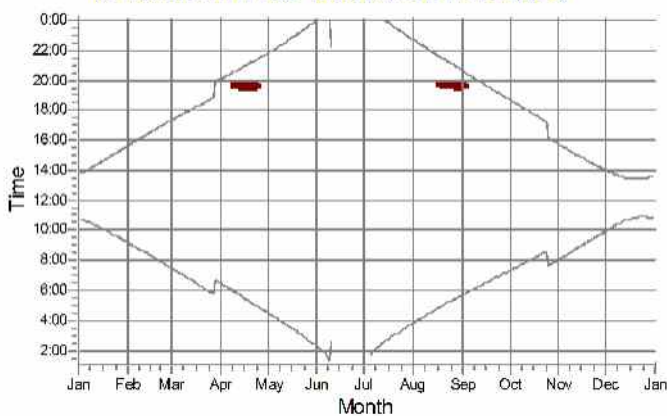
43: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (43)



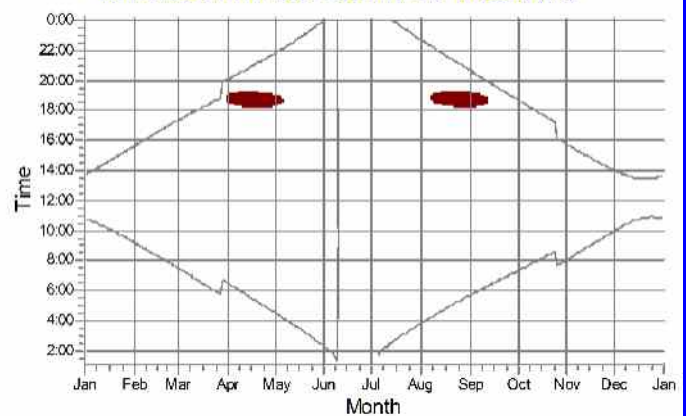
44: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (44)



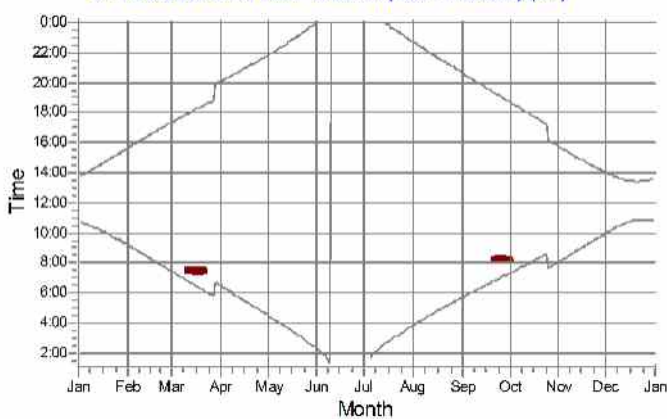
45: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (45)



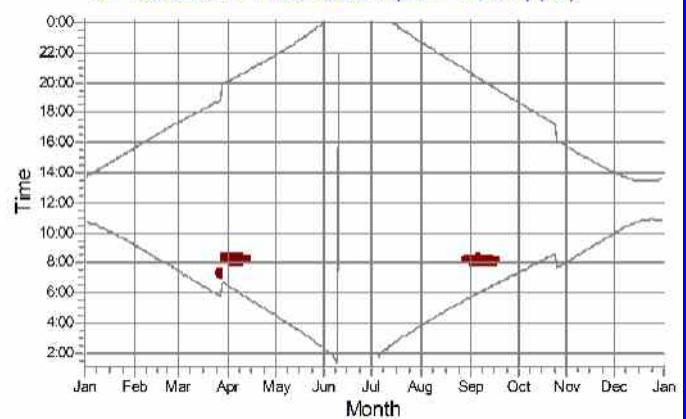
46: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (46)



47: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (47)



48: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (48)



Shadow receptors



E: Poksamo



H: Tie 81

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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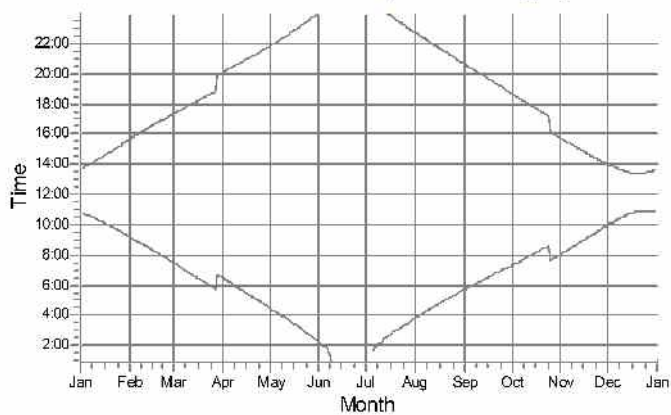
Atte Lohman / atte.lohman@poyry.com

Calculated:

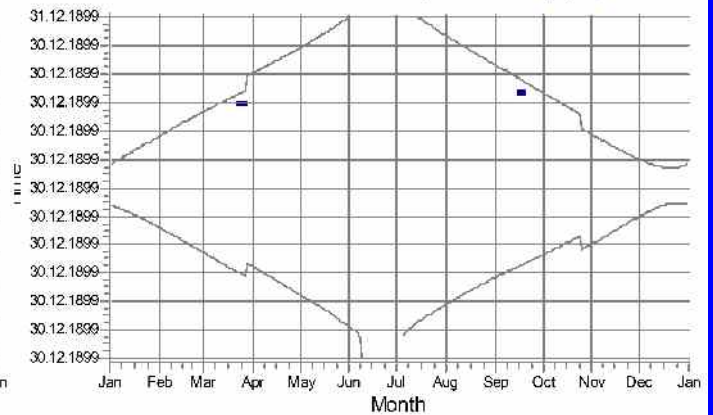
12.12.2012 3:42/2.8.563

SHADOW - Calendar per WTG, graphical**Calculation:** Posio Murtotuuli

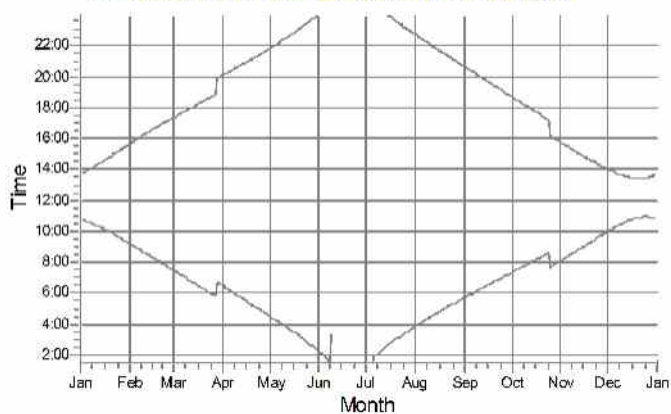
49: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (49)



50: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (50)



51: NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (51)



Shadow receptors



G: Pyytölampi

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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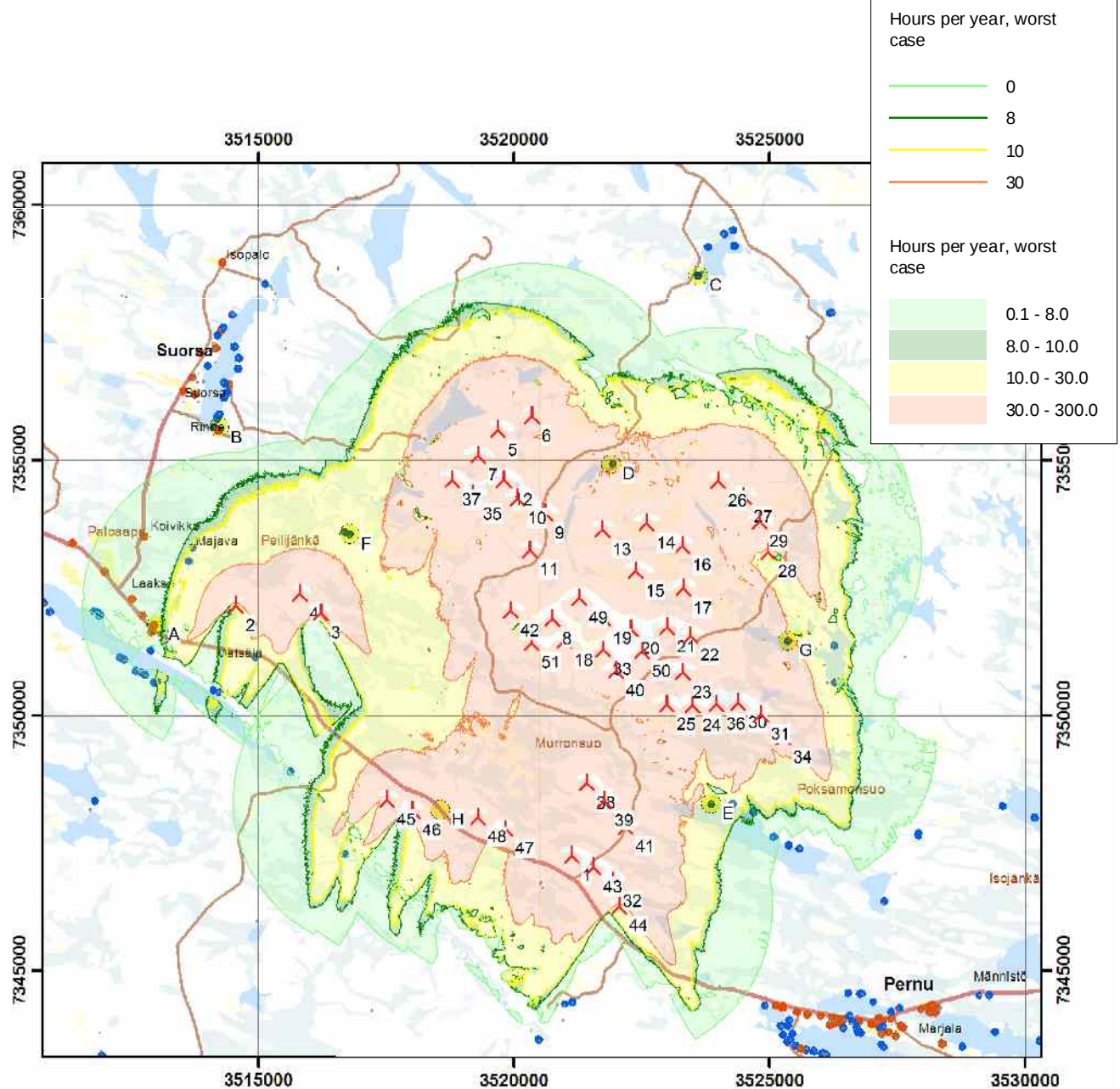
Atte Lohman / atte.lohman@poyry.com

Calculated:

12.12.2012 3:42/2.8.563

SHADOW - Map

Calculation: Posio Murtotuuli



0 2.5 5 7.5 10km

Map: Taaleritehdas_Posio_tuustakartta, Print scale 1:125 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 520 340 North: 7 348 940

▲ New WTG



Shadow receptor

Flicker map level: Taaleritehdas Posio korkeuskäyrät (säde 10km)

Project: **Taaleritehdas_Posio**
 Description: **Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa**

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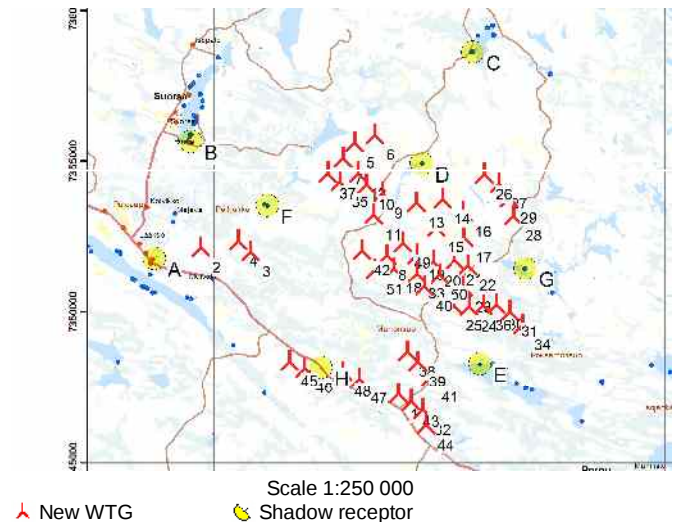
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 FI-02151 Espoo
 +358 10 33 24271
 Atte Lohman / atte.lohman@poyry.com
 Calculated:
 11.2.2013 12:47/2.8.579

SHADOW - Main Result

Calculation: Posio Murtotuuli

Assumptions for shadow calculations

Maximum distance for influence 3 000 m
 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: Taaleritehdas Posio korkeuskäyrät (säde 10km)
 Obstacles not used in calculation
 Eye height: 1.5 m
 Grid resolution: 10.0 m



WTGs

Finish TM ETRS-TM35FIN-ETRS89

East North Z Row data/Description

WTG type

Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
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...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
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...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
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...Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
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...Yes</						

To be continued on next page...

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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Calculated:

11.2.2013 12:47/2.8.579

SHADOW - Main Result**Calculation:** Posio Murtotuuli

...continued from previous page

Finish TM ETRS-TM35FIN-ETRS89					WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	RPM [RPM]
East	North	Z	Row data/Description		Valid	Manufact.					
		[m]									
38	521 258	7 345 594	280.8	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
39	521 605	7 345 246	290.1	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
40	521 829	7 347 782	336.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
41	522 022	7 344 724	287.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
42	519 766	7 348 971	275.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
43	521 391	7 343 941	292.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
44	521 895	7 343 178	282.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
45	517 345	7 345 267	230.6	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
46	517 848	7 345 049	227.9	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
47	519 663	7 344 691	245.0	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
48	519 127	7 344 920	265.7	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
49	521 107	7 349 214	332.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
50	522 339	7 348 160	362.2	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8
51	520 176	7 348 330	302.5	NORDEX N117 hub: 120.0 m (TOT: 178.5 m) (... Yes	Yes	NORDEX	N117-2 400	2 400	117.0	120.0	11.8

Project

Taaleritehdas_Posio

Description:

Taaleritehdas Posio Murtotuuli-tuulipuisto, 51 voimalaa

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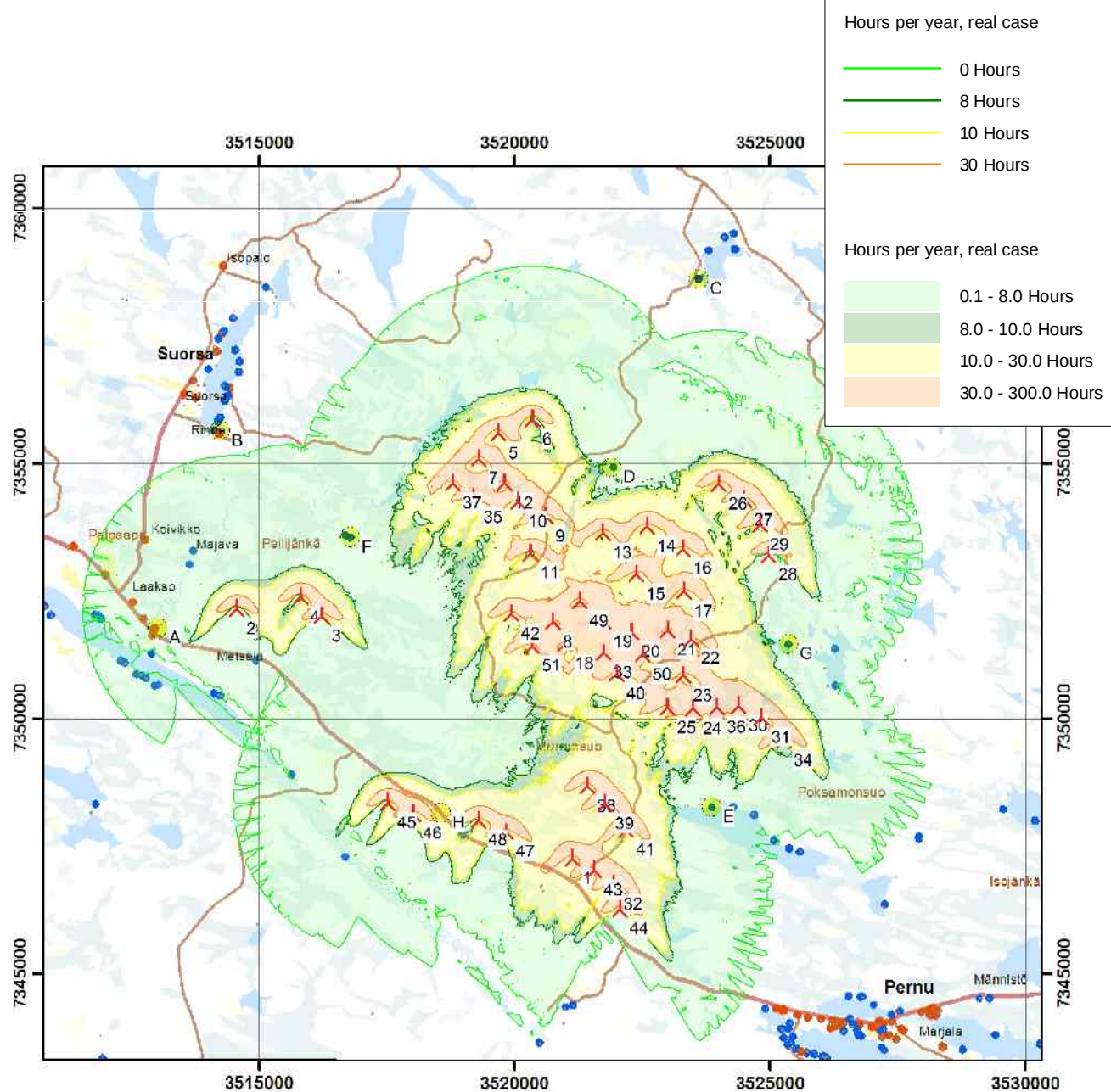
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Calculated:

11.2.2013 12:47/2.8.579

SHADOW - Map**Calculation:** Posio Murtotuuli

0 2.5 5 7.5 10km

Map: Taaleritehdas_Posio_tuustakartta, Print scale 1:125 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 520 340 North: 7 348 940

▲ New WTG



Shadow receptor

Flicker map level: Taaleritehdas Posio korkeuskäyrät (säde 10km)