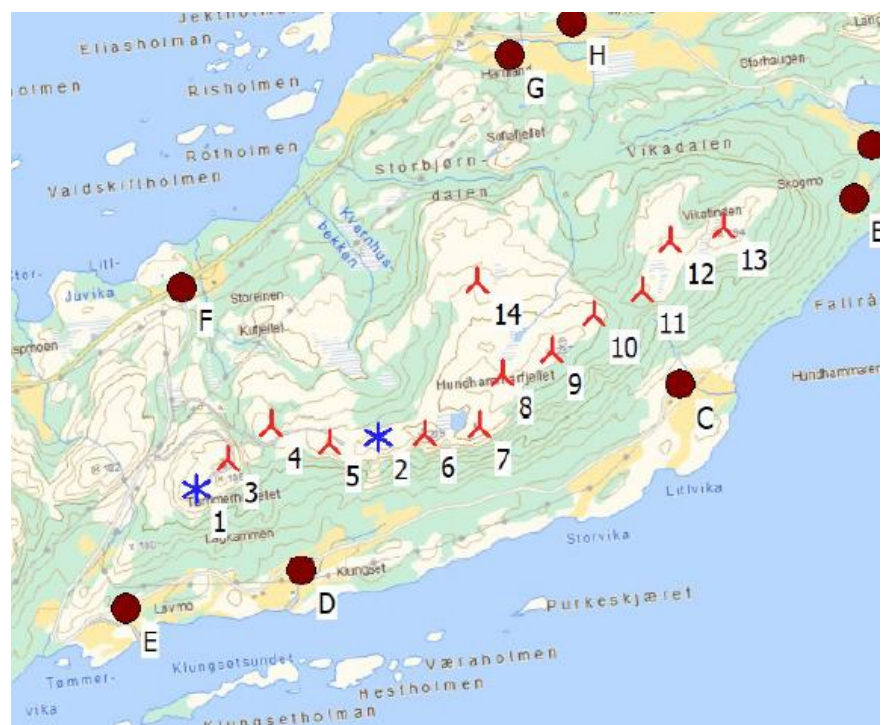


Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Støy- og skyggekastberegninger – vedlegg 6, MTA



Project:

Hundhammerfjellet Reetablering

NTE Energi AS

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 Calculated:
 19.12.2018 21.51/3.2.737

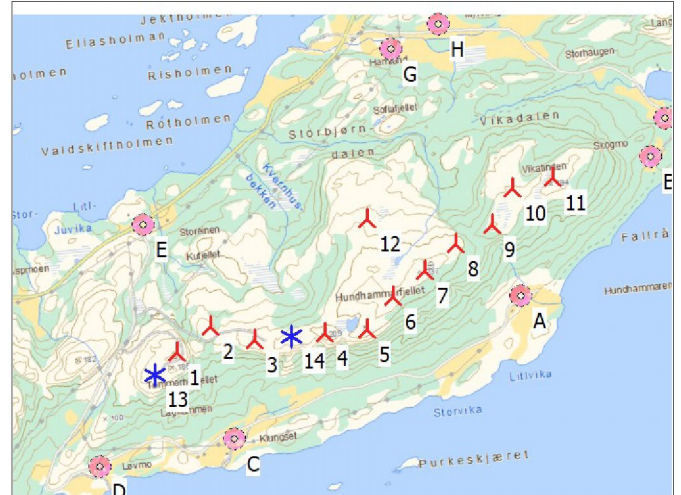
NORD2000 - Main Result

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Assumptions

Weather stability	50,0 %
Relative humidity	15,0 °C
Air temperature	2,0 m
Height for air temperature	Night; Clear sky
Stability parameters	0,0100
Inverse Monin Obukhov length	0,0500
Temperature scale T*	
Terrain	
Elevation based on object	
Height Contours	2013
Roughness based on area object	
Area object (Roughness):	ROUGH_REGIONS_Hundhammerfjellet vindpark_6.w2r (25)
Terrain type based on area object	
Area object (Nord2000):	Terrain hardness
Month for calculation	July
Wind speed criteria	
Uniform wind speed at 10 m agl.	
Wind speed	
Max noise wind speed	Max noise wind speed
Wind direction	All receptors downwind
Height above ground level for receiver	4,0 m
Wind speed has been extrapolated to calculation height using	
Fixed shear:	0,1300
No stability correction	5.022
Version	

All coordinates are in
 ETRS 89 Zone: 32



Scale 1:50 000
 ▲ New WTG ★ Existing WTG ■ Noise sensitive area

WTGs

X(East)	Y(North)	Z	Row data/Description	WTG type			Noise data					
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Creator	Name
1	611 497	7 182 974	178,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
2	611 722	7 183 142	145,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
3	612 015	7 183 056	170,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
4	612 478	7 183 097	205,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
5	612 757	7 183 128	199,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
6	612 927	7 183 340	225,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
7	613 136	7 183 515	234,1 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
8	613 342	7 183 694	199,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
9	613 584	7 183 818	198,3 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
10	613 714	7 184 057	184,6 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
11	613 981	7 184 127	174,1 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
12	612 753	7 183 853	175,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
13	611 350	7 182 825	170,0 M1-E-70 E4 2000 71.0	Yes	ENERCON	E-70 E4-2 000	2 000	71,0	65,0	Day	USER	8m/s, 64m Hub, Man. guaranteed 10/2004
										Evening	USER	8m/s, 64m Hub, Man. guaranteed 10/2004
										Night	USER	8m/s, 64m Hub, Man. guaranteed 10/2004
14	612 257	7 183 083	190,0 M5- E-70 E4 2,3 MW 2300	Yes	ENERCON	E-70 E4 2,3 MW-2 300	2 300	71,0	64,0	Day	EMD	Level 0 - guaranteed - OM II- 02/2006
										Evening	EMD	Level 0 - guaranteed - OM II- 02/2006
										Night	EMD	Level 0 - guaranteed - OM II- 02/2006

Calculation Results

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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 Helge Dalbu / helge.dalbu@multiconsult.no
 Calculated:
 19.12.2018 21.51/3.2.737

NORD2000 - Main Result**Calculation:** Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6**Sound level****Noise sensitive area**

No.	Name	X(East)	Y(North)	Z [m]	Imission height [m]	Noise [dB(A)]	From WTGs [dB(A)]	Demands fulfilled? Noise [dB(A)]
A	Hundhammer	613 769	7 183 346	24,8	4,0	45,0	51,1	No
	A Day						44,7	
	A Evening						44,7	
	A Night						44,7	
B	Skogmo	614 630	7 184 268	28,5	4,0	45,0	44,5	Yes
	B Day						38,2	
	B Evening						38,2	
	B Night						38,2	
C	Klungset	611 877	7 182 400	10,0	4,0	45,0	49,1	No
	C Day						42,7	
	C Evening						42,7	
	C Night						42,7	
D	Løvmø	610 992	7 182 219	12,0	4,0	45,0	46,3	No
	D Day						39,9	
	D Evening						39,9	
	D Night						39,9	
E	Storeienen	611 279	7 183 819	37,0	4,0	45,0	46,2	No
	E Day						39,8	
	E Evening						39,8	
	E Night						39,8	
F	Hamlandsvika	614 727	7 184 523	12,2	4,0	45,0	41,7	Yes
	F Day						35,3	
	F Evening						35,3	
	F Night						35,3	
G	Hamland	612 918	7 184 980	23,2	4,0	45,0	43,2	Yes
	G Day						36,8	
	G Evening						36,8	
	G Night						36,8	
H	Myhrvang	613 225	7 185 144	33,1	4,0	45,0	43,2	Yes
	H Day						36,8	
	H Evening						36,8	
	H Night						36,8	

Project:

Hundhammerfjellet Reetablering

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Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

19.12.2018 21.51/3.2.737

NORD2000 - Assumptions for NORD2000 calculation

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Assumptions

Weather stability

Relative humidity

50,0 %

Air temperature

15,0 °C

Height for air temperature

2,0 m

Stability parameters

Night;Clear sky

Inverse Monin Obukhov length

0,0100

Temperature scale T*

0,0500

Terrain

Elevation based on object

Height Contours 2013

Roughness based on area object

Area object (Roughness): ROUGH_REGIONS_Hundhammerfjellet vindpark_6.w2r (25)

Terrain type based on area object

Area object (Nord2000): Terrain hardness

Month for calculation

July

Wind speed criteria

Uniform wind speed at 10 m agl.

Wind speed

Max noise wind speed

Max noise wind speed

All receptors downwind

Wind direction

4,0 m

Height above ground level for receiver

Wind speed has been extrapolated to calculation height using

Fixed shear: 0,1300

No stability correction

5.022

Version

All coordinates are in

ETRS 89 Zone: 32

Setup for Lden calculation

Variant	Name	From hour	To hour	Hours	Penalty [dB]	Days per year
1	Day	7	19	12	0	365
2	Evening	19	23	4	5	365
3	Night	23	7	8	10	365

WTG: VESTAS V136-4.2 4200 136.0 !O!

Noise: Mode 0/0-0S (HWO)

Source	Source/Date	Creator	Edited
0067-7065 V05	21.12.2017	USER	08.06.2018 09.03

Wind speed [m/s]	LwA,ref [dB(A)]
3,0	90,9
4,0	91,1
5,0	92,9
6,0	96,0
7,0	99,6
8,0	102,8
9,0	103,9
10,0	103,9
11,0	103,9
12,0	103,9
13,0	103,9
14,0	103,9
15,0	103,9
16,0	103,9
17,0	103,9
18,0	103,9
19,0	103,9
20,0	103,9

Project:

Hundhammerfjellet Reetablering

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Calculated:
19.12.2018 21.51/3.2.737

NORD2000 - Assumptions for NORD2000 calculation

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

WTG: ENERCON E-70 E4 2000 71.0 !O!

Noise: 8m/s, 64m Hub, Man. guaranteed 10/2004

Source	Source/Date	Creator	Edited
Enercon	07.10.2004	USER	17.09.2018 14.20

Wind speed [m/s]	LwA,ref [dB(A)]
6,0	91,1
7,0	93,6
8,0	97,4
9,0	99,5
10,0	101,1
11,0	102,2
12,0	102,7
13,0	103,2

Project:

Hundhammerfjellet Reetablering

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Calculated:

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NORD2000 - Assumptions for NORD2000 calculation

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

WTG: ENERCON E-70 E4 2,3 MW 2300 71.0 !O!

Noise: Level 0 - guaranteed - OM II- 02/2006

Source Source/Date Creator Edited
Enercon 07.10.2004 EMD 12.07.2006 12.26

Noise data corresponding to 95 % production are based on Report WICO 314SEA05/01

Wind speed [m/s]	LwA,ref [dB(A)]
6,0	92,0
7,0	94,6
8,0	98,4
9,0	100,5
10,0	102,1

NSA: Hundhammer-A

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Skogmo-B

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 700,0 m

NSA: Klungset-C

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Løvmo-D

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Storeienen-E

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Hamlandsvika-F

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Hamland-G

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Myhrvang-H

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

Project:

Hundhammerfjellet Reetablering

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Calculated:

19.12.2018 21.51/3.2.737

NORD2000 - Details

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Calculation Results

Noise sensitive area: A Hundhammer

WTG			Sound level								Source noise										
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]								LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
1	2302	20,0	Day	19,56	6,1	10,5	15,4	14,7	10,3	-6,1	-62,1	-137,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	2302	20,0	Evening	19,56	6,1	10,5	15,4	14,7	10,3	-6,1	-62,1	-137,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	2302	20,0	Night	19,56	6,1	10,5	15,4	14,7	10,3	-6,1	-62,1	-137,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2057	20,0	Day	6,95	-0,5	0,5	2,7	-0,4	-7,7	-24,6	-67,6	-142,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2057	20,0	Evening	6,95	-0,5	0,5	2,7	-0,4	-7,7	-24,6	-67,6	-142,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2057	20,0	Night	6,95	-0,5	0,5	2,7	-0,4	-7,7	-24,6	-67,6	-142,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	1778	20,0	Day	25,11	9,8	16,8	20,0	20,8	16,7	1,3	-43,6	-125,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	1778	20,0	Evening	25,11	9,8	16,8	20,0	20,8	16,7	1,3	-43,6	-125,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	1778	20,0	Night	25,11	9,8	16,8	20,0	20,8	16,7	1,3	-43,6	-125,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	1315	9,0	Day	28,53	13,5	16,5	23,8	24,3	21,1	8,7	-28,0	-108,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	1315	9,0	Evening	28,53	13,5	16,5	23,8	24,3	21,1	8,7	-28,0	-108,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	1315	9,0	Night	28,53	13,5	16,5	23,8	24,3	21,1	8,7	-28,0	-108,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	1035	9,0	Day	32,04	15,0	21,4	27,0	27,8	24,7	14,0	-17,1	-92,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	1035	9,0	Evening	32,04	15,0	21,4	27,0	27,8	24,7	14,0	-17,1	-92,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	1035	9,0	Night	32,04	15,0	21,4	27,0	27,8	24,7	14,0	-17,1	-92,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	842	20,0	Day	33,14	11,5	24,8	26,9	28,7	26,6	17,1	-10,1	-79,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	842	20,0	Evening	33,14	11,5	24,8	26,9	28,7	26,6	17,1	-10,1	-79,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	842	20,0	Night	33,14	11,5	24,8	26,9	28,7	26,6	17,1	-10,1	-79,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	655	20,0	Day	35,69	12,5	27,7	29,0	31,2	29,3	21,0	-2,4	-64,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	655	20,0	Evening	35,69	12,5	27,7	29,0	31,2	29,3	21,0	-2,4	-64,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	655	20,0	Night	35,69	12,5	27,7	29,0	31,2	29,3	21,0	-2,4	-64,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	551	20,0	Day	38,40	16,0	30,7	32,1	33,7	31,7	23,9	3,0	-53,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	551	20,0	Evening	38,40	16,0	30,7	32,1	33,7	31,7	23,9	3,0	-53,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	551	20,0	Night	38,40	16,0	30,7	32,1	33,7	31,7	23,9	3,0	-53,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	507	9,0	Day	39,12	18,0	30,6	33,4	34,3	32,4	24,9	5,0	-49,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	507	9,0	Evening	39,12	18,0	30,6	33,4	34,3	32,4	24,9	5,0	-49,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	507	9,0	Night	39,12	18,0	30,6	33,4	34,3	32,4	24,9	5,0	-49,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	713	20,0	Day	35,00	12,4	27,2	28,1	30,6	28,6	20,1	-4,1	-67,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	713	20,0	Evening	35,00	12,4	27,2	28,1	30,6	28,6	20,1	-4,1	-67,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	713	20,0	Night	35,00	12,4	27,2	28,1	30,6	28,6	20,1	-4,1	-67,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	809	20,0	Day	34,53	13,5	26,5	28,5	30,0	27,7	18,4	-7,8	-75,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	809	20,0	Evening	34,53	13,5	26,5	28,5	30,0	27,7	18,4	-7,8	-75,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	809	20,0	Night	34,53	13,5	26,5	28,5	30,0	27,7	18,4	-7,8	-75,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	1136	20,0	Day	6,44	-8,0	1,4	-2,1	-1,2	0,7	-5,2	-36,2	-112,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	1136	20,0	Evening	6,44	-8,0	1,4	-2,1	-1,2	0,7	-5,2	-36,2	-112,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	1136	20,0	Night	6,44	-8,0	1,4	-2,1	-1,2	0,7	-5,2	-36,2	-112,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
13	2475	13,0	Day	7,45	-0,5	1,5	2,6	0,8	-6,9	-28,8	-83,8	-151,3	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	2475	13,0	Evening	7,45	-0,5	1,5	2,6	0,8	-6,9	-28,8	-83,8	-151,3	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	2475	13,0	Night	7,45	-0,5	1,5	2,6	0,8	-6,9	-28,8	-83,8	-151,3	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
14	1536	10,0	Day	16,65	2,2	6,0	12,1	12,4	8,3	-5,8	-46,9	-129,8	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	1536	10,0	Evening	16,65	2,2	6,0	12,1	12,4	8,3	-5,8	-46,9	-129,8	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	1536	10,0	Night	16,65	2,2	6,0	12,1	12,4	8,3	-5,8	-46,9	-129,8	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3

Noise sensitive area: B Skogmo

WTG			Sound level								Source noise										
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]								LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
1	3389	20,0	Day	5,19	-5,6	1,3	0,2	-2,4	-11,4	-38,1	-104,6	-159,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	3389	20,0	Evening	5,19	-5,6	1,3	0,2	-2,4	-11,4	-38,1	-104,6	-159,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	3389	20,0	Night	5,19	-5,6	1,3	0,2	-2,4	-11,4	-38,1	-104,6	-159,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	3118	20,0	Day	-2,34	-13,3	-6,1	-7,7	-9,9	-17,1	-38,8	-94,5	-152,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	3118	20,0	Evening	-2,34	-13,3	-6,1	-7,7	-9,9	-17,1	-38,8	-94,5	-152,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	3118	20,0	Night	-2,34	-13,3	-6,1	-7,7	-9,9	-17,1	-38,8	-94,5	-152,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	2882	20,0	Day	3,67	-8,5	-1,3	-1,3	-2,6	-8,4	-28,6	-90,0	-158,4									

Project:

Hundhammerfjellet Reetabling

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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Calculated:

19.12.2018 21.51/3.2.737

NORD2000 - Details**Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6**

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WTG		Sound level									Source noise											
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]									LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000		
11	664	20,0	Night	34,86	12,5	27,3	27,9	30,5	28,3	20,1	-2,6	-63,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
12	1 922	20,0	Day	2,60	-9,9	-0,6	-3,5	-5,6	-9,5	-18,2	-59,5	-138,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
12	1 922	20,0	Evening	2,60	-9,9	-0,6	-3,5	-5,6	-9,5	-18,2	-59,5	-138,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
12	1 922	20,0	Night	2,60	-9,9	-0,6	-3,5	-5,6	-9,5	-18,2	-59,5	-138,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
13	3 584	13,0	Day	-6,48	-14,8	-10,0	-12,1	-16,0	-22,8	-40,8	-101,5	-154,9	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4	
13	3 584	13,0	Evening	-6,48	-14,8	-10,0	-12,1	-16,0	-22,8	-40,8	-101,5	-154,9	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4	
13	3 584	13,0	Night	-6,48	-14,8	-10,0	-12,1	-16,0	-22,8	-40,8	-101,5	-154,9	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4	
14	2 653	10,0	Day	-6,90	-22,2	-18,1	-17,8	-13,0	-9,5	-23,7	-79,2	-149,1	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3	
14	2 653	10,0	Evening	-6,90	-22,2	-18,1	-17,8	-13,0	-9,5	-23,7	-79,2	-149,1	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3	
14	2 653	10,0	Night	-6,90	-22,2	-18,1	-17,8	-13,0	-9,5	-23,7	-79,2	-149,1	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3	

Noise sensitive area: C Klungset

WTG		Sound level									Source noise											
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]									LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000		
1	688	20,0	Day	36,18	16,1	28,7	29,9	31,6	29,2	20,6	-3,1	-65,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
1	688	20,0	Evening	36,18	16,1	28,7	29,9	31,6	29,2	20,6	-3,1	-65,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
1	688	20,0	Night	36,18	16,1	28,7	29,9	31,6	29,2	20,6	-3,1	-65,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
2	758	20,0	Day	34,57	14,4	27,5	28,3	29,9	27,4	18,5	-6,2	-71,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
2	758	20,0	Evening	34,57	14,4	27,5	28,3	29,9	27,4	18,5	-6,2	-71,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
2	758	20,0	Night	34,57	14,4	27,5	28,3	29,9	27,4	18,5	-6,2	-71,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
3	670	20,0	Day	34,73	12,4	27,1	28,0	30,3	28,1	19,9	-3,1	-64,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
3	670	20,0	Evening	34,73	12,4	27,1	28,0	30,3	28,1	19,9	-3,1	-64,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
3	670	20,0	Night	34,73	12,4	27,1	28,0	30,3	28,1	19,9	-3,1	-64,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
4	920	20,0	Day	32,37	13,2	25,6	26,3	27,7	24,8	14,8	-13,7	-85,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
4	920	20,0	Evening	32,37	13,2	25,6	26,3	27,7	24,8	14,8	-13,7	-85,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
4	920	20,0	Night	32,37	13,2	25,6	26,3	27,7	24,8	14,8	-13,7	-85,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
5	1 142	20,0	Day	30,18	10,8	23,5	24,5	25,4	22,2	10,8	-22,2	-99,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
5	1 142	20,0	Evening	30,18	10,8	23,5	24,5	25,4	22,2	10,8	-22,2	-99,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
5	1 142	20,0	Night	30,18	10,8	23,5	24,5	25,4	22,2	10,8	-22,2	-99,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
6	1 409	20,0	Day	26,96	7,4	19,8	21,4	22,5	18,9	5,9	-32,4	-113,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
6	1 409	20,0	Evening	26,96	7,4	19,8	21,4	22,5	18,9	5,9	-32,4	-113,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
6	1 409	20,0	Night	26,96	7,4	19,8	21,4	22,5	18,9	5,9	-32,4	-113,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
7	1 681	20,0	Day	24,93	6,3	17,8	19,7	20,4	16,3	1,5	-41,7	-123,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
7	1 681	20,0	Evening	24,93	6,3	17,8	19,7	20,4	16,3	1,5	-41,7	-123,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
7	1 681	20,0	Night	24,93	6,3	17,8	19,7	20,4	16,3	1,5	-41,7	-123,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
8	1 954	20,0	Day	23,18	5,6	16,2	18,2	18,5	13,9	-2,5	-50,2	-130,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
8	1 954	20,0	Evening	23,18	5,6	16,2	18,2	18,5	13,9	-2,5	-50,2	-130,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
8	1 954	20,0	Night	23,18	5,6	16,2	18,2	18,5	13,9	-2,5	-50,2	-130,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
9	2 219	20,0	Day	21,68	4,6	15,2	16,8	16,9	11,7	-6,3	-58,0	-135,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
9	2 219	20,0	Evening	21,68	4,6	15,2	16,8	16,9	11,7	-6,3	-58,0	-135,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
9	2 219	20,0	Night	21,68	4,6	15,2	16,8	16,9	11,7	-6,3	-58,0	-135,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
10	2 473	20,0	Day	20,56	3,9	14,7	15,7	15,5	9,8	-9,8	-65,1	-138,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
10	2 473	20,0	Evening	20,56	3,9	14,7	15,7	15,5	9,8	-9,8	-65,1	-138,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
10	2 473	20,0	Night	20,56	3,9	14,7	15,7	15,5	9,8	-9,8	-65,1	-138,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
11	2 721	20,0	Day	19,34	3,4	14,0	14,4	14,0	7,9	-13,1	-71,6	-141,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
11	2 721	20,0	Evening	19,34	3,4	14,0	14,4	14,0	7,9	-13,1	-71,6	-141,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
11	2 721	20,0	Night	19,34	3,4	14,0	14,4	14,0	7,9	-13,1	-71,6	-141,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
12	1 696	20,0	Day	23,20	2,9	16,1	16,7	19,0	15,8	1,4	-41,9	-123,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
12	1 696	20,0	Evening	23,20	2,9	16,1	16,7	19,0	15,8	1,4	-41,9	-123,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
12	1 696	20,0	Night	23,20	2,9	16,1	16,7	19,0	15,8	1,4	-41,9	-123,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1	
13	677	13,0	Day	34,82	13,5	27,9	28,1	30,3	27,8	19,5	-3,5	-64,7	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4	
13	677	13,0	Evening	34,82	13,5	27,9	28,1	30,3	27,8	19,5	-3,5	-64,7	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4	
13	677	13,0	Night	34,82	13,5	27,9	28,1	30,3	27,8	19,5	-3,5											

NORD2000 - Details**Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6**

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WTG			Sound level								Source noise										
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]								LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
6	2 236	20,0	Day	22,31	5,5	14,8	17,6	17,7	12,7	-5,5	-57,8	-135,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	2 236	20,0	Evening	22,31	5,5	14,8	17,6	17,7	12,7	-5,5	-57,8	-135,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	2 236	20,0	Night	22,31	5,5	14,8	17,6	17,7	12,7	-5,5	-57,8	-135,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	2 505	20,0	Day	20,93	4,3	14,0	16,3	16,2	10,6	-9,2	-65,3	-138,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	2 505	20,0	Evening	20,93	4,3	14,0	16,3	16,2	10,6	-9,2	-65,3	-138,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	2 505	20,0	Night	20,93	4,3	14,0	16,3	16,2	10,6	-9,2	-65,3	-138,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	2 774	20,0	Day	19,79	3,7	13,8	15,0	14,7	8,7	-12,7	-72,1	-141,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	2 774	20,0	Evening	19,79	3,7	13,8	15,0	14,7	8,7	-12,7	-72,1	-141,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	2 774	20,0	Night	19,79	3,7	13,8	15,0	14,7	8,7	-12,7	-72,1	-141,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	3 045	20,0	Day	18,67	2,8	13,3	13,8	13,3	6,8	-16,1	-78,7	-143,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	3 045	20,0	Evening	18,67	2,8	13,3	13,8	13,3	6,8	-16,1	-78,7	-143,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	3 045	20,0	Night	18,67	2,8	13,3	13,8	13,3	6,8	-16,1	-78,7	-143,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	3 284	20,0	Day	17,97	5,0	13,1	12,9	12,1	5,1	-19,1	-84,0	-144,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	3 284	20,0	Evening	17,97	5,0	13,1	12,9	12,1	5,1	-19,1	-84,0	-144,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	3 284	20,0	Night	17,97	5,0	13,1	12,9	12,1	5,1	-19,1	-84,0	-144,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	3 546	20,0	Day	16,95	4,1	12,3	11,9	10,9	3,4	-22,3	-89,5	-146,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	3 546	20,0	Evening	16,95	4,1	12,3	11,9	10,9	3,4	-22,3	-89,5	-146,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	3 546	20,0	Night	16,95	4,1	12,3	11,9	10,9	3,4	-22,3	-89,5	-146,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	2 402	20,0	Day	23,05	10,2	17,7	17,7	17,6	12,0	-7,3	-62,0	-137,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	2 402	20,0	Evening	23,05	10,2	17,7	17,7	17,6	12,0	-7,3	-62,0	-137,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	2 402	20,0	Night	23,05	10,2	17,7	17,7	17,6	12,0	-7,3	-62,0	-137,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
13	703	13,0	Day	36,35	18,2	26,1	30,5	32,1	29,8	21,1	-2,8	-65,9	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	703	13,0	Evening	36,35	18,2	26,1	30,5	32,1	29,8	21,1	-2,8	-65,9	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	703	13,0	Night	36,35	18,2	26,1	30,5	32,1	29,8	21,1	-2,8	-65,9	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
14	1 531	10,0	Day	25,05	10,5	13,5	20,5	20,8	17,1	3,4	-37,1	-119,4	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	1 531	10,0	Evening	25,05	10,5	13,5	20,5	20,8	17,1	3,4	-37,1	-119,4	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	1 531	10,0	Night	25,05	10,5	13,5	20,5	20,8	17,1	3,4	-37,1	-119,4	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3

Noise sensitive area: E Storeien

WTG			Sound level								Source noise										
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]								LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
1	873	20,0	Day	33,12	12,0	26,2	26,9	28,6	25,7	16,1	-11,1	-80,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	873	20,0	Evening	33,12	12,0	26,2	26,9	28,6	25,7	16,1	-11,1	-80,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	873	20,0	Night	33,12	12,0	26,2	26,9	28,6	25,7	16,1	-11,1	-80,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	809	15,0	Day	33,64	13,3	26,4	27,5	29,0	26,5	17,3	-8,4	-75,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	809	15,0	Evening	33,64	13,3	26,4	27,5	29,0	26,5	17,3	-8,4	-75,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	809	15,0	Night	33,64	13,3	26,4	27,5	29,0	26,5	17,3	-8,4	-75,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	1 060	20,0	Day	30,15	9,6	22,5	24,2	25,7	22,9	12,2	-18,9	-94,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	1 060	20,0	Evening	30,15	9,6	22,5	24,2	25,7	22,9	12,2	-18,9	-94,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	1 060	20,0	Night	30,15	9,6	22,5	24,2	25,7	22,9	12,2	-18,9	-94,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	1 400	9,0	Day	27,78	10,5	19,1	22,9	23,4	19,6	6,5	-31,5	-112,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	1 400	9,0	Evening	27,78	10,5	19,1	22,9	23,4	19,6	6,5	-31,5	-112,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	1 400	9,0	Night	27,78	10,5	19,1	22,9	23,4	19,6	6,5	-31,5	-112,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	1 632	20,0	Day	25,32	6,8	17,9	20,1	20,8	16,8	2,4	-39,7	-121,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	1 632	20,0	Evening	25,32	6,8	17,9	20,1	20,8	16,8	2,4	-39,7	-121,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	1 632	20,0	Night	25,32	6,8	17,9	20,1	20,8	16,8	2,4	-39,7	-121,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	1 716	20,0	Day	25,75	9,4	19,3	20,7	20,8	16,4	1,4	-42,4	-123,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	1 716	20,0	Evening	25,75	9,4	19,3	20,7	20,8	16,4	1,4	-42,4	-123,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	1 716	20,0	Night	25,75	9,4	19,3	20,7	20,8	16,4	1,4	-42,4	-123,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 882	20,0	Day	24,37	6,6	17,7	19,3	19,6	15,0	-1,1	-47,7	-128,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 882	20,0	Evening	24,37	6,6	17,7	19,3	19,6	15,0	-1,1	-47,7	-128,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 882	20,0	Night	24,37	6,6	17,7	19,3	19,6	15,0	-1,1	-47,7	-128,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	2 067	20,0	Day	22,54	5,0	15,8	17,6														

NORD2000 - Details

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Noise sensitive area: F Hamlandsvika

WTG			Sound level								Source noise										
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]								LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
1	3 582	20,0	Day	2,03	-7,7	-0,6	-4,2	-7,9	-17,6	-42,1	-102,9	-154,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	3 582	20,0	Evening	2,03	-7,7	-0,6	-4,2	-7,9	-17,6	-42,1	-102,9	-154,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	3 582	20,0	Night	2,03	-7,7	-0,6	-4,2	-7,9	-17,6	-42,1	-102,9	-154,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	3 307	20,0	Day	-0,47	-10,3	-3,2	-6,4	-11,1	-18,7	-36,2	-95,1	-153,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	3 307	20,0	Evening	-0,47	-10,3	-3,2	-6,4	-11,1	-18,7	-36,2	-95,1	-153,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	3 307	20,0	Night	-0,47	-10,3	-3,2	-6,4	-11,1	-18,7	-36,2	-95,1	-153,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	3 083	20,0	Day	0,51	-9,8	-3,0	-4,7	-8,0	-17,0	-37,7	-92,7	-151,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	3 083	20,0	Evening	0,51	-9,8	-3,0	-4,7	-8,0	-17,0	-37,7	-92,7	-151,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	3 083	20,0	Night	0,51	-9,8	-3,0	-4,7	-8,0	-17,0	-37,7	-92,7	-151,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	2 663	20,0	Day	3,58	-12,5	-3,0	-2,6	-1,3	-3,8	-22,0	-80,6	-152,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	2 663	20,0	Evening	3,58	-12,5	-3,0	-2,6	-1,3	-3,8	-22,0	-80,6	-152,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	2 663	20,0	Night	3,58	-12,5	-3,0	-2,6	-1,3	-3,8	-22,0	-80,6	-152,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	2 414	20,0	Day	2,23	-7,8	-2,4	-2,6	-4,8	-12,5	-34,3	-91,6	-169,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	2 414	20,0	Evening	2,23	-7,8	-2,4	-2,6	-4,8	-12,5	-34,3	-91,6	-169,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	2 414	20,0	Night	2,23	-7,8	-2,4	-2,6	-4,8	-12,5	-34,3	-91,6	-169,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	2 154	20,0	Day	8,04	-5,4	1,4	3,4	3,0	-2,8	-21,9	-74,8	-155,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	2 154	20,0	Evening	8,04	-5,4	1,4	3,4	3,0	-2,8	-21,9	-74,8	-155,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	2 154	20,0	Night	8,04	-5,4	1,4	3,4	3,0	-2,8	-21,9	-74,8	-155,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 884	20,0	Day	23,10	3,4	16,6	17,8	18,4	14,0	-1,8	-48,2	-128,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 884	20,0	Evening	23,10	3,4	16,6	17,8	18,4	14,0	-1,8	-48,2	-128,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 884	20,0	Night	23,10	3,4	16,6	17,8	18,4	14,0	-1,8	-48,2	-128,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	1 614	20,0	Day	24,81	3,8	17,5	19,5	20,3	16,5	2,4	-39,4	-121,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	1 614	20,0	Evening	24,81	3,8	17,5	19,5	20,3	16,5	2,4	-39,4	-121,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	1 614	20,0	Night	24,81	3,8	17,5	19,5	20,3	16,5	2,4	-39,4	-121,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	1 343	20,0	Day	27,00	8,1	19,8	21,3	22,5	19,2	6,8	-30,0	-110,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	1 343	20,0	Evening	27,00	8,1	19,8	21,3	22,5	19,2	6,8	-30,0	-110,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	1 343	20,0	Night	27,00	8,1	19,8	21,3	22,5	19,2	6,8	-30,0	-110,6	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	1 115	20,0	Day	29,05	8,9	21,8	23,1	24,5	21,7	10,8	-21,4	-98,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	1 115	20,0	Evening	29,05	8,9	21,8	23,1	24,5	21,7	10,8	-21,4	-98,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	1 115	20,0	Night	29,05	8,9	21,8	23,1	24,5	21,7	10,8	-21,4	-98,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	845	20,0	Day	31,95	11,2	24,5	25,4	27,5	25,1	16,0	-10,6	-79,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	845	20,0	Evening	31,95	11,2	24,5	25,4	27,5	25,1	16,0	-10,6	-79,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	845	20,0	Night	31,95	11,2	24,5	25,4	27,5	25,1	16,0	-10,6	-79,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	2 085	20,0	Day	12,14	-2,4	8,4	6,6	5,5	-1,5	-21,0	-71,7	-145,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	2 085	20,0	Evening	12,14	-2,4	8,4	6,6	5,5	-1,5	-21,0	-71,7	-145,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	2 085	20,0	Night	12,14	-2,4	8,4	6,6	5,5	-1,5	-21,0	-71,7	-145,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
13	3 781	13,0	Day	-6,05	-14,1	-9,3	-12,3	-16,1	-21,0	-39,8	-104,2	-155,4	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	3 781	13,0	Evening	-6,05	-14,1	-9,3	-12,3	-16,1	-21,0	-39,8	-104,2	-155,4	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	3 781	13,0	Night	-6,05	-14,1	-9,3	-12,3	-16,1	-21,0	-39,8	-104,2	-155,4	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
14	2 860	10,0	Day	-7,67	-15,4	-12,3	-14,6	-16,2	-16,1	-29,3	-85,2	-151,7	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	2 860	10,0	Evening	-7,67	-15,4	-12,3	-14,6	-16,2	-16,1	-29,3	-85,2	-151,7	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	2 860	10,0	Night	-7,67	-15,4	-12,3	-14,6	-16,2	-16,1	-29,3	-85,2	-151,7	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3

Noise sensitive area: G Hamland

WTG			Sound level								Source noise										
No.	Distance	Wind speed at hub height	Variant	Octave data [Hz]								LwA,ref	Octave data [Hz]								
	[m]	[m/s]		63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
1	2 458	20,0	Day	14,37	0,6	6,5	8,7	10,0	6,3	-11,1	-64,4	-137,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	2 458	20,0	Evening	14,37	0,6	6,5	8,7	10,0	6,3	-11,1	-64,4	-137,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	2 458	20,0	Night	14,37	0,6	6,5	8,7	10,0	6,3	-11,1	-64,4	-137,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2 192	20,0	Day	14,78	1,1	6,6	10,5	9,9	5,1	-11,8	-62,3	-139,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2 192	20,0	Evening	14,78	1,1	6,6	10,5	9,9	5,1	-11,8	-62,3	-139,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2 192	20,0	Night	14,78	1,1	6,6	10,5	9,9	5,1	-11,8	-62,3	-139,3	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	2 125	20,0	Day	17,61	2,3	8,5	12,4	13,2	10,0	-5,5	-54,2	-132,8	103,89	85,5</							

NORD2000 - Details

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

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WTG			Sound level								Source noise									
No.	Distance	Wind speed at hub height	Octave data [Hz]								LwA,ref	Octave data [Hz]								
		[m/s]	63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
12	1 139	20,0 Evening	29,25	12,1	20,1	23,8	25,0	21,9	10,7	-22,1	-99,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	1 139	20,0 Night	29,25	12,1	20,1	23,8	25,0	21,9	10,7	-22,1	-99,4	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
13	2 665	13,0 Day	8,69	-3,8	1,1	4,6	3,5	-2,2	-23,4	-82,0	-154,2	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	2 665	13,0 Evening	8,69	-3,8	1,1	4,6	3,5	-2,2	-23,4	-82,0	-154,2	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	2 665	13,0 Night	8,69	-3,8	1,1	4,6	3,5	-2,2	-23,4	-82,0	-154,2	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
14	2 009	10,0 Day	11,09	-0,9	2,9	7,3	5,6	0,5	-17,4	-67,5	-148,3	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	2 009	10,0 Evening	11,09	-0,9	2,9	7,3	5,6	0,5	-17,4	-67,5	-148,3	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	2 009	10,0 Night	11,09	-0,9	2,9	7,3	5,6	0,5	-17,4	-67,5	-148,3	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3

Noise sensitive area: H Myhrvang

WTG			Sound level								Source noise									
No.	Distance	Wind speed at hub height	Octave data [Hz]								LwA,ref	Octave data [Hz]								
		[m/s]	63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000	
1	2 774	20,0 Day	19,14	3,4	13,9	14,1	13,7	7,5	-13,7	-72,9	-141,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	2 774	20,0 Evening	19,14	3,4	13,9	14,1	13,7	7,5	-13,7	-72,9	-141,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
1	2 774	20,0 Night	19,14	3,4	13,9	14,1	13,7	7,5	-13,7	-72,9	-141,8	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2 504	20,0 Day	20,43	4,9	14,8	15,3	15,2	9,6	-10,1	-65,8	-139,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2 504	20,0 Evening	20,43	4,9	14,8	15,3	15,2	9,6	-10,1	-65,8	-139,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
2	2 504	20,0 Night	20,43	4,9	14,8	15,3	15,2	9,6	-10,1	-65,8	-139,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	2 413	20,0 Day	20,77	4,1	14,8	15,8	15,8	10,2	-8,9	-63,4	-138,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	2 413	20,0 Evening	20,77	4,1	14,8	15,8	15,8	10,2	-8,9	-63,4	-138,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
3	2 413	20,0 Night	20,77	4,1	14,8	15,8	15,8	10,2	-8,9	-63,4	-138,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	2 179	20,0 Day	21,92	4,8	15,4	17,0	17,1	12,1	-5,7	-56,9	-134,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	2 179	20,0 Evening	21,92	4,8	15,4	17,0	17,1	12,1	-5,7	-56,9	-134,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
4	2 179	20,0 Night	21,92	4,8	15,4	17,0	17,1	12,1	-5,7	-56,9	-134,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	2 070	20,0 Day	22,53	5,3	15,8	17,6	17,8	13,0	-4,1	-53,6	-132,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	2 070	20,0 Evening	22,53	5,3	15,8	17,6	17,8	13,0	-4,1	-53,6	-132,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
5	2 070	20,0 Night	22,53	5,3	15,8	17,6	17,8	13,0	-4,1	-53,6	-132,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	1 829	9,0 Day	24,55	9,5	15,7	20,2	20,0	15,4	-0,3	-46,0	-127,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	1 829	9,0 Evening	24,55	9,5	15,7	20,2	20,0	15,4	-0,3	-46,0	-127,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
6	1 829	9,0 Night	24,55	9,5	15,7	20,2	20,0	15,4	-0,3	-46,0	-127,0	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 632	9,0 Day	25,55	8,4	18,4	20,5	20,9	16,8	2,4	-39,9	-121,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 632	9,0 Evening	25,55	8,4	18,4	20,5	20,9	16,8	2,4	-39,9	-121,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
7	1 632	9,0 Night	25,55	8,4	18,4	20,5	20,9	16,8	2,4	-39,9	-121,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	1 455	20,0 Day	27,80	9,0	21,6	22,2	23,0	19,0	5,6	-33,4	-115,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	1 455	20,0 Evening	27,80	9,0	21,6	22,2	23,0	19,0	5,6	-33,4	-115,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
8	1 455	20,0 Night	27,80	9,0	21,6	22,2	23,0	19,0	5,6	-33,4	-115,1	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	1 374	9,0 Day	27,51	9,4	20,2	22,1	22,9	19,4	6,6	-30,8	-111,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	1 374	9,0 Evening	27,51	9,4	20,2	22,1	22,9	19,4	6,6	-30,8	-111,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
9	1 374	9,0 Night	27,51	9,4	20,2	22,1	22,9	19,4	6,6	-30,8	-111,9	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	1 192	20,0 Day	28,95	8,3	22,0	22,9	24,5	21,3	9,8	-24,1	-102,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	1 192	20,0 Evening	28,95	8,3	22,0	22,9	24,5	21,3	9,8	-24,1	-102,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
10	1 192	20,0 Night	28,95	8,3	22,0	22,9	24,5	21,3	9,8	-24,1	-102,5	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	1 267	18,0 Day	29,27	10,1	22,5	23,7	24,6	21,0	8,8	-26,5	-106,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	1 267	18,0 Evening	29,27	10,1	22,5	23,7	24,6	21,0	8,8	-26,5	-106,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
11	1 267	18,0 Night	29,27	10,1	22,5	23,7	24,6	21,0	8,8	-26,5	-106,2	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	1 375	20,0 Day	27,26	8,5	19,3	21,9	22,9	19,4	6,7	-30,7	-111,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	1 375	20,0 Evening	27,26	8,5	19,3	21,9	22,9	19,4	6,7	-30,7	-111,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
12	1 375	20,0 Night	27,26	8,5	19,3	21,9	22,9	19,4	6,7	-30,7	-111,7	103,89	85,5	92,5	95,9	98,5	98,3	95,4	90,6	81,1
13	2 983	13,0 Day	17,43	3,2	11,6	12,9	12,0	5,4	-17,0	-78,5	-144,1	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	2 983	13,0 Evening	17,43	3,2	11,6	12,9	12,0	5,4	-17,0	-78,5	-144,1	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
13	2 983	13,0 Night	17,43	3,2	11,6	12,9	12,0	5,4	-17,0	-78,5	-144,1	103,23	84,8	91,8	95,2	97,8	97,6	94,7	89,9	80,4
14	2 278	10,0 Day	19,84	5,9	11,8	15,6	15,0	9,6	-8,8	-61,3	-138,0	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	2 278	10,0 Evening	19,84	5,9	11,8	15,6	15,0	9,6	-8,8	-61,3	-138,0	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3
14	2 278	10,0 Night	19,84	5,9	11,8	15,6	15,0	9,6	-8,8	-61,3	-138,0	102,08	83,7	90,7	94,1	96,7	96,5	93,6	88,8	79,3

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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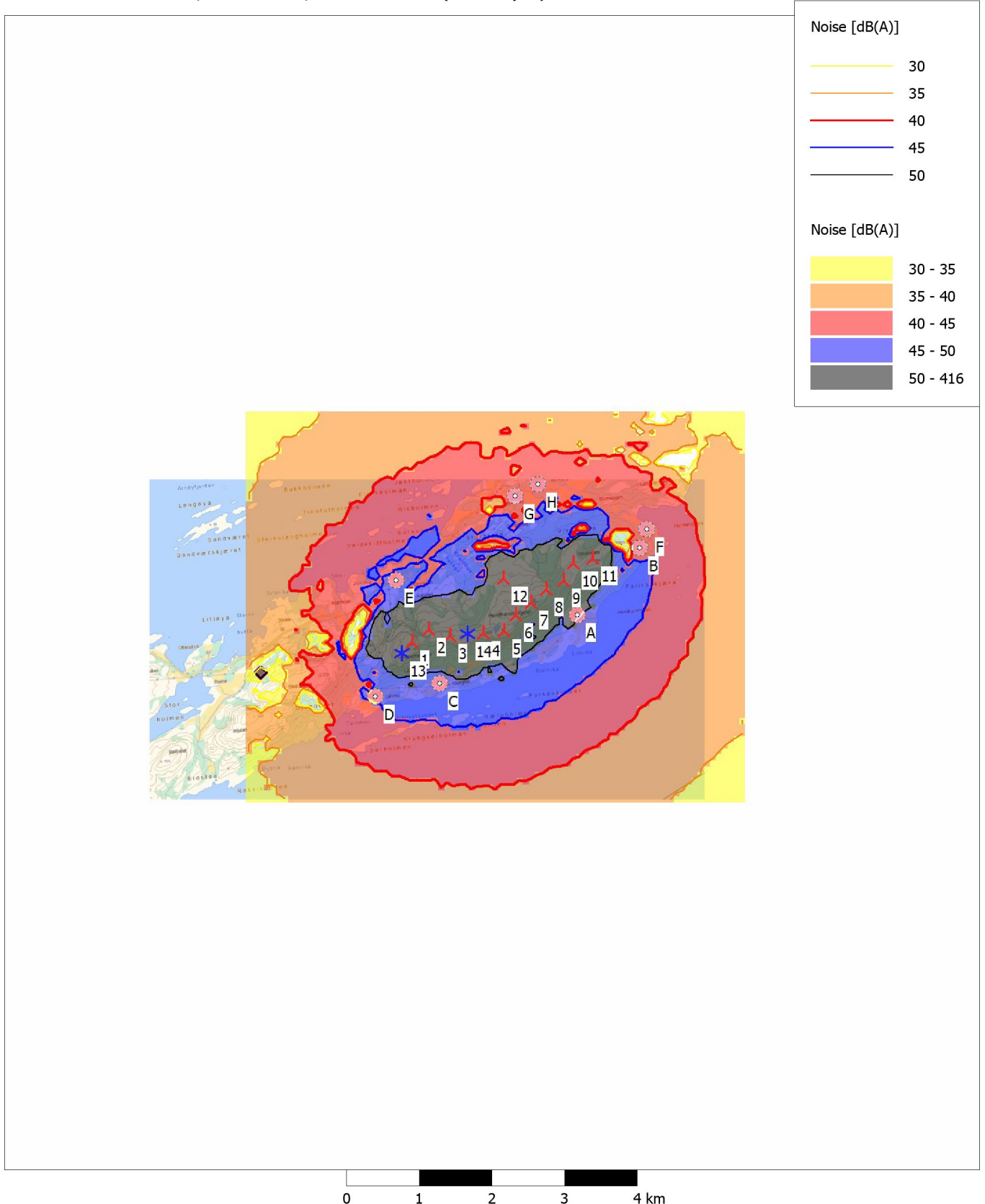
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

19.12.2018 21.51/3.2.737

NORD2000 - Highest noise value

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6



Project:

Hundhammerfjellet Reetablering

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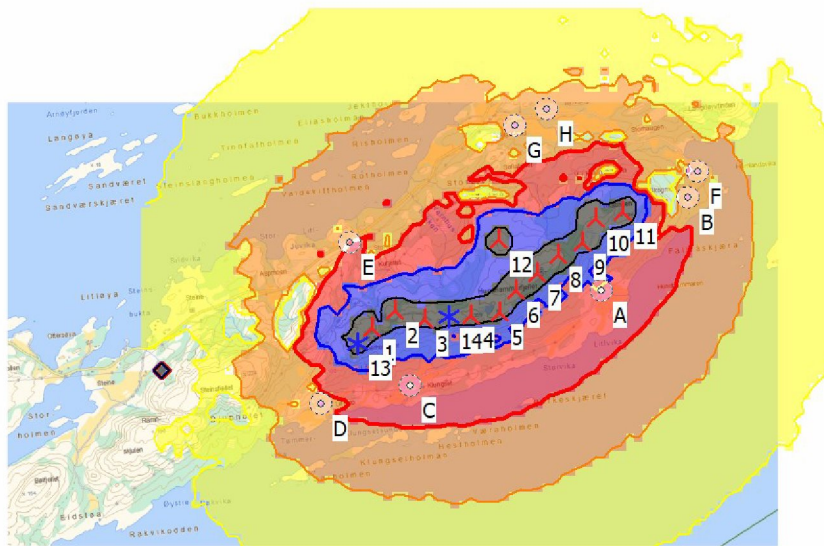
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

19.12.2018 21.51/3.2.737

NORD2000 - Lday


Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6




0 1 2 3 4 km

 New WTG

Map: HHF , Print scale 1:75 000, Map center ETRS 89 Zone: 32 East: 612 860 North: 7 183 682

 Existing WTG

 Noise sensitive area

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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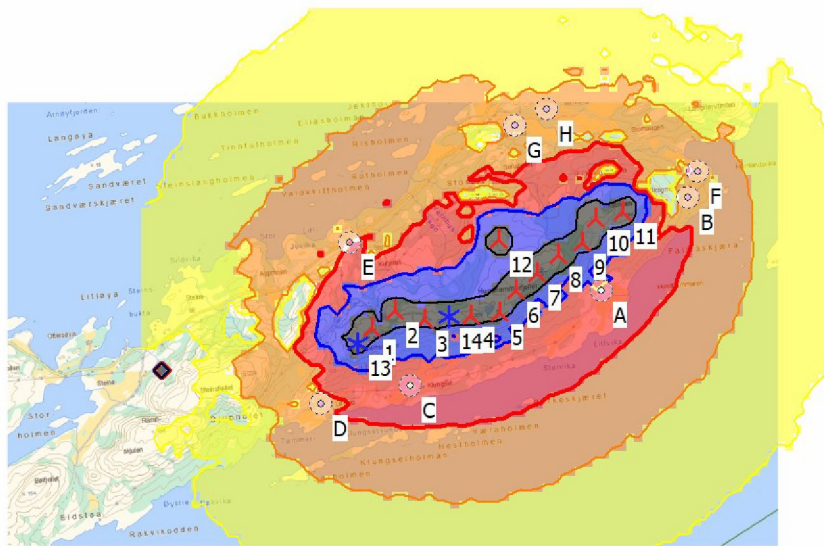
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

19.12.2018 21.51/3.2.737

NORD2000 - Levening

Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6



0 1 2 3 4 km

Map: HHF , Print scale 1:75 000, Map center ETRS 89 Zone: 32 East: 612 860 North: 7 183 682

New WTG

Existing WTG

Noise sensitive area

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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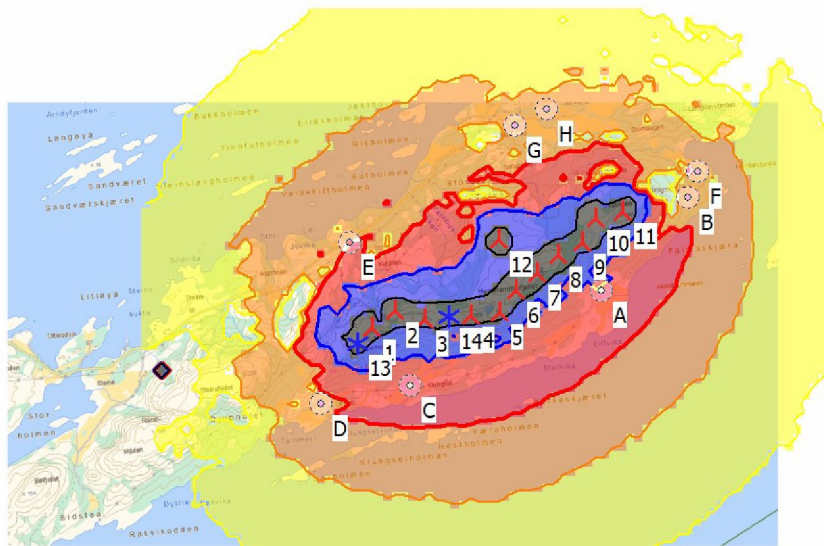
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

19.12.2018 21.51/3.2.737

NORD2000 - Lnight


Calculation: Worst case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6




0 1 2 3 4 km

Map: HHF, Print scale 1:75 000, Map center ETRS 89 Zone: 32 East: 612 860 North: 7 183 682

 New WTG

 Existing WTG

 Noise sensitive area

Project:

Hundhammerfjellet Reetablering

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 Helge Dalbu / helge.dalbu@multiconsult.no
 Calculated:
 16.12.2018 01.08/3.2.737

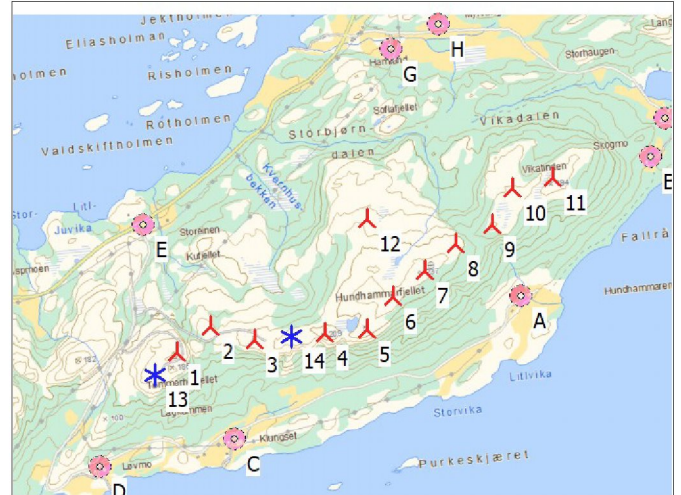
NORD2000 - Main Result

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Assumptions

Weather stability	50,0 %
Relative humidity	15,0 °C
Air temperature	2,0 m
Height for air temperature	Night; Clear sky
Stability parameters	0,0100
Inverse Monin Obukhov length	0,0500
Temperature scale T*	
Terrain	
Elevation based on object	
Height Contours	2013
Roughness based on area object	
Area object (Roughness):	ROUGH_REGIONS_Hundhammerfjellet vindpark_6.w2r (25)
Terrain type based on area object	
Area object (Nord2000):	Terrain hardness
Month for calculation	July
Wind speed criteria	
Uniform wind speed at 10 m agl.	
Wind speed distribution	Målemast.30,00m -
Probability of exceedance	
Wind direction	0,0 ° - 330,0 ° - 30,0 °
Height above ground level for receiver	4,0 m
Wind speed has been extrapolated to calculation height using	
Fixed shear:	0,1300
No stability correction	
Version	5.022

All coordinates are in
 ETRS 89 Zone: 32



Scale 1:50 000
 🚩 New WTG 🌟 Existing WTG 🏠 Noise sensitive area

WTGs

X(East)	Y(North)	Z	Row data/Description	WTG type			Noise data					
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Setting	Creator	Name
1	611 497	7 182 974	178,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
2	611 722	7 183 142	145,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
3	612 015	7 183 056	170,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
4	612 478	7 183 097	205,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
5	612 757	7 183 128	199,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
6	612 927	7 183 340	225,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
7	613 136	7 183 515	234,1 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
8	613 342	7 183 694	199,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
9	613 584	7 183 818	198,3 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
10	613 714	7 184 057	184,6 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
11	613 981	7 184 127	174,1 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
12	612 753	7 183 853	175,0 VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	Day	USER	Mode 0/0-05 (HWO)
										Evening	USER	Mode 0/0-05 (HWO)
										Night	USER	Mode 0/0-05 (HWO)
13	611 350	7 182 825	170,0 M1-E-70 E4 2000 71.0	Yes	ENERCON	E-70 E4-2 000	2 000	71,0	65,0	Day	USER	8m/s, 64m Hub, Man. guaranteed 10/2004
										Evening	USER	8m/s, 64m Hub, Man. guaranteed 10/2004
										Night	USER	8m/s, 64m Hub, Man. guaranteed 10/2004
14	612 257	7 183 083	190,0 M5- E-70 E4 2,3 MW 2300	Yes	ENERCON	E-70 E4 2,3 MW-2 300	2 300	71,0	64,0	Day	EMD	Level 0 - guaranteed - OM II- 02/2006
										Evening	EMD	Level 0 - guaranteed - OM II- 02/2006
										Night	EMD	Level 0 - guaranteed - OM II- 02/2006

Calculation Results

NORD2000 - Main Result**Calculation:** Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6**Sound level****Noise sensitive area**

No.	Name	X(East)	Y(North)	Z [m]	Emission height [m]	Demands Noise [dB(A)]	Sound level L50 [dB(A)]	Demands fulfilled? Noise [dB(A)]
A	Hundhammer	613 769	7 183 346	24,8	4,0	45,0	45,4	No
	A Day						39,0	
	A Evening						39,0	
	A Night						39,0	
B	Skogmo	614 630	7 184 268	28,5	4,0	45,0	36,0	Yes
	B Day						29,6	
	B Evening						29,6	
	B Night						29,6	
C	Klungset	611 877	7 182 400	10,0	4,0	45,0	42,7	Yes
	C Day						36,3	
	C Evening						36,3	
	C Night						36,3	
D	Løvmo	610 992	7 182 219	12,0	4,0	45,0	39,2	Yes
	D Day						32,8	
	D Evening						32,8	
	D Night						32,8	
E	Storeienen	611 279	7 183 819	37,0	4,0	45,0	39,9	Yes
	E Day						33,5	
	E Evening						33,5	
	E Night						33,5	
F	Hamlandsvika	614 727	7 184 523	12,2	4,0	45,0	32,9	Yes
	F Day						26,5	
	F Evening						26,5	
	F Night						26,5	
G	Hamland	612 918	7 184 980	23,2	4,0	45,0	36,4	Yes
	G Day						30,0	
	G Evening						30,0	
	G Night						30,0	
H	Myhrvang	613 225	7 185 144	33,1	4,0	45,0	37,5	Yes
	H Day						31,1	
	H Evening						31,1	
	H Night						31,1	

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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+47 21 58 60 15

Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

16.12.2018 01.08/3.2.737

NORD2000 - Assumptions for NORD2000 calculation

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Assumptions

Weather stability

Relative humidity

50,0 %

Air temperature

15,0 °C

Height for air temperature

2,0 m

Stability parameters

Night;Clear sky

Inverse Monin Obukhov length

0,0100

Temperature scale T*

0,0500

Terrain

Elevation based on object

Height Contours 2013

Roughness based on area object

Area object (Roughness): ROUGH_REGIONS_Hundhammerfjellet vindpark_6.w2r (25)

Terrain type based on area object

Area object (Nord2000): Terrain hardness

Month for calculation

July

Wind speed criteria

Uniform wind speed at 10 m agl.

Wind speed distribution

Målemast.30,00m -

Probability of exceedance

Wind direction

0,0 ° - 330,0 ° - 30,0 °

Height above ground level for receiver

4,0 m

Wind speed has been extrapolated to calculation height using

Fixed shear: 0,1300

No stability correction

Version

5.022

All coordinates are in

ETRS 89 Zone: 32

Setup for Lden calculation

Variant	Name	From hour	To hour	Hours	Penalty [dB]	Days per year
1	Day	7	19	12	0	365
2	Evening	19	23	4	5	365
3	Night	23	7	8	10	365

WTG: VESTAS V136-4.2 4200 136.0 !O!

Noise: Mode 0/0-0S (HWO)

Source	Source/Date	Creator	Edited
0067-7065 V05	21.12.2017	USER	08.06.2018 09.03

Wind speed [m/s]	LwA,ref [dB(A)]
3,0	90,9
4,0	91,1
5,0	92,9
6,0	96,0
7,0	99,6
8,0	102,8
9,0	103,9
10,0	103,9
11,0	103,9
12,0	103,9
13,0	103,9
14,0	103,9
15,0	103,9
16,0	103,9
17,0	103,9
18,0	103,9
19,0	103,9
20,0	103,9

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen
Nedre Skøyen vei 2
NO-0213 Oslo
+47 21 58 60 15
Helge Dalbu / helge.dalbu@multiconsult.no
Calculated:
16.12.2018 01.08/3.2.737

NORD2000 - Assumptions for NORD2000 calculation

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

WTG: ENERCON E-70 E4 2000 71.0 !O!

Noise: 8m/s, 64m Hub, Man. guaranteed 10/2004

Source	Source/Date	Creator	Edited
Enercon	07.10.2004	USER	17.09.2018 14.20

Wind speed [m/s]	LwA,ref [dB(A)]
6,0	91,1
7,0	93,6
8,0	97,4
9,0	99,5
10,0	101,1
11,0	102,2
12,0	102,7
13,0	103,2

Project:

Hundhammerfjellet Reetablering

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Calculated:

16.12.2018 01.08/3.2.737

NORD2000 - Assumptions for NORD2000 calculation

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

WTG: ENERCON E-70 E4 2,3 MW 2300 71.0 !O!

Noise: Level 0 - guaranteed - OM II- 02/2006

Source Source/Date Creator Edited
Enercon 07.10.2004 EMD 12.07.2006 12.26

Noise data corresponding to 95 % production are based on Report WICO 314SEA05/01

Wind speed [m/s]	LwA,ref [dB(A)]
6,0	92,0
7,0	94,6
8,0	98,4
9,0	100,5
10,0	102,1

NSA: Hundhammer-A

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Skogmo-B

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): Use standard value from calculation model

Distance demand: 700,0 m

NSA: Klungset-C

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Løvmo-D

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Storeienen-E

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Hamlandsvika-F

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Hamland-G

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

NSA: Myhrvang-H

Predefined calculation standard: Yellow zone

Imission height(a.g.l.): 4,0 m

Distance demand: 700,0 m

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

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Calculated:

16.12.2018 01.08/3.2.737

NORD2000 - Details

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Calculation Results

Noise sensitive area: A Hundhammer

WTG			Sound level
No.	Distance	Variant	[dB(A)]
	[m]		
1	2 302	Day	-7,99
1	2 302	Evening	-7,99
1	2 302	Night	-7,99
2	2 057	Day	-5,80
2	2 057	Evening	-5,80
2	2 057	Night	-5,80
3	1 778	Day	-4,82
3	1 778	Evening	-4,82
3	1 778	Night	-4,82
4	1 315	Day	22,69
4	1 315	Evening	22,69
4	1 315	Night	22,69
5	1 035	Day	26,51
5	1 035	Evening	26,51
5	1 035	Night	26,51
6	842	Day	27,57
6	842	Evening	27,57
6	842	Night	27,57
7	655	Day	30,06
7	655	Evening	30,06
7	655	Night	30,06
8	551	Day	32,52
8	551	Evening	32,52
8	551	Night	32,52
9	507	Day	33,71
9	507	Evening	33,71
9	507	Night	33,71
10	713	Day	29,29
10	713	Evening	29,29
10	713	Night	29,29
11	809	Day	28,43
11	809	Evening	28,43
11	809	Night	28,43
12	1 136	Day	0,26
12	1 136	Evening	0,26
12	1 136	Night	0,26
13	2 475	Day	-11,81
13	2 475	Evening	-11,81
13	2 475	Night	-11,81
14	1 536	Day	-8,11
14	1 536	Evening	-8,11
14	1 536	Night	-8,11

Noise sensitive area: B Skogmo

WTG			Sound level
No.	Distance	Variant	[dB(A)]
	[m]		
1	3 389	Day	-15,88
1	3 389	Evening	-15,88
1	3 389	Night	-15,88
2	3 118	Day	-14,36
2	3 118	Evening	-14,36
2	3 118	Night	-14,36
3	2 882	Day	-10,90
3	2 882	Evening	-10,90
3	2 882	Night	-10,90
4	2 450	Day	-7,19
4	2 450	Evening	-7,19
4	2 450	Night	-7,19
5	2 192	Day	-3,27
5	2 192	Evening	-3,27
5	2 192	Night	-3,27

To be continued on next page...

NORD2000 - Details**Calculation:** Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

...continued from previous page

WTG		Sound level
No.	Distance Variant	
	[m]	[dB(A)]
6	1 939 Day	-1,46
6	1 939 Evening	-1,46
6	1 939 Night	-1,46
7	1 673 Day	-0,18
7	1 673 Evening	-0,18
7	1 673 Night	-0,18
8	1 410 Day	1,62
8	1 410 Evening	1,62
8	1 410 Night	1,62
9	1 138 Day	9,89
9	1 138 Evening	9,89
9	1 138 Night	9,89
10	940 Day	4,98
10	940 Evening	4,98
10	940 Night	4,98
11	664 Day	29,57
11	664 Evening	29,57
11	664 Night	29,57
12	1 922 Day	-6,99
12	1 922 Evening	-6,99
12	1 922 Night	-6,99
13	3 584 Day	-22,14
13	3 584 Evening	-22,14
13	3 584 Night	-22,14
14	2 653 Day	-13,48
14	2 653 Evening	-13,48
14	2 653 Night	-13,48

Noise sensitive area: C Klungset

WTG		Sound level
No.	Distance Variant	
	[m]	[dB(A)]
1	688 Day	30,60
1	688 Evening	30,60
1	688 Night	30,60
2	758 Day	28,88
2	758 Evening	28,88
2	758 Night	28,88
3	670 Day	29,16
3	670 Evening	29,16
3	670 Night	29,16
4	920 Day	26,78
4	920 Evening	26,78
4	920 Night	26,78
5	1 142 Day	24,54
5	1 142 Evening	24,54
5	1 142 Night	24,54
6	1 409 Day	21,38
6	1 409 Evening	21,38
6	1 409 Night	21,38
7	1 681 Day	14,83
7	1 681 Evening	14,83
7	1 681 Night	14,83
8	1 954 Day	-2,88
8	1 954 Evening	-2,88
8	1 954 Night	-2,88
9	2 219 Day	-5,06
9	2 219 Evening	-5,06
9	2 219 Night	-5,06
10	2 473 Day	-10,01
10	2 473 Evening	-10,01
10	2 473 Night	-10,01
11	2 721 Day	-10,66
11	2 721 Evening	-10,66

To be continued on next page...

Project:

Hundhammerfjellet Reetablering

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Calculated:

16.12.2018 01.08/3.2.737

NORD2000 - Details**Calculation:** Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

...continued from previous page

WTG		Sound level	
No.	Distance [m]	Variant	[dB(A)]
11	2 721	Night	-10,66
12	1 696	Day	-1,82
12	1 696	Evening	-1,82
12	1 696	Night	-1,82
13	677	Day	24,57
13	677	Evening	24,57
13	677	Night	24,57
14	780	Day	25,09
14	780	Evening	25,09
14	780	Night	25,09

Noise sensitive area: D Løvmo

WTG		Sound level	
No.	Distance [m]	Variant	[dB(A)]
1	908	Day	27,32
1	908	Evening	27,32
1	908	Night	27,32
2	1 176	Day	8,79
2	1 176	Evening	8,79
2	1 176	Night	8,79
3	1 321	Day	22,94
3	1 321	Evening	22,94
3	1 321	Night	22,94
4	1 726	Day	20,52
4	1 726	Evening	20,52
4	1 726	Night	20,52
5	1 985	Day	18,71
5	1 985	Evening	18,71
5	1 985	Night	18,71
6	2 236	Day	16,59
6	2 236	Evening	16,59
6	2 236	Night	16,59
7	2 505	Day	12,10
7	2 505	Evening	12,10
7	2 505	Night	12,10
8	2 774	Day	-6,11
8	2 774	Evening	-6,11
8	2 774	Night	-6,11
9	3 045	Day	-13,33
9	3 045	Evening	-13,33
9	3 045	Night	-13,33
10	3 284	Day	-16,23
10	3 284	Evening	-16,23
10	3 284	Night	-16,23
11	3 546	Day	-11,88
11	3 546	Evening	-11,88
11	3 546	Night	-11,88
12	2 402	Day	-9,81
12	2 402	Evening	-9,81
12	2 402	Night	-9,81
13	703	Day	29,34
13	703	Evening	29,34
13	703	Night	29,34
14	1 531	Day	15,90
14	1 531	Evening	15,90
14	1 531	Night	15,90

Noise sensitive area: E Storeien

WTG		Sound level	
No.	Distance [m]	Variant	[dB(A)]
1	873	Day	27,09
1	873	Evening	27,09

To be continued on next page...

NORD2000 - Details**Calculation:** Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

...continued from previous page

WTG		Sound level
No.	Distance Variant	[dB(A)]
	[m]	
1	873 Night	27,09
2	809 Day	28,19
2	809 Evening	28,19
2	809 Night	28,19
3	1 060 Day	24,51
3	1 060 Evening	24,51
3	1 060 Night	24,51
4	1 400 Day	22,31
4	1 400 Evening	22,31
4	1 400 Night	22,31
5	1 632 Day	17,64
5	1 632 Evening	17,64
5	1 632 Night	17,64
6	1 716 Day	18,22
6	1 716 Evening	18,22
6	1 716 Night	18,22
7	1 882 Day	18,03
7	1 882 Evening	18,03
7	1 882 Night	18,03
8	2 067 Day	12,67
8	2 067 Evening	12,67
8	2 067 Night	12,67
9	2 305 Day	7,81
9	2 305 Evening	7,81
9	2 305 Night	7,81
10	2 447 Day	10,14
10	2 447 Evening	10,14
10	2 447 Night	10,14
11	2 720 Day	2,95
11	2 720 Evening	2,95
11	2 720 Night	2,95
12	1 475 Day	21,14
12	1 475 Evening	21,14
12	1 475 Night	21,14
13	997 Day	21,60
13	997 Evening	21,60
13	997 Night	21,60
14	1 224 Day	20,90
14	1 224 Evening	20,90
14	1 224 Night	20,90

Noise sensitive area: F Hamlandsvika

WTG		Sound level
No.	Distance Variant	[dB(A)]
	[m]	
1	3 582 Day	-17,19
1	3 582 Evening	-17,19
1	3 582 Night	-17,19
2	3 307 Day	-16,76
2	3 307 Evening	-16,76
2	3 307 Night	-16,76
3	3 083 Day	-14,55
3	3 083 Evening	-14,55
3	3 083 Night	-14,55
4	2 663 Day	-12,15
4	2 663 Evening	-12,15
4	2 663 Night	-12,15
5	2 414 Day	-10,30
5	2 414 Evening	-10,30
5	2 414 Night	-10,30
6	2 154 Day	-8,53
6	2 154 Evening	-8,53
6	2 154 Night	-8,53
7	1 884 Day	-8,18

To be continued on next page...

NORD2000 - Details**Calculation:** Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

...continued from previous page

WTG		Sound level
No.	Distance Variant	[dB(A)]
	[m]	
7	1 884 Evening	-8,18
7	1 884 Night	-8,18
8	1 614 Day	-6,52
8	1 614 Evening	-6,52
8	1 614 Night	-6,52
9	1 343 Day	-2,18
9	1 343 Evening	-2,18
9	1 343 Night	-2,18
10	1 115 Day	9,10
10	1 115 Evening	9,10
10	1 115 Night	9,10
11	845 Day	26,38
11	845 Evening	26,38
11	845 Night	26,38
12	2 085 Day	-3,03
12	2 085 Evening	-3,03
12	2 085 Night	-3,03
13	3 781 Day	-21,42
13	3 781 Evening	-21,42
13	3 781 Night	-21,42
14	2 860 Day	-15,36
14	2 860 Evening	-15,36
14	2 860 Night	-15,36

Noise sensitive area: G Hamland

WTG		Sound level
No.	Distance Variant	[dB(A)]
	[m]	
1	2 458 Day	-7,85
1	2 458 Evening	-7,85
1	2 458 Night	-7,85
2	2 192 Day	-4,39
2	2 192 Evening	-4,39
2	2 192 Night	-4,39
3	2 125 Day	-4,81
3	2 125 Evening	-4,81
3	2 125 Night	-4,81
4	1 933 Day	7,76
4	1 933 Evening	7,76
4	1 933 Night	7,76
5	1 859 Day	4,39
5	1 859 Evening	4,39
5	1 859 Night	4,39
6	1 640 Day	15,00
6	1 640 Evening	15,00
6	1 640 Night	15,00
7	1 481 Day	20,90
7	1 481 Evening	20,90
7	1 481 Night	20,90
8	1 354 Day	17,91
8	1 354 Evening	17,91
8	1 354 Night	17,91
9	1 339 Day	21,91
9	1 339 Evening	21,91
9	1 339 Night	21,91
10	1 219 Day	23,30
10	1 219 Evening	23,30
10	1 219 Night	23,30
11	1 363 Day	22,61
11	1 363 Evening	22,61
11	1 363 Night	22,61
12	1 139 Day	23,68
12	1 139 Evening	23,68
12	1 139 Night	23,68

To be continued on next page...

NORD2000 - Details

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

...continued from previous page

WTG			Sound level
No.	Distance	Variant	[dB(A)]
	[m]		
13	2 665	Day	-14,96
13	2 665	Evening	-14,96
13	2 665	Night	-14,96
14	2 009	Day	-7,67
14	2 009	Evening	-7,67
14	2 009	Night	-7,67

Noise sensitive area: H Myhrvang

WTG			Sound level
No.	Distance	Variant	[dB(A)]
	[m]		
1	2 774	Day	12,98
1	2 774	Evening	12,98
1	2 774	Night	12,98
2	2 504	Day	13,56
2	2 504	Evening	13,56
2	2 504	Night	13,56
3	2 413	Day	10,45
3	2 413	Evening	10,45
3	2 413	Night	10,45
4	2 179	Day	12,92
4	2 179	Evening	12,92
4	2 179	Night	12,92
5	2 070	Day	17,08
5	2 070	Evening	17,08
5	2 070	Night	17,08
6	1 829	Day	19,37
6	1 829	Evening	19,37
6	1 829	Night	19,37
7	1 632	Day	20,69
7	1 632	Evening	20,69
7	1 632	Night	20,69
8	1 455	Day	22,09
8	1 455	Evening	22,09
8	1 455	Night	22,09
9	1 374	Day	22,70
9	1 374	Evening	22,70
9	1 374	Night	22,70
10	1 192	Day	23,63
10	1 192	Evening	23,63
10	1 192	Night	23,63
11	1 267	Day	23,66
11	1 267	Evening	23,66
11	1 267	Night	23,66
12	1 375	Day	21,67
12	1 375	Evening	21,67
12	1 375	Night	21,67
13	2 983	Day	1,37
13	2 983	Evening	1,37
13	2 983	Night	1,37
14	2 278	Day	2,88
14	2 278	Evening	2,88
14	2 278	Night	2,88

Project:

Hundhammerfjellet Reetablering

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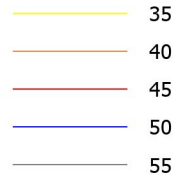
Calculated:

16.12.2018 01.08/3.2.737

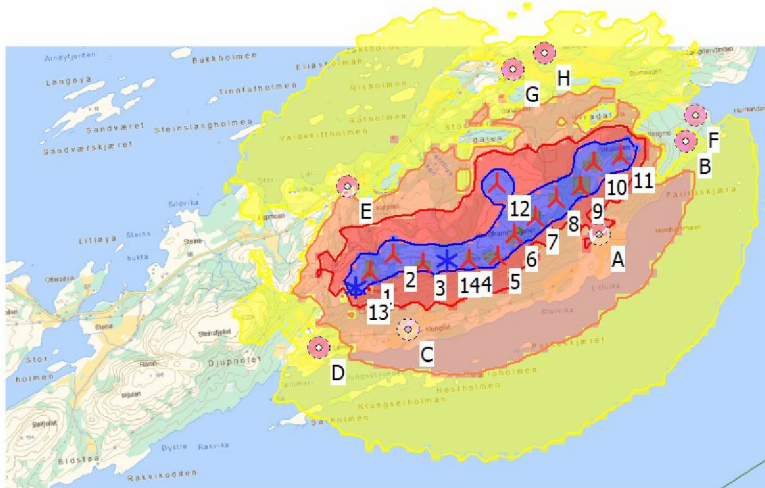
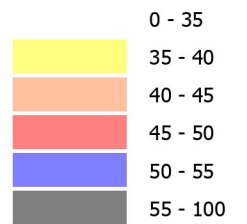
NORD2000 - Aggregated Lden

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6

Noise [dB(A)]



Noise [dB(A)]



Map: HHF , Print scale 1:75 000, Map center ETRS 89 Zone: 32 East: 612 860 North: 7 183 682

New WTG

Existing WTG

Noise sensitive area

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

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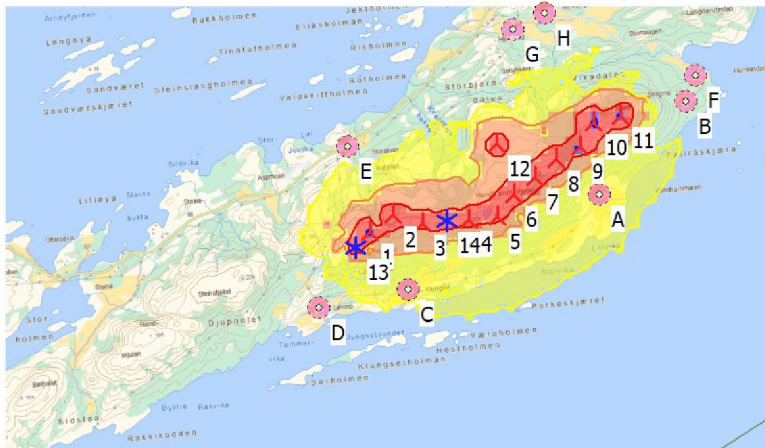
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

16.12.2018 01.08/3.2.737


NORD2000 - Lday


Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6



Map: HHF , Print scale 1:75 000, Map center ETRS 89 Zone: 32 East: 612 860 North: 7 183 682

 New WTG

 Existing WTG

 Noise sensitive area

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

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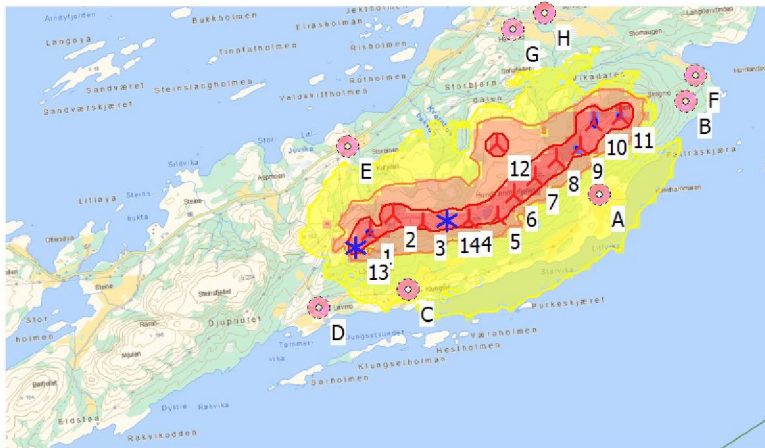
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

16.12.2018 01.08/3.2.737

NORD2000 - Levening

Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6



Map: HHF , Print scale 1:75 000, Map center ETRS 89 Zone: 32 East: 612 860 North: 7 183 682

New WTG

Existing WTG

Noise sensitive area

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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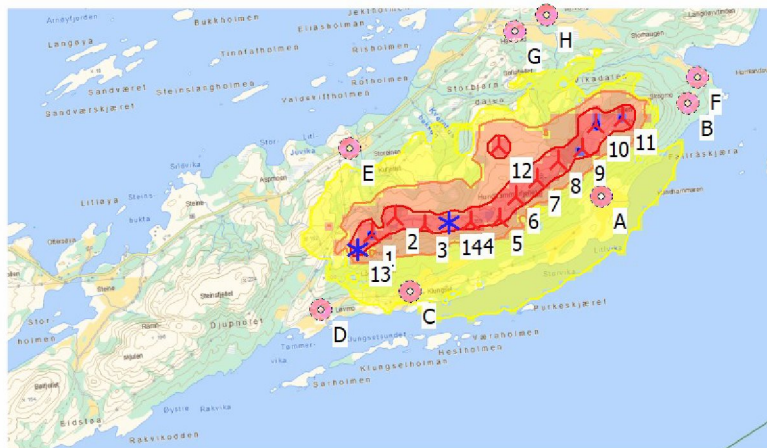
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

16.12.2018 01.08/3.2.737


NORD2000 - Lnight


Calculation: Real case, 12 x V136 4,2MW + 2 x E70 (2.0+2.3) layout v6



Map: HHF , Print scale 1:75 000, Map center ETRS 89 Zone: 32 East: 612 860 North: 7 183 682

 New WTG

 Existing WTG

 Noise sensitive area

SHADOW - Main Result

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6

Assumptions for shadow calculations

Maximum distance for influence

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

Please look in WTG table

Minimum sun height over horizon for influence 3 °

Day step for calculation 1 days

Time step for calculation 1 minutes

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

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: Height Contours 2013

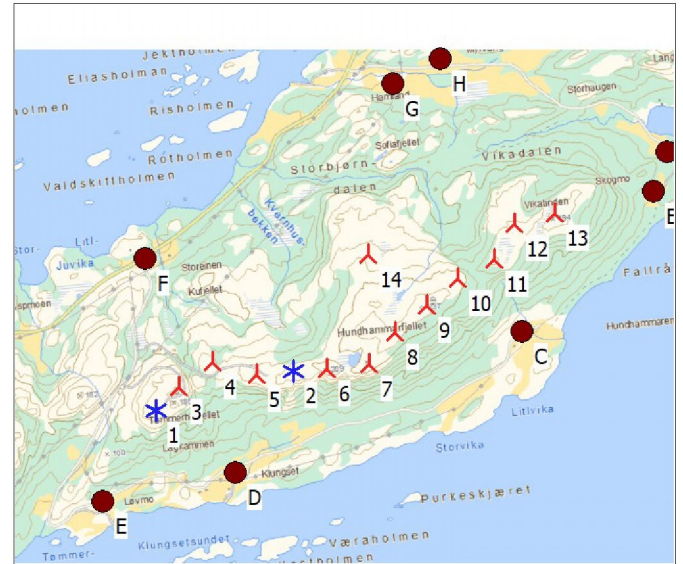
Obstacles used in calculation

Eye height for map: 1,5 m

Grid resolution: 10,0 m

All coordinates are in

ETRS 89 Zone: 32



▲ New WTG

★ Existing WTG

● Shadow receptor

WTGs

	X(East)	Y(North)	Z	Row data/Description	WTG type			Shadow data				
					Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
1	611 350	7 182 825	170,0	M1-E-70 E4 2000 71,0	Yes	ENERCON	E-70 E4-2 000	2 000	71,0	65,0	1 644	20,0
2	612 257	7 183 083	190,0	M5- E-70 E4 2,3 MW 2300	Yes	ENERCON	E-70 E4 2,3 MW-2 300	2 300	71,0	64,0	1 644	20,0
3	611 497	7 182 974	178,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
4	611 722	7 183 142	145,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
5	612 015	7 183 056	170,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
6	612 478	7 183 097	205,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
7	612 757	7 183 128	199,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
8	612 927	7 183 340	225,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
9	613 136	7 183 515	234,1	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
10	613 342	7 183 694	199,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
11	613 584	7 183 818	198,3	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
12	613 714	7 184 057	184,6	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
13	613 981	7 184 127	174,1	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
14	612 753	7 183 853	175,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4

Shadow receptor-Input

No.	Name	X(East)	Y(North)	Z	Width	Height	Elevation	Slope of	Direction mode	Eye height
				[m]	[m]	[m]	a.g.l.	window		(ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	Hamlandsvika	614 724	7 184 531	10,9	2,0	2,0	2,0	90,0	"Green house mode"	4,0
B	Skogmo	614 639	7 184 269	27,7	2,0	2,0	2,0	90,0	"Green house mode"	4,0
C	Hundhammer	613 767	7 183 342	24,9	2,0	2,0	2,0	90,0	"Green house mode"	4,0
D	Klungset	611 876	7 182 409	10,1	2,0	2,0	2,0	90,0	"Green house mode"	4,0
E	Løvmo	610 998	7 182 220	11,2	2,0	2,0	2,0	90,0	"Green house mode"	4,0
F	Storeienen	611 279	7 183 824	36,8	2,0	2,0	2,0	90,0	"Green house mode"	4,0
G	Hamlad	612 913	7 184 983	22,7	2,0	2,0	2,0	90,0	"Green house mode"	4,0
H	Myhrvang	613 230	7 185 147	33,2	2,0	2,0	2,0	90,0	"Green house mode"	4,0

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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Calculated:

20.12.2018 11.11/3.2.737

SHADOW - Main Result**Calculation:** Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Calculation Results**

Shadow receptor

No.	Name	Shadow, worst case		
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Hamlandsvika	36:54	67	0:49
B	Skogmo	60:28	110	0:46
C	Hundhammer	54:24	118	0:38
D	Klungset	2:23	19	0:10
E	Løvmø	30:46	81	0:32
F	Storeienen	98:04	131	1:46
G	Hamlund	72:06	78	1:43
H	Myhrvang	63:22	62	1:51

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

No.	Name	Worst case [h/year]
1	M1-E-70 E4 2000 71.0	5:29
2	M5- E-70 E4 2,3 MW 2300	8:36
3	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (627)	21:57
4	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (628)	25:02
5	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)	27:50
6	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (630)	30:02
7	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (631)	21:57
8	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)	47:42
9	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)	19:10
10	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (634)	20:30
11	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)	41:28
12	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)	55:37
13	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)	81:09
14	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)	33:11

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

SHADOW - Calendar

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6
Shadow receptor: A - Hamlandsvika
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December						
1	10.18	09.03	07.27	06.35	16.58 (13)	04.46	03.01	02.35	04.12	05.52	17.07 (13)	07.21	16.47 (11)	07.59	09.39			
	14.18	15.55	17.29	20.05	47	17.45 (12)	21.41	23.27	00.01	22.28	20.36	13	17.20 (13)	18.47	19	17.06 (11)	15.57	14.28
2	10.17	09.00	07.24	06.31	16.58 (13)	04.42	02.58	02.37	04.15	05.55	17.03 (13)	07.24	16.47 (11)	08.02	09.42			
	14.21	15.58	17.32	20.08	45	17.43 (12)	21.44	23.30	00.00	22.25	20.33	19	17.22 (13)	18.43	17	17.04 (11)	15.54	14.25
3	10.16	08.57	07.20	06.28	16.58 (13)	04.39	02.55	02.39	04.19	05.58	17.00 (13)	07.27	16.49 (11)	08.06	09.45			
	14.23	16.02	17.35	20.11	43	17.41 (12)	21.47	23.33	00.00	22.21	20.29	24	17.24 (13)	18.39	13	17.02 (11)	15.50	14.23
4	10.14	08.53	07.17	06.24	16.58 (13)	04.35	02.52	02.41	04.22	06.01	16.59 (13)	07.30	16.52 (11)	08.09	09.48			
	14.25	16.05	17.38	20.14	39	17.37 (12)	21.51	23.36	00.00	22.18	20.25	26	17.25 (13)	18.36	6	16.58 (11)	15.47	14.21
5	10.13	08.50	07.13	06.20	16.59 (13)	04.31	02.49	02.44	04.25	06.04	16.57 (13)	07.33						
	14.28	16.09	17.41	20.17	33	17.32 (13)	21.54	23.39	00.00	22.14	20.22	29	17.26 (13)	18.32				
6	10.11	08.47	07.10	06.17	16.59 (13)	04.28	02.47	02.47	04.29	06.07	16.56 (13)	07.36						
	14.30	16.12	17.45	20.20	31	17.30 (13)	21.58	23.42	00.00	22.10	20.18	31	17.27 (13)	18.28				
7	10.09	08.44	07.06	06.13	17.00 (13)	04.24	02.44	02.49	04.32	06.10	16.54 (13)	07.39						
	14.33	16.16	17.48	20.23	29	17.29 (13)	22.01	23.45	00.00	22.07	20.14	33	17.27 (13)	18.25				
8	10.08	08.40	07.02	06.10	17.01 (13)	04.21	02.42	02.52	04.35	06.13	16.53 (13)	07.43						
	14.36	16.19	17.51	20.26	27	17.28 (13)	22.05	23.48	00.00	22.03	20.11	38	17.31 (12)	18.21				
9	10.06	08.37	06.59	06.06	17.02 (13)	04.17	02.39	02.55	04.39	06.16	16.52 (13)	07.46						
	14.38	16.22	17.54	20.30	24	17.26 (13)	22.08	23.50	00.00	22.00	20.07	42	17.34 (12)	18.18				
10	10.04	08.34	06.55	06.02	16.23 (11)	20.33	19	17.05 (13)	04.14	02.37	02.58	04.42	06.19	16.51 (13)	07.49			
	14.41	16.26	17.57	10	16.23 (11)	20.33	19	17.24 (13)	22.11	23.53	23.39	21.56	20.03	45	17.36 (12)	18.14		
11	10.01	08.30	06.52	06.10 (11)	05.59	17.08 (13)	04.10	02.35	03.01	04.45	06.22	16.51 (13)	07.52	16.51 (13)	08.07			
	14.44	16.29	18.00	15	16.25 (11)	20.36	12	17.20 (13)	22.15	23.55	23.37	21.53	20.00	46	17.37 (12)	18.11		
12	09.59	08.27	06.48	06.08 (11)	05.55		04.07	02.33	03.04	04.49	06.25	16.50 (13)	07.55	16.50 (13)	08.01			
	14.47	16.33	18.03	18	16.26 (11)	20.39		22.18	23.58	23.34	21.49	19.56	48	17.38 (12)	18.07			
13	09.57	08.23	06.44	06.07 (11)	05.51		04.03	02.31	03.08	04.52	06.28	16.50 (13)	07.58	16.50 (13)	08.01			
	14.50	16.36	18.06	20	16.27 (11)	20.42		22.22	00.00	23.31	21.45	19.52	48	17.38 (12)	18.03			
14	09.55	08.20	06.41	06.06 (11)	05.48		04.00	02.30	03.11	04.55	06.31	16.50 (13)	08.01	16.50 (13)	08.04			
	14.53	16.39	18.10	22	16.28 (11)	20.45		22.25	00.02	23.28	21.42	19.49	49	17.39 (12)	18.00			
15	09.52	08.17	06.37	06.05 (11)	05.44		03.56	02.28	03.14	04.58	06.34	16.50 (13)	08.04	16.50 (13)	08.07			
	14.57	16.43	18.13	22	16.27 (11)	20.48		22.29	00.03	23.25	21.38	19.45	49	17.39 (12)	17.56			
16	09.50	08.13	06.34	06.04 (11)	05.40		03.53	02.27	03.17	05.02	06.37	16.50 (13)	08.07	16.50 (13)	08.07			
	15.00	16.46	18.16	23	16.27 (11)	20.52		22.32	00.05	23.22	21.35	19.41	47	17.37 (12)	17.53			
17	09.47	08.10	06.30	06.04 (11)	05.37		03.49	02.26	03.21	05.05	06.40	16.50 (13)	08.10	16.50 (13)	08.10			
	15.03	16.50	18.19	24	16.28 (11)	20.55		22.36	00.06	23.19	21.31	19.38	47	17.37 (12)	17.49			
18	09.44	08.06	06.26	06.04 (11)	05.33		03.46	02.25	03.24	05.08	06.43	16.51 (13)	08.13	16.51 (13)	08.13			
	15.06	16.53	18.22	23	16.27 (11)	20.58		22.39	00.07	23.15	21.27	19.34	46	17.37 (12)	17.46			
19	09.42	08.03	06.23	06.04 (11)	05.29		03.42	02.24	03.27	05.11	06.46	16.51 (13)	08.17	16.51 (13)	08.17			
	15.10	16.56	18.25	34	16.43 (12)	21.01		22.43	00.08	23.12	21.24	19.30	45	17.36 (12)	17.42			
20	09.39	07.59	06.19	06.05 (11)	05.26		03.39	02.24	03.31	05.15	06.49	16.53 (13)	08.20	16.53 (13)	08.20			
	15.13	16.59	18.28	37	16.46 (12)	21.04		22.46	00.09	23.09	21.20	19.27	42	17.35 (12)	17.39			
21	09.36	07.56	06.15	06.06 (11)	05.22		03.36	02.24	03.34	05.18	06.52	16.53 (11)	08.23	16.53 (11)	08.23			
	15.17	17.03	18.31	40	16.47 (12)	21.08		22.50	00.09	23.06	21.16	19.23	41	17.34 (12)	17.35			
22	09.33	07.52	06.12	06.07 (11)	05.18		03.32	02.24	03.37	05.21	06.55	16.51 (11)	08.26	16.51 (11)	08.26			
	15.20	17.06	18.34	41	16.48 (12)	21.11		22.53	00.09	23.02	21.13	19.19	41	17.32 (12)	17.32			
23	09.31	07.49	06.08	06.07 (13)	05.15		03.29	02.24	03.41	05.24	06.58	16.50 (11)	08.29	16.50 (11)	08.29			
	15.23	17.09	18.37	42	16.49 (12)	21.14		22.57	00.09	22.59	21.09	19.16	38	17.31 (12)	17.28			
24	09.28	07.45	06.04	06.05 (13)	05.11		03.26	02.25	03.44	05.27	07.01	16.48 (11)	08.33	16.48 (11)	08.33			
	15.27	17.13	18.40	44	16.49 (12)	21.17		23.00	00.09	22.56	21.05	19.12	35	17.28 (12)	17.25			
25	09.25	07.42	06.01	06.03 (13)	05.07		03.23	02.25	03.48	05.30	07.04	16.47 (11)	07.36	16.47 (11)	07.36			
	15.30	17.16	18.43	46	16.49 (12)	21.21		23.04	00.08	22.52	21.02	19.08	29	17.24 (12)	16.21			
26	09.22	07.38	05.57	06.02 (13)	05.04		03.19	02.26	03.51	05.33	07.07	16.47 (11)	07.39	16.47 (11)	07.39			
	15.34	17.19	18.46	47	16.49 (12)	21.24		23.07	00.08	22.49	20.58	19.05	23	17.10 (11)	16.18			
27	09.19	07.35	05.53	06.01 (13)	05.00		03.16	02.28	03.55	05.37	07.09	16.46 (11)	07.42	16.46 (11)	07.42			
	15.37	17.22	18.49	48	16.49 (12)	21.27		23.10	00.07	22.45	20.54	19.01	23	17.09 (11)	16.14			
28	09.16	07.31	05.50	06.00 (13)	04.57		03.13	02.29	03.58	05.40	07.12	16.46 (11)	07.46	16.46 (11)	07.46			
	15.41	17.26	18.52	48	16.48 (12)	21.31		23.14	00.05	22.42	20.51	18.57	23	17.09 (11)	16.11			
29	09.13	07.26	05.46	06.00 (13)	04.53		03.10	02.31	04.01	05.43	07.15	16.46 (11)	07.49	16.46 (11)	07.49			
	15.44	17.21	18.48	48	17.48 (12)	21.34		23.17	00.04	22.39	20.47	18.54	22	17.08 (11)	16.07			
30	09.09	07.21	05.42	06.00 (13)	04.49		03.07	02.33	04.05	05.46	07.18	16.46 (11)	07.52	16.46 (11)	07.52			
	15.48	17.16	18.43	48	17.47 (12)	21.37		23.20	00.03	22.35	20.44	18.50	21	17.07 (11)	16.04			
31	09.06	07.16	05.39	06.00 (13)	04.43		03.04	02.30	04.08	05.49	07.16	16.46 (11)	07.5					

SHADOW - Calendar

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Shadow receptor:** B - Skogmo

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March		April		May		June	
1	10.18	09.03	07.27		06.35		17.30 (11)	04.46	17.41 (13)	03.01
	14.19	15.55	17.29		20.05	25	18.16 (12)	21.41	18.23 (13)	23.27
2	10.17	09.00	07.24		06.31		17.31 (11)	04.42	17.42 (13)	02.58
	14.21	15.58	17.32		20.08	34	18.21 (12)	21.44	18.22 (13)	23.30
3	10.16	08.57	07.20		06.28		17.33 (11)	04.39	17.43 (13)	02.55
	14.23	16.02	17.35		20.11	36	18.24 (12)	21.47	18.22 (13)	23.33
4	10.14	08.53	07.17		06.24		17.34 (11)	04.35	17.43 (13)	02.52
	14.25	16.05	17.38		20.14	36	18.25 (12)	21.51	18.21 (13)	23.36
5	10.13	08.50	07.13		06.21		17.39 (11)	04.32	17.44 (13)	02.50
	14.28	16.09	17.41		20.17	30	18.27 (12)	21.54	18.20 (13)	23.39
6	10.11	08.47	07.10		06.17		17.59 (12)	04.28	17.46 (13)	02.47
	14.30	16.12	17.45		20.20	28	18.27 (12)	21.58	18.20 (13)	23.42
7	10.09	08.44	07.06		06.13		17.58 (12)	04.24	17.47 (13)	02.44
	14.33	16.16	17.48		20.23	29	18.27 (12)	22.01	18.18 (13)	23.45
8	10.08	08.40	07.02		06.10		17.57 (12)	04.21	17.48 (13)	02.42
	14.36	16.19	17.51		20.26	31	18.28 (12)	22.05	18.17 (13)	23.48
9	10.06	08.37	06.59		06.06		17.56 (12)	04.17	17.50 (13)	02.40
	14.38	16.22	17.54		20.30	32	18.28 (12)	22.08	18.16 (13)	23.50
10	10.04	08.34	06.55		06.02		17.56 (12)	04.14	17.52 (13)	02.37
	14.41	16.26	17.57		20.33	32	18.28 (12)	22.11	18.14 (13)	23.53
11	10.01	08.30	06.52		05.59		17.55 (13)	04.10	17.54 (13)	02.35
	14.44	16.29	18.00		20.36	33	18.28 (12)	22.15	18.12 (13)	23.55
12	09.59	08.27	06.48		05.55		17.52 (13)	04.07	17.57 (13)	02.33
	14.47	16.33	18.03		20.39	36	18.28 (12)	22.18	18.08 (13)	23.58
13	09.57	08.23	06.44		05.51		17.50 (13)	04.03		02.31
	14.50	16.36	18.06		20.42	37	18.27 (12)	22.22		00.00
14	09.55	08.20	06.41		05.48		17.48 (13)	04.00		02.30
	14.54	16.39	18.10		20.45	39	18.27 (12)	22.25		00.02
15	09.52	08.17	06.37		05.44		17.46 (13)	03.56		02.28
	14.57	16.43	18.13		20.48	40	18.26 (12)	22.29		00.03
16	09.50	08.13	06.34		05.40		17.46 (13)	03.53		02.27
	15.00	16.46	18.16		20.52	40	18.26 (12)	22.32		00.05
17	09.47	08.10	06.30		05.37		17.45 (13)	03.49		02.26
	15.03	16.50	18.19		20.55	40	18.25 (13)	22.36		00.06
18	09.44	08.06	06.26		05.33		17.43 (13)	03.46		02.25
	15.07	16.53	18.22		20.58	42	18.25 (13)	22.39		00.07
19	09.42	08.03	06.23		05.29		17.43 (13)	03.43		02.24
	15.10	16.56	18.25		21.01	42	18.25 (13)	22.43		00.08
20	09.39	07.59	06.19		16.39 (11)		17.42 (13)	03.39		02.24
	15.13	17.00	18.28	12	16.51 (11)		18.25 (13)	22.46		00.09
21	09.36	07.56	06.15		16.36 (11)		17.41 (13)	03.36		02.24
	15.17	17.03	18.31	17	16.53 (11)		18.26 (13)	22.50		00.09
22	09.33	07.52	06.12		16.34 (11)		17.41 (13)	03.32		02.24
	15.20	17.06	18.34	20	16.54 (11)		18.26 (13)	22.53		00.09
23	09.31	07.49	06.08		16.33 (11)		17.40 (13)	03.29		02.24
	15.23	17.09	18.37	23	16.56 (11)		18.25 (13)	22.57		00.09
24	09.28	07.45	06.04		16.32 (11)		17.40 (13)	03.26		02.25
	15.27	17.13	18.40	24	16.56 (11)		18.26 (13)	23.00		00.09
25	09.25	07.42	06.01		16.30 (11)		17.40 (13)	03.23		02.26
	15.30	17.16	18.43	26	16.56 (11)		18.26 (13)	23.04		00.08
26	09.22	07.38	05.57		16.30 (11)		17.40 (13)	03.19		02.27
	15.34	17.19	18.46	27	16.57 (11)		18.25 (13)	23.07		00.08
27	09.19	07.35	05.53		16.29 (11)		17.40 (13)	03.16		02.28
	15.37	17.22	18.49	27	16.56 (11)		18.25 (13)	23.10		00.07
28	09.16	07.31	05.50		16.29 (11)		17.40 (13)	03.13		02.29
	15.41	17.26	18.52	27	16.56 (11)		18.25 (13)	23.14		00.05
29	09.13		06.46		17.29 (11)		17.41 (13)	03.10		02.31
	15.44		19.56	27	17.56 (11)		18.25 (13)	23.17		00.04
30	09.09		06.42		17.29 (11)		17.41 (13)	03.07		02.33
	15.48		19.59	26	17.55 (11)		18.24 (13)	23.20		00.02
31	09.06		06.39		17.30 (11)			03.04		
	15.51		20.02	25	17.55 (11)			23.24		
Potential sun hours	163	235	363		454		578		641	
Total, worst case			281		1154		366			

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

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

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Shadow receptor:** B - Skogmo

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December		
1	02.35	04.12	18.06 (13)	05.52	17.55 (13)	07.21	07.59	09.39
	00.01	22.28	15 18.21 (13)	20.36	33 18.28 (12)	18.47	15.57	14.28
2	02.37	04.15	18.03 (13)	05.55	17.54 (12)	07.24	08.02	09.42
	23.59	22.25	19 18.22 (13)	20.33	32 18.26 (12)	18.43	15.54	14.26
3	02.39	04.19	18.01 (13)	05.58	17.54 (12)	07.27	08.06	09.45
	23.57	22.21	24 18.25 (13)	20.29	32 18.26 (12)	18.39	15.50	14.23
4	02.41	04.22	17.59 (13)	06.01	17.54 (12)	07.30	08.09	09.48
	23.55	22.17	27 18.26 (13)	20.25	31 18.25 (12)	18.36	15.47	14.21
5	02.44	04.25	17.58 (13)	06.04	17.55 (12)	07.33	08.12	09.51
	23.52	22.14	30 18.28 (13)	20.22	29 18.24 (12)	18.32	15.44	14.19
6	02.47	04.29	17.56 (13)	06.07	17.55 (12)	07.36	08.16	09.53
	23.50	22.10	33 18.29 (13)	20.18	28 18.23 (12)	18.29	15.40	14.17
7	02.49	04.32	17.54 (13)	06.10	17.35 (11)	07.39	08.19	09.56
	23.47	22.07	35 18.29 (13)	20.14	28 18.22 (12)	18.25	15.37	14.16
8	02.52	04.35	17.53 (13)	06.13	17.29 (11)	07.43	08.22	09.58
	23.45	22.03	37 18.30 (13)	20.11	36 18.20 (12)	18.21	15.34	14.14
9	02.55	04.39	17.52 (13)	06.16	17.26 (11)	07.46	08.26	10.01
	23.42	22.00	39 18.31 (13)	20.07	36 18.17 (12)	18.18	15.31	14.13
10	02.58	04.42	17.51 (13)	06.19	17.24 (11)	07.49	08.29	10.03
	23.39	21.56	40 18.31 (13)	20.03	36 18.15 (12)	18.14	15.27	14.11
11	03.01	04.45	17.51 (13)	06.22	17.23 (11)	07.52	08.33	10.05
	23.37	21.53	41 18.32 (13)	20.00	27 18.10 (12)	18.11	15.24	14.10
12	03.04	04.49	17.50 (13)	06.25	17.22 (11)	07.55	08.36	10.08
	23.34	21.49	42 18.32 (13)	19.56	24 17.46 (11)	18.07	15.21	14.09
13	03.08	04.52	17.48 (13)	06.28	17.21 (11)	07.58	08.39	10.10
	23.31	21.45	44 18.32 (13)	19.52	25 17.46 (11)	18.03	15.18	14.08
14	03.11	04.55	17.48 (13)	06.31	17.20 (11)	08.01	08.43	10.11
	23.28	21.42	44 18.32 (13)	19.49	26 17.46 (11)	18.00	15.15	14.07
15	03.14	04.58	17.48 (13)	06.34	17.19 (11)	08.04	08.46	10.13
	23.25	21.38	44 18.32 (13)	19.45	27 17.46 (11)	17.56	15.12	14.06
16	03.17	05.02	17.47 (13)	06.37	17.18 (11)	08.07	08.50	10.15
	23.22	21.35	45 18.32 (13)	19.41	27 17.45 (11)	17.53	15.08	14.05
17	03.21	05.05	17.47 (13)	06.40	17.18 (11)	08.10	08.53	10.16
	23.18	21.31	45 18.32 (13)	19.38	27 17.45 (11)	17.49	15.05	14.05
18	03.24	05.08	17.47 (13)	06.43	17.18 (11)	08.13	08.56	10.17
	23.15	21.27	45 18.32 (13)	19.34	26 17.44 (11)	17.46	15.02	14.05
19	03.27	05.11	17.47 (13)	06.46	17.18 (11)	08.17	09.00	10.19
	23.12	21.24	45 18.32 (13)	19.30	25 17.43 (11)	17.42	14.59	14.05
20	03.31	05.15	17.46 (13)	06.49	17.19 (11)	08.20	09.03	10.19
	23.09	21.20	45 18.31 (13)	19.27	23 17.42 (11)	17.39	14.57	14.05
21	03.34	05.18	17.46 (13)	06.52	17.20 (11)	08.23	09.07	10.20
	23.06	21.16	45 18.31 (13)	19.23	21 17.41 (11)	17.35	14.54	14.05
22	03.38	05.21	17.46 (13)	06.55	17.21 (11)	08.26	09.10	10.21
	23.02	21.13	44 18.30 (13)	19.19	18 17.39 (11)	17.32	14.51	14.05
23	03.41	05.24	17.46 (13)	06.58	17.22 (11)	08.29	09.13	10.21
	22.59	21.09	44 18.30 (13)	19.16	14 17.36 (11)	17.28	14.48	14.06
24	03.44	05.27	17.47 (13)	07.01	17.26 (11)	08.33	09.17	10.22
	22.56	21.05	42 18.29 (13)	19.12	6 17.32 (11)	17.25	14.45	14.06
25	03.48	05.30	17.47 (13)	07.04		07.36	09.20	10.22
	22.52	21.02	41 18.28 (13)	19.08		16.21	14.43	14.07
26	03.51	05.33	17.47 (13)	07.07		07.39	09.23	10.22
	22.49	20.58	40 18.27 (12)	19.05		16.18	14.40	14.08
27	03.55	05.37	17.47 (13)	07.09		07.42	09.26	10.22
	22.45	20.54	40 18.27 (12)	19.01		16.14	14.37	14.10
28	03.58	05.40	17.48 (13)	07.12		07.46	09.30	10.21
	22.42	20.51	40 18.28 (12)	18.57		16.11	14.35	14.11
29	04.02	05.43	17.49 (13)	07.15		07.49	09.33	10.21
	22.38	20.47	39 18.28 (12)	18.54		16.07	14.32	14.13
30	04.05	05.46	17.51 (13)	07.18		07.52	09.36	10.20
	22.35	20.44	37 18.28 (12)	18.50		16.04	14.30	14.14
31	04.08	18.12 (13)	05.49	17.52 (13)		07.55		10.19
	22.32	3 18.15 (13)	20.40	36 18.28 (12)		16.00		14.16
Potential sun hours	621	513	394	637	302	192	125	
Total, worst case	3	1187	637					

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

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

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **Shadow receptor:** C - Hundhammer
Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	
1	10.18	09.03	07.28	06.35	18.20 (6)	04.46	18.31 (8) 03.01
	14.19	15.55	17.29	20.05	15 18.35 (6)	21.41	28 18.59 (8) 23.27
2	10.17	09.00	07.24	06.32	18.18 (6)	04.42	18.29 (8) 02.58
	14.21	15.58	17.32	20.08	18 18.36 (6)	21.44	30 18.59 (8) 23.30
3	10.16	08.57	07.20	06.28	18.12 (7)	04.39	18.28 (8) 02.55
	14.23	16.02	17.35	20.11	25 18.37 (6)	21.47	32 19.00 (8) 23.33
4	10.14	08.53	07.17	06.24	18.09 (7)	04.35	18.28 (8) 02.52
	14.25	16.05	17.38	20.14	28 18.37 (6)	21.51	33 19.01 (8) 23.36
5	10.13	08.50	07.13	06.21	18.07 (7)	04.32	18.27 (8) 02.50
	14.28	16.09	17.42	20.17	31 18.38 (6)	21.54	34 19.01 (8) 23.39
6	10.11	08.47	07.10	06.17	18.05 (7)	04.28	18.26 (8) 02.47
	14.30	16.12	17.45	20.20	33 18.38 (6)	21.58	36 19.02 (8) 23.42
7	10.09	08.44	07.06	06.13	18.04 (7)	04.25	18.26 (8) 02.45
	14.33	16.16	17.48	20.23	34 18.38 (6)	22.01	36 19.02 (8) 23.45
8	10.07	08.40	07.02	06.10	18.03 (7)	04.21	18.26 (8) 02.42
	14.36	16.19	17.51	20.27	34 18.37 (6)	22.05	36 19.02 (8) 23.48
9	10.06	08.37	06.59	06.06	18.02 (7)	04.17	18.26 (8) 02.40
	14.39	16.23	17.54	20.30	35 18.37 (6)	22.08	36 19.02 (8) 23.50
10	10.03	08.34	06.55	06.02	18.01 (7)	04.14	18.25 (8) 02.38
	14.42	16.26	17.57	20.33	35 18.36 (6)	22.11	38 19.03 (8) 23.53
11	10.01	08.30	06.52	05.59	18.00 (7)	04.10	18.25 (8) 02.36
	14.44	16.29	18.00	20.36	34 18.34 (6)	22.15	37 19.02 (8) 23.55
12	09.59	08.27	06.48	05.55	18.00 (7)	04.07	18.25 (8) 02.34
	14.47	16.33	18.03	20.39	33 18.33 (6)	22.18	37 19.02 (8) 23.57
13	09.57	08.23	06.44	05.51	18.01 (7)	04.03	18.26 (8) 02.32
	14.51	16.36	18.07	20.42	31 18.32 (6)	22.22	37 19.03 (8) 23.59
14	09.55	08.20	06.41	05.48	18.00 (7)	04.00	18.26 (8) 02.30
	14.54	16.40	18.10	20.45	30 18.30 (7)	22.25	37 19.03 (8) 00.01
15	09.52	08.17	06.37	05.44	18.01 (7)	03.56	18.26 (8) 02.29
	14.57	16.43	18.13	20.49	28 18.29 (7)	22.29	36 19.02 (8) 00.03
16	09.50	08.13	06.34	05.40	18.01 (7)	03.53	18.26 (8) 02.27
	15.00	16.46	18.16	20.52	27 18.28 (7)	22.32	36 19.02 (8) 00.05
17	09.47	08.10	06.30	05.37	18.01 (7)	03.50	18.27 (8) 02.26
	15.03	16.50	18.19	20.55	27 18.28 (7)	22.36	35 19.02 (8) 00.06
18	09.44	08.06	06.26	05.33	18.02 (7)	03.46	18.27 (8) 02.25
	15.07	16.53	18.22	20.58	24 18.26 (7)	22.39	34 19.01 (8) 00.07
19	09.42	08.03	06.23	05.29	18.03 (7)	03.43	18.27 (8) 02.25
	15.10	16.56	18.25	21.01	22 18.25 (7)	22.43	34 19.01 (8) 00.08
20	09.39	07.59	06.19	05.26	18.05 (7)	03.39	18.29 (8) 02.24
	15.13	17.00	18.28	21.05	19 18.24 (7)	22.46	32 19.01 (8) 00.09
21	09.36	07.56	06.15	05.22	18.06 (7)	03.36	18.29 (8) 02.24
	15.17	17.03	18.31	21.08	15 18.21 (7)	22.50	31 19.00 (8) 00.09
22	09.33	07.52	06.12	05.19	18.10 (7)	03.33	18.30 (8) 02.24
	15.20	17.06	18.34	21.11	7 18.17 (7)	22.53	30 19.00 (8) 00.09
23	09.31	07.49	06.08	05.15		03.29	18.31 (8) 02.25
	15.24	17.09	18.37	21.14		22.57	29 19.00 (8) 00.09
24	09.28	07.45	06.04	05.11		03.26	18.31 (8) 02.25
	15.27	17.13	18.40	21.18		23.00	27 18.58 (8) 00.09
25	09.25	07.42	06.01	05.08		03.23	18.33 (8) 02.26
	15.30	17.16	18.43	21.21		23.03	25 18.58 (8) 00.08
26	09.22	07.38	05.57	05.04		03.20	18.34 (8) 02.27
	15.34	17.19	18.46	21.24		23.07	24 18.58 (8) 00.07
27	09.19	07.35	05.54	05.00	18.38 (8)	03.16	18.35 (8) 02.28
	15.37	17.22	18.49	21.27	13 18.51 (8)	23.10	22 18.57 (8) 00.06
28	09.16	07.31	05.50	04.57	18.35 (8)	03.13	18.37 (8) 02.29
	15.41	17.26	18.53	21.31	19 18.54 (8)	23.14	19 18.56 (8) 00.05
29	09.13		06.46	04.53	18.33 (8)	03.10	18.38 (8) 02.31
	15.44		19.56	21.34	23 18.56 (8)	23.17	17 18.55 (8) 00.04
30	09.09		06.43	04.50	18.32 (8)	03.07	18.40 (8) 02.33
	15.48		19.59	21.37	26 18.58 (8)	23.20	14 18.54 (8) 00.02
31	09.06		06.39			03.04	18.42 (8)
	15.51		20.02	18.23 (6)		23.24	10 18.52 (8)
Potential sun hours	163	235	363	454		578	641
Total, worst case			10	666		942	4

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

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

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **Shadow receptor:** C - Hundhammer

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35	04.12	18.36 (8) 05.52	18.00 (7) 07.21	07.59	09.39
	00.01	22.28	19.13 (8) 20.36	18.34 (6) 18.47	15.57	14.28
2	02.37	04.15	18.36 (8) 05.55	17.59 (7) 07.24	08.02	09.42
	23.59	22.25	19.13 (8) 20.33	18.34 (6) 18.43	15.54	14.26
3	02.39	04.19	18.35 (8) 05.58	17.59 (7) 07.27	08.06	09.45
	23.57	22.21	19.12 (8) 20.29	18.34 (6) 18.39	15.50	14.24
4	02.42	04.22	18.36 (8) 06.01	18.00 (7) 07.30	08.09	09.48
	23.55	22.17	19.12 (8) 20.25	18.34 (6) 18.36	15.47	14.22
5	02.44	04.25	18.36 (8) 06.04	18.00 (7) 07.34	08.12	09.51
	23.52	22.14	19.12 (8) 20.22	18.34 (6) 18.32	15.44	14.20
6	02.47	04.29	18.36 (8) 06.07	18.01 (7) 07.37	08.16	09.53
	23.50	22.10	19.12 (8) 20.18	18.34 (6) 18.29	15.40	14.18
7	02.50	04.32	18.37 (8) 06.10	18.02 (7) 07.40	08.19	09.56
	23.47	22.07	19.12 (8) 20.14	18.33 (6) 18.25	15.37	14.16
8	02.53	04.36	18.36 (8) 06.13	18.04 (7) 07.43	08.22	09.58
	23.45	22.03	19.10 (8) 20.11	18.33 (6) 18.21	15.34	14.14
9	02.55	04.39	18.37 (8) 06.16	18.05 (7) 07.46	08.26	10.01
	23.42	22.00	19.10 (8) 20.07	18.31 (6) 18.18	15.31	14.13
10	02.58	04.42	18.37 (8) 06.19	18.11 (6) 07.49	08.29	10.03
	23.39	21.56	19.09 (8) 20.03	18.30 (6) 18.14	15.27	14.11
11	03.02	04.45	18.38 (8) 06.22	18.12 (6) 07.52	08.33	10.05
	23.37	21.53	19.08 (8) 20.00	18.28 (6) 18.11	15.24	14.10
12	03.05	18.51 (8) 04.49	18.39 (8) 06.25	18.14 (6) 07.55	08.36	10.08
	23.34	18.59 (8) 21.49	19.07 (8) 19.56	18.25 (6) 18.07	15.21	14.09
13	03.08	18.49 (8) 04.52	18.41 (8) 06.28	07.58	08.39	10.09
	23.31	19.01 (8) 21.45	19.06 (8) 19.52	18.03	15.18	14.08
14	03.11	18.47 (8) 04.55	18.41 (8) 06.31	08.01	08.43	10.11
	23.28	19.02 (8) 21.42	19.03 (8) 19.49	18.00	15.15	14.07
15	03.14	18.45 (8) 04.59	18.43 (8) 06.34	08.04	08.46	10.13
	23.25	19.04 (8) 21.38	19.01 (8) 19.45	17.56	15.12	14.06
16	03.18	18.45 (8) 05.02	18.46 (8) 06.37	08.07	08.50	10.15
	23.22	19.06 (8) 21.35	18.58 (8) 19.41	17.53	15.09	14.06
17	03.21	18.44 (8) 05.05	06.40	08.10	08.53	10.16
	23.18	19.06 (8) 21.31	19.38	17.49	15.06	14.05
18	03.24	18.42 (8) 05.08	06.43	08.13	08.56	10.17
	23.15	19.07 (8) 21.27	19.34	17.46	15.03	14.05
19	03.28	18.42 (8) 05.11	06.46	08.17	09.00	10.18
	23.12	19.08 (8) 21.24	19.30	17.42	15.00	14.05
20	03.31	18.41 (8) 05.15	06.49	08.20	09.03	10.19
	23.09	19.09 (8) 21.20	19.27	17.39	14.57	14.05
21	03.34	18.41 (8) 05.18	18.14 (7) 06.52	08.23	09.07	10.20
	23.06	19.10 (8) 21.16	9 18.23 (7) 19.23	17.35	14.54	14.05
22	03.38	18.39 (8) 05.21	18.10 (7) 06.55	08.26	09.10	10.21
	23.02	19.10 (8) 21.13	16 18.26 (7) 19.19	17.32	14.51	14.05
23	03.41	18.39 (8) 05.24	18.08 (7) 06.58	08.29	09.13	10.21
	22.59	19.11 (8) 21.09	19 18.27 (7) 19.16	17.28	14.48	14.06
24	03.45	18.38 (8) 05.27	18.07 (7) 07.01	08.33	09.17	10.22
	22.56	19.11 (8) 21.05	22 18.29 (7) 19.12	17.25	14.45	14.07
25	03.48	18.38 (8) 05.30	18.05 (7) 07.04	07.36	09.20	10.22
	22.52	19.12 (8) 21.02	25 18.30 (7) 19.08	16.21	14.43	14.08
26	03.51	18.38 (8) 05.34	18.04 (7) 07.07	07.39	09.23	10.22
	22.49	19.12 (8) 20.58	26 18.30 (7) 19.05	16.18	14.40	14.09
27	03.55	18.37 (8) 05.37	18.02 (7) 07.10	07.42	09.26	10.22
	22.45	19.12 (8) 20.55	28 18.30 (7) 19.01	16.14	14.38	14.10
28	03.58	18.37 (8) 05.40	18.01 (7) 07.13	07.46	09.30	10.21
	22.42	19.13 (8) 20.51	29 18.30 (7) 18.58	16.11	14.35	14.11
29	04.02	18.37 (8) 05.43	18.01 (7) 07.16	07.49	09.33	10.21
	22.38	19.13 (8) 20.47	29 18.30 (6) 18.54	16.07	14.33	14.13
30	04.05	18.36 (8) 05.46	18.01 (7) 07.19	07.52	09.36	10.20
	22.35	19.13 (8) 20.44	31 18.32 (6) 18.50	16.04	14.30	14.14
31	04.09	18.36 (8) 05.49	18.00 (7)	07.56		10.19
	22.32	19.13 (8) 20.40	33 18.33 (6)	16.01		14.16
Potential sun hours	620	513	394	302	192	125
Total, worst case	550	755	337			

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

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

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Shadow receptor:** D - Klungset

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10.18	09.03	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	09.39	
	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	14.28	
2	10.17	09.00	07.24	06.32	04.43	02.58	02.37	04.16	05.55	07.25	08.02	09.42	
	14.21	15.59	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	14.26	
3	10.16	08.57	07.21	06.28	04.39	02.56	02.40	04.19	05.58	07.28	08.06	09.45	
	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.40	15.51	14.24	
4	10.14	08.54	07.17	06.24	04.35	02.53	02.42	04.22	06.01	07.31	08.09	09.48	
	14.26	16.06	17.39	20.14	21.51	23.36	23.54	22.18	20.25	18.36	15.47	14.22	
5	10.13	08.50	07.13	06.21	04.32	02.50	02.45	04.26	06.04	07.34	08.12	09.51	
	14.28	16.09	17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44	14.20	
6	10.11	08.47	07.10	06.17	04.28	02.48	02.47	04.29	06.07	07.37	08.16	09.53	
	14.31	16.12	17.45	20.20	21.58	23.42	23.50	22.10	20.18	18.29	15.41	14.18	
7	10.09	08.44	07.06	06.13	04.25	02.45	02.50	04.32	06.10	07.40	08.19	09.56	
	14.33	16.16	17.48	20.24	22.01	23.45	23.47	22.07	20.14	18.25	15.37	14.16	
8	10.08	08.40	07.03	06.10	04.21	02.43	02.53	04.36	06.13	07.43	08.23	09.58	
	14.36	16.19	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.22	15.34	14.15	
9	10.06	08.37	06.59	06.06	04.18	02.40	02.56	04.39	06.16	07.46	08.26	10.01	
	14.39	16.23	17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13	
10	10.04	08.34	06.55	06.03	04.14	02.38	02.59	04.42	06.19	07.49	08.29	10.03	
	14.42	16.26	17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.28	14.12	
11	10.01	08.30	06.52	05.59	04.11	02.36	03.02	04.46	06.22	07.52	08.33	10.05	
	14.45	16.30	18.01	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10	
12	09.59	08.27	06.48	05.55	04.07	02.34	03.05	04.49	06.25	07.55	08.36	10.08	
	14.48	16.33	18.04	20.39	22.18	23.57	1 05.05 (9)	23.34	21.49	19.56	18.07	15.21	14.09
13	09.57	08.24	06.45	05.52	04.04	02.32	05.02 (9)	03.08	04.52	06.28	07.58	08.40	10.10
	14.51	16.36	18.07	20.42	22.22	23.59	4 05.06 (9)	23.31	21.45	19.52	18.04	15.18	14.08
14	09.55	08.20	06.41	05.48	04.00	02.31	05.02 (9)	03.11	04.56	06.31	08.01	08.43	10.11
	14.54	16.40	18.10	20.45	22.25	00.01	6 05.08 (9)	23.28	21.42	19.49	18.00	15.15	14.07
15	09.52	08.17	06.37	05.44	03.57	02.29	05.01 (9)	03.15	04.59	06.34	08.04	08.46	10.13
	14.57	16.43	18.13	20.49	22.29	00.03	7 05.08 (9)	23.25	21.38	19.45	17.57	15.12	14.06
16	09.50	08.13	06.34	05.41	03.53	02.28	05.01 (9)	03.18	05.02	06.37	08.07	08.50	10.15
	15.00	16.47	18.16	20.52	22.32	00.05	8 05.09 (9)	23.22	21.35	19.41	17.53	15.09	14.06
17	09.47	08.10	06.30	05.37	03.50	02.27	05.00 (9)	03.21	05.05	06.40	08.10	08.53	10.16
	15.04	16.50	18.19	20.55	22.36	00.06	9 05.09 (9)	23.18	21.31	19.38	17.49	15.06	14.05
18	09.44	08.06	06.26	05.33	03.46	02.26	05.00 (9)	03.25	05.08	06.43	08.14	08.57	10.17
	15.07	16.53	18.22	20.58	22.39	00.07	10 05.10 (9)	23.15	21.27	19.34	17.46	15.03	14.05
19	09.42	08.03	06.23	05.30	03.43	02.25	05.01 (9)	03.28	05.12	06.46	08.17	09.00	10.18
	15.10	16.57	18.25	21.01	22.43	00.08	9 05.10 (9)	23.12	21.24	19.31	17.42	15.00	14.05
20	09.39	07.59	06.19	05.26	03.40	02.25	05.01 (9)	03.31	05.15	06.49	08.20	09.03	10.19
	15.14	17.00	18.28	21.05	22.46	00.08	9 05.10 (9)	23.09	21.20	19.27	17.39	14.57	14.05
21	09.36	07.56	06.16	05.22	03.36	02.25	05.01 (9)	03.35	05.18	06.52	08.23	09.07	10.20
	15.17	17.03	18.31	21.08	22.50	00.09	10 05.11 (9)	23.06	21.17	19.23	17.35	14.54	14.05
22	09.33	07.52	06.12	05.19	03.33	02.25	05.02 (9)	03.38	05.21	06.55	08.26	09.10	10.21
	15.20	17.06	18.34	21.11	22.53	00.09	10 05.12 (9)	23.02	21.13	19.20	17.32	14.51	14.06
23	09.31	07.49	06.08	05.15	03.30	02.25	05.02 (9)	03.41	05.24	06.58	08.30	09.13	10.21
	15.24	17.10	18.37	21.14	22.57	00.09	9 05.11 (9)	22.59	21.09	19.16	17.28	14.48	14.06
24	09.28	07.45	06.05	05.11	03.26	02.26	05.01 (9)	03.45	05.28	07.01	08.33	09.17	10.22
	15.27	17.13	18.40	21.18	23.00	00.09	10 05.11 (9)	22.56	21.06	19.12	17.25	14.46	14.07
25	09.25	07.42	06.01	05.08	03.23	02.26	05.02 (9)	03.48	05.31	07.04	07.36	09.20	10.22
	15.31	17.16	18.44	21.21	23.04	00.08	9 05.11 (9)	22.52	21.02	19.09	16.21	14.43	14.08
26	09.22	07.38	05.57	05.04	03.20	02.27	05.03 (9)	03.52	05.34	07.07	07.39	09.23	10.22
	15.34	17.19	18.47	21.24	23.07	00.07	9 05.12 (9)	22.49	20.58	19.05	16.18	14.40	14.09
27	09.19	07.35	05.54	05.01	03.17	02.28	05.03 (9)	03.55	05.37	07.10	07.42	09.26	10.22
	15.38	17.23	18.50	21.28	23.10	00.06	8 05.11 (9)	22.45	20.55	19.01	16.14	14.38	14.10
28	09.16	07.31	05.50	04.57	03.14	02.30	05.04 (9)	03.59	05.40	07.13	07.46	09.30	10.21
	15.41	17.26	18.53	21.31	23.14	00.05	7 05.11 (9)	22.42	20.51	18.58	16.11	14.35	14.12
29	09.13		06.46	04.53	03.10	02.32	05.05 (9)	04.02	05.43	07.16	07.49	09.33	10.21
	15.45		19.56	21.34	23.17	00.04	5 05.10 (9)	22.39	20.47	18.54	16.08	14.33	14.13
30	09.10		06.43	04.50	03.07	02.33	05.06 (9)	04.05	05.46	07.19	07.52	09.36	10.20
	15.48		19.59	21.37	23.20	00.02	3 05.09 (9)	22.35	20.44	18.50	16.04	14.31	14.15
31	09.06		06.39		03.04			04.09	05.49		07.56		10.19
	15.52		20.02		23.24			22.32	20.40		16.01		14.17
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125	
Total, worst case						143							

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

Day in month	Sun rise (hh:mm)	Minutes with flicker	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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Calculated:

20.12.2018 11.11/3.2.737

SHADOW - Calendar**Calculation:** Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Shadow receptor:** E - Løvmo**Assumptions for shadow calculations**

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December		
1	10.18	09.03	07.28	06.35	04.46	03.01	05.06 (5)	02.35	05.05 (5)	04.12	05.52	07.22	07.59	09.39
	14.19	15.55	17.29	20.05	21.41	23.27	31 05.48 (6)	00.01	21 05.26 (5)	22.28	20.36	18.47	15.57	14.28
2	10.17	09.00	07.24	06.32	04.43	02.59	05.05 (5)	02.38	05.06 (5)	04.16	05.55	07.25	08.02	09.42
	14.21	15.59	17.32	20.08	21.44	23.30	32 05.48 (6)	23.59	20 05.26 (5)	22.25	20.33	18.43	15.54	14.26
3	10.16	08.57	07.21	06.28	04.39	02.56	05.04 (5)	02.40	05.06 (5)	04.19	05.58	07.28	08.06	09.45
	14.23	16.02	17.35	20.11	21.48	23.33	31 05.46 (6)	23.57	20 05.26 (5)	22.21	20.29	18.40	15.51	14.24
4	10.14	08.54	07.17	06.25	04.36	02.53	05.02 (5)	02.42	05.07 (5)	04.22	06.01	07.31	08.09	09.48
	14.26	16.06	17.39	20.14	21.51	23.36	29 05.45 (6)	23.55	19 05.26 (5)	22.18	20.25	18.36	15.47	14.22
5	10.13	08.50	07.13	06.21	04.32	02.50	05.02 (5)	02.45	05.07 (5)	04.26	06.04	07.34	08.12	09.51
	14.28	16.09	17.42	20.17	21.54	23.39	23 05.31 (2)	23.52	20 05.34 (2)	22.14	20.22	18.32	15.44	14.20
6	10.11	08.47	07.10	06.17	04.28	02.48	05.01 (5)	02.47	05.08 (5)	04.29	06.07	07.37	08.16	09.53
	14.31	16.13	17.45	20.20	21.58	23.42	24 05.30 (2)	23.50	22 05.36 (2)	22.11	20.18	18.29	15.41	14.18
7	10.09	08.44	07.06	06.14	04.25	02.45	05.01 (5)	02.50	05.09 (5)	04.33	06.10	07.40	08.19	09.56
	14.33	16.16	17.48	20.24	22.01	23.45	21 05.29 (2)	23.47	22 05.37 (2)	22.07	20.14	18.25	15.37	14.16
8	10.08	08.40	07.03	06.10	04.21	02.43	05.01 (5)	02.53	05.09 (5)	04.36	06.13	07.43	08.23	09.58
	14.36	16.19	17.51	20.27	22.05	23.48	19 05.20 (5)	23.45	27 05.51 (6)	22.03	20.11	18.22	15.34	14.15
9	10.06	08.37	06.59	06.06	04.18	02.40	05.01 (5)	02.56	05.10 (5)	04.39	06.16	07.46	08.26	10.01
	14.39	16.23	17.54	20.30	22.08	23.50	20 05.21 (5)	23.42	31 05.53 (6)	22.00	20.07	18.18	15.31	14.13
10	10.04	08.34	06.56	06.03	04.14	02.38	05.01 (5)	02.59	05.11 (5)	04.43	06.19	07.49	08.29	10.03
	14.42	16.26	17.57	20.33	22.12	23.53	20 05.21 (5)	23.39	32 05.54 (6)	21.56	20.04	18.14	15.28	14.12
11	10.01	08.30	06.52	05.59	04.11	02.36	05.01 (5)	03.02	05.13 (5)	04.46	06.22	07.52	08.33	10.05
	14.45	16.30	18.01	20.36	22.15	23.55	21 05.22 (5)	23.37	30 05.55 (6)	21.53	20.00	18.11	15.25	14.10
12	09.59	08.27	06.48	05.55	04.07	02.34	05.01 (5)	03.05	05.15 (5)	04.49	06.25	07.55	08.36	10.08
	14.48	16.33	18.04	20.39	22.19	23.57	21 05.22 (5)	23.34	29 05.56 (6)	21.49	19.56	18.07	15.21	14.09
13	09.57	08.24	06.45	05.52	04.04	02.32	05.01 (5)	03.08	05.29 (2)	04.52	06.28	07.58	08.40	10.10
	14.51	16.37	18.07	20.42	22.22	23.59	21 05.22 (5)	23.31	26 05.57 (6)	21.46	19.53	18.04	15.18	14.08
14	09.55	08.20	06.41	05.48	04.00	02.31	05.01 (5)	03.11	05.30 (2)	04.56	06.31	08.01	08.43	10.11
	14.54	16.40	18.10	20.46	22.25	23.57	22 05.23 (5)	23.28	26 05.58 (6)	21.42	19.49	18.00	15.15	14.07
15	09.52	08.17	06.37	05.44	03.57	02.29	05.01 (5)	03.15	05.29 (2)	04.59	06.34	08.04	08.46	10.13
	14.57	16.43	18.13	20.49	22.29	23.59	22 05.23 (5)	23.25	29 05.59 (6)	21.38	19.45	17.57	15.12	14.07
16	09.50	08.13	06.34	05.41	03.53	02.28	05.01 (5)	03.18	05.29 (2)	05.02	06.37	08.07	08.50	10.15
	15.00	16.47	18.16	20.52	22.32	23.59	23 05.24 (5)	23.22	29 05.59 (6)	21.35	19.42	17.53	15.09	14.06
17	09.47	08.10	06.30	05.37	03.50	02.27	05.01 (5)	03.21	05.29 (2)	05.05	06.40	08.11	08.53	10.16
	15.04	16.50	18.19	20.55	22.36	23.59	22 05.23 (5)	23.18	30 05.59 (6)	21.31	19.38	17.50	15.06	14.06
18	09.45	08.06	06.27	05.33	03.46	02.26	05.01 (5)	03.25	05.30 (2)	05.09	06.43	08.14	08.57	10.17
	15.07	16.53	18.22	20.58	22.39	23.59	23 05.24 (5)	23.15	29 06.00 (6)	21.27	19.34	17.46	15.03	14.05
19	09.42	08.03	06.23	05.30	03.43	02.25	05.01 (5)	03.28	05.30 (2)	05.12	06.46	08.17	09.00	10.19
	15.10	16.57	18.25	21.01	22.43	23.59	23 05.24 (5)	23.12	29 06.00 (6)	21.24	19.31	17.42	15.00	14.05
20	09.39	07.59	06.19	05.26	03.40	02.25	05.02 (5)	03.31	05.31 (2)	05.15	06.49	08.20	09.03	10.19
	15.14	17.00	18.28	21.05	22.46	23.59	22 05.24 (5)	23.09	29 06.01 (6)	21.20	19.27	17.39	14.57	14.05
21	09.36	07.56	06.16	05.22	03.36	02.25	05.02 (5)	03.35	05.31 (2)	05.18	06.52	08.23	09.07	10.20
	15.17	17.03	18.31	21.08	22.50	23.59	22 05.24 (5)	23.06	28 06.00 (6)	21.17	19.23	17.35	14.54	14.05
22	09.34	07.52	06.12	05.19	03.33	02.25	05.03 (5)	03.38	05.33 (2)	05.21	06.55	08.26	09.10	10.21
	15.21	17.06	18.34	21.11	22.53	23.59	22 05.25 (5)	23.02	25 06.01 (6)	21.13	19.20	17.32	14.51	14.06
23	09.31	07.49	06.08	05.15	03.30	02.25	05.02 (5)	03.42	05.41 (6)	05.24	06.58	08.30	09.13	10.21
	15.24	17.10	18.37	21.14	22.57	23.59	23 05.25 (5)	22.59	19 06.00 (6)	21.09	19.16	17.28	14.49	14.06
24	09.28	07.45	06.05	05.12	03.26	02.26	05.02 (5)	03.45	05.42 (6)	05.28	07.01	08.33	09.17	10.22
	15.27	17.13	18.41	21.18	23.00	23.59	23 05.25 (5)	22.56	19 06.01 (6)	21.06	19.12	17.25	14.46	14.07
25	09.25	07.42	06.01	05.08	03.23	02.26	05.03 (5)	03.48	05.41 (6)	05.31	07.04	07.36	09.20	10.22
	15.31	17.16	18.44	21.21	23.04	23.59	23 05.26 (5)	22.52	19 06.00 (6)	21.02	19.09	16.21	14.43	14.08
26	09.22	07.38	05.57	05.04	03.20	02.27	05.04 (5)	03.52	05.42 (6)	05.34	07.07	07.39	09.23	10.22
	15.34	17.19	18.47	21.24	23.07	23.59	22 05.26 (5)	22.49	18 06.00 (6)	20.58	19.05	16.18	14.41	14.09
27	09.19	07.35	05.54	05.01	03.17	02.29	05.04 (5)	03.55	05.43 (6)	05.37	07.10	07.43	09.27	10.22
	15.38	17.23	18.50	21.28	23.10	23.59	22 05.26 (5)	22.45	17 06.00 (6)	20.55	19.01	16.15	14.38	14.10
28	09.16	07.31	05.50	04.57	03.14	02.30	05.04 (5)	03.59	05.43 (6)	05.40	07.13	07.46	09.30	10.21
	15.41	17.26	18.53	21.31	23.14	23.59	22 05.26 (5)	22.42	16 05.59 (6)	20.51	18.58	16.11	14.35	14.12
29	09.13	07.26	05.46	04.53	03.10	02.32	05.04 (5)	04.02	05.44 (6)	05.43	07.16	07.49	09.33	10.21
	15.45	17.26	18.53	21.34	23.17	23.59	22 05.26 (5)	22.39	14 05.58 (6)	20.47	18.54	16.08	14.33	14.13
30	09.10	07.21	05.41	04.50	03.07	02.33	05.04 (5)	04.05	05.45 (6)	05.46	07.19	07.52	09.36	10.20
	15.48	17.26	18.53	21.38	23.20	23.59	22 05.26 (5)	22.35	12 05.57 (6)	20.44	18.51	16.04	14.31	14.15
31	09.06	07.16	05.31	04.43	03.04	02.34	05.09 (5)	04.09	05.46 (6)	05.49	07.26	07.56	09.33	10.19
	15.52	17.26	18.53	21.38	23.24	23.59	25 05.48 (6)	22.32	9 05.55 (6)	20.40	16.01	14.31	14.17	14.17
Potential sun hours	163	235	363	454	578	641	693	716	716	513	394	302	192	126
Total, worst case					437									

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

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

SHADOW - Calendar

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **Shadow receptor:** F - Storeienen

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June
1	10.18 14.19	09.03 15.55	07.28 17.29	09.02 (2) 11.53 (3)	06.35 20.05	04.46 21.41
2	10.17 14.21	09.00 15.58	07.24 17.32	09.00 (2) 11.51 (3)	06.32 20.08	07.34 (14) 21.44
3	10.16 14.23	08.57 16.02	07.21 17.35	08.59 (2) 11.49 (3)	06.28 20.11	07.30 (14) 21.48
4	10.14 14.26	08.54 16.05	07.17 17.39	08.40 (6) 11.47 (3)	06.24 20.14	07.28 (14) 21.51
5	10.13 14.28	08.50 16.09	12.15 (1) 12.24 (1)	07.13 17.42	08.37 (6) 11.42 (3)	06.21 20.17
6	10.11 14.31	08.47 16.12	12.14 (1) 12.26 (1)	07.10 17.45	08.35 (6) 10.40 (4)	06.17 20.21
7	10.10 14.33	08.44 16.16	12.13 (1) 12.27 (1)	07.06 17.48	08.14 (7) 10.38 (4)	06.13 20.24
8	10.08 14.36	08.41 16.19	12.12 (1) 12.28 (1)	07.03 17.51	08.12 (7) 10.37 (4)	06.10 20.27
9	10.06 14.39	08.37 16.23	12.12 (1) 12.28 (1)	06.59 17.54	08.11 (7) 10.34 (4)	06.06 20.30
10	10.04 14.42	08.34 16.26	11.37 (3) 12.28 (1)	06.56 17.57	08.10 (7) 10.30 (4)	06.03 20.33
11	10.02 14.45	08.30 16.30	11.32 (3) 12.28 (1)	06.52 18.01	08.09 (7) 10.59	05.59 20.36
12	09.59 14.48	08.27 16.33	11.31 (3) 12.29 (1)	06.48 18.04	08.09 (7) 10.55	05.55 20.39
13	09.57 14.51	08.24 16.36	11.29 (3) 12.29 (1)	06.45 18.07	08.08 (7) 10.52	05.52 20.42
14	09.55 14.54	08.20 16.40	11.27 (3) 12.28 (1)	06.41 18.10	08.08 (7) 10.54	05.48 20.46
15	09.52 14.57	08.17 16.43	10.20 (4) 12.26 (1)	06.37 18.13	08.08 (7) 10.54	05.44 20.49
16	09.50 15.00	08.13 16.47	10.17 (4) 12.24 (1)	06.34 18.16	08.10 (7) 10.51	05.41 20.52
17	09.47 15.04	08.10 16.50	10.15 (4) 11.56 (3)	06.30 18.19	07.40 (8) 10.55	05.37 20.55
18	09.45 15.07	08.06 16.53	10.13 (4) 11.57 (3)	06.27 18.22	08.48 (6) 10.53	20.52 20.58
19	09.42 15.10	08.03 16.57	10.12 (4) 11.57 (3)	06.23 18.25	07.37 (8) 10.50	05.30 21.02
20	09.39 15.14	08.00 17.00	09.41 (5) 11.57 (3)	06.19 18.28	07.36 (8) 10.52	05.26 21.05
21	09.36 15.17	07.56 17.03	09.37 (5) 11.58 (3)	06.16 18.31	07.35 (8) 10.52	05.22 21.08
22	09.34 15.20	07.53 17.06	09.35 (5) 11.58 (3)	06.12 18.34	07.35 (8) 10.51	05.19 21.11
23	09.31 15.24	07.49 17.10	09.33 (5) 11.57 (3)	06.08 18.37	07.35 (8) 10.51	05.15 21.14
24	09.28 15.27	07.45 17.13	09.31 (5) 11.57 (3)	06.05 18.41	07.34 (8) 10.51	05.11 21.18
25	09.25 15.31	07.42 17.16	09.30 (5) 11.56 (3)	06.01 18.44	07.36 (8) 10.50	05.08 21.21
26	09.22 15.34	07.38 17.19	09.29 (5) 11.56 (3)	05.57 18.47	07.36 (8) 10.54	05.04 21.24
27	09.19 15.38	07.35 17.23	09.29 (5) 11.56 (3)	05.54 18.50	07.38 (8) 10.51	05.01 21.28
28	09.16 15.41	07.31 17.26	09.06 (2) 11.54 (3)	05.50 18.53	07.46 (8) 10.50	05.01 21.28
29	09.13 15.45			06.46 19.56		
30	09.10 15.48			06.43 19.59		
31	09.07 15.52			06.39 20.02		
Potential sun hours	163	235	363	454	578	641
Total, worst case		1365	1327	238		

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

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

SHADOW - Calendar

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Shadow receptor:** F - Storeienen

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December						
1	02.35	04.12	05.52	07.23 (14)	07.22	08.47 (7)	07.59	11.42 (1)	09.39			
	00.01	22.28	20.36	07.43 (14)	18.47	41	09.32 (6)	15.57	17	11.59 (1)	14.28	
2	02.37	04.15	05.55	07.22 (14)	07.25	08.47 (7)	08.02	11.42 (1)	09.42			
	23.59	22.25	20.33	21	07.43 (14)	18.43	41	09.32 (6)	15.54	17	11.59 (1)	14.26
3	02.39	04.19	05.58	07.22 (14)	07.28	08.48 (7)	08.06	11.43 (1)	09.45			
	23.57	22.21	20.29	22	07.44 (14)	18.40	58	11.07 (4)	15.51	15	11.58 (1)	14.24
4	02.42	04.22	06.01	07.21 (14)	07.31	08.48 (7)	08.09	11.43 (1)	09.48			
	23.55	22.18	20.25	21	07.42 (14)	18.36	72	11.10 (4)	15.47	14	11.57 (1)	14.22
5	02.44	04.26	06.04	07.21 (14)	07.34	08.49 (7)	08.13	11.44 (1)	09.51			
	23.53	22.14	20.22	21	07.42 (14)	18.32	81	11.13 (4)	15.44	12	11.56 (1)	14.20
6	02.47	04.29	06.07	07.21 (14)	07.37	08.50 (7)	08.16	11.46 (1)	09.54			
	23.50	22.11	20.18	20	07.41 (14)	18.29	90	11.14 (4)	15.41	8	11.54 (1)	14.18
7	02.50	04.32	06.10	07.22 (14)	07.40	08.52 (7)	08.19	11.46 (1)	09.56			
	23.48	22.07	20.15	18	07.40 (14)	18.25	92	11.15 (4)	15.37	14.16		
8	02.53	04.36	06.13	07.23 (14)	07.43	09.11 (6)	08.23	11.47 (1)	09.59			
	23.45	22.04	20.11	16	07.39 (14)	18.22	87	11.16 (4)	15.34	14.14		
9	02.56	04.39	06.16	07.24 (14)	07.46	09.14 (6)	08.26	11.48 (1)	10.01			
	23.42	22.00	20.07	13	07.37 (14)	18.18	100	12.20 (3)	15.31	14.13		
10	02.59	04.42	06.19	07.26 (14)	07.49	09.17 (6)	08.29	11.49 (1)	10.03			
	23.40	21.56	20.04	7	07.33 (14)	18.14	101	12.22 (3)	15.28	14.11		
11	03.02	04.46	06.22	07.27 (14)	07.52	09.34 (2)	08.33	11.50 (1)	10.06			
	23.37	21.53	20.00	18.11	102	12.24 (3)	15.24	11.51 (1)	14.10			
12	03.05	04.49	06.25	07.55	103	09.34 (2)	08.36	11.52 (1)	10.08			
	23.34	21.49	19.56	18.07	105	12.25 (3)	15.21	11.53 (1)	14.09			
13	03.08	04.52	06.28	07.58	106	09.37 (2)	08.40	11.54 (1)	10.10			
	23.31	21.46	19.53	18.04	104	12.27 (3)	15.18	11.55 (1)	14.08			
14	03.11	04.56	06.31	08.01	107	10.01 (5)	08.43	11.56 (1)	10.12			
	23.28	21.42	19.49	18.00	98	12.27 (3)	15.15	11.57 (1)	14.07			
15	03.14	04.59	06.34	08.04	108	10.01 (5)	08.47	11.58 (1)	10.13			
	23.25	21.38	19.45	17.57	98	12.27 (3)	15.12	11.59 (1)	14.06			
16	03.18	05.02	06.37	08.08	109	10.02 (5)	08.50	11.60 (1)	10.15			
	23.22	21.35	19.42	6	08.34 (8)	17.53	99	12.28 (3)	15.09	14.06		
17	03.21	05.05	06.40	08.25 (8)	08.11	10.02 (5)	08.53	11.61 (1)	10.16			
	23.19	21.31	19.38	12	08.37 (8)	17.49	99	12.28 (3)	15.06	14.05		
18	03.24	05.08	06.43	08.24 (8)	08.14	10.04 (5)	08.57	11.62 (1)	10.18			
	23.16	21.28	19.34	14	08.38 (8)	17.46	95	12.29 (3)	15.03	14.05		
19	03.28	05.12	06.46	08.21 (8)	08.17	10.04 (5)	09.00	11.63 (1)	10.19			
	23.12	21.24	19.31	17	08.38 (8)	17.42	92	12.28 (3)	15.00	14.05		
20	03.31	05.15	06.49	08.21 (8)	08.20	10.06 (5)	09.04	11.64 (1)	10.20			
	23.09	21.20	19.27	17	08.38 (8)	17.39	88	12.28 (3)	14.57	14.05		
21	03.34	05.18	06.52	08.20 (8)	08.23	10.08 (5)	09.07	11.65 (1)	10.21			
	23.06	21.17	19.23	18	08.38 (8)	17.35	82	12.28 (3)	14.54	14.05		
22	03.38	05.21	06.55	08.20 (8)	08.26	10.42 (4)	09.10	11.66 (1)	10.21			
	23.02	21.13	19.20	18	08.38 (8)	17.32	66	12.28 (3)	14.51	14.06		
23	03.41	05.24	06.58	08.20 (8)	08.30	10.43 (4)	09.14	11.67 (1)	10.22			
	22.59	21.09	19.16	17	08.37 (8)	17.28	63	12.28 (3)	14.48	14.06		
24	03.45	05.27	07.01	08.20 (8)	08.33	10.44 (4)	09.17	11.68 (1)	10.22			
	22.56	21.06	19.12	16	08.36 (8)	17.25	59	12.26 (3)	14.46	14.07		
25	03.48	05.31	07.04	08.21 (8)	07.36	09.46 (4)	09.20	11.69 (1)	10.22			
	22.52	21.02	19.09	14	08.35 (8)	16.21	55	11.26 (3)	14.43	14.08		
26	03.52	05.34	07.07	08.22 (8)	07.39	09.48 (4)	09.23	11.70 (1)	10.22			
	22.49	20.58	19.05	22	09.24 (6)	16.18	57	11.55 (1)	14.40	14.09		
27	03.55	05.37	07.10	08.24 (8)	07.43	09.50 (4)	09.27	11.71 (1)	10.22			
	22.46	20.55	19.01	31	09.29 (6)	16.14	53	11.56 (1)	14.38	14.10		
28	03.58	05.40	07.13	08.25 (8)	07.46	10.57 (3)	09.30	11.72 (1)	10.21			
	22.42	20.51	11	07.39 (14)	18.58	31	09.30 (6)	16.11	39	11.57 (1)	14.35	
29	04.02	05.43	07.16	08.26 (8)	07.49	10.58 (3)	09.33	11.73 (1)	10.21			
	22.39	20.47	15	07.41 (14)	18.54	36	09.31 (6)	16.08	39	11.58 (1)	14.33	
30	04.05	05.46	07.19	08.27 (8)	07.52	11.00 (3)	09.36	11.74 (1)	10.20			
	22.35	20.44	17	07.42 (14)	18.51	39	09.32 (6)	16.04	35	11.58 (1)	14.30	
31	04.09	05.49	07.24 (14)	07.56	11.03 (3)	11.03 (3)	11.03 (3)	11.75 (1)	10.19			
	22.32	20.40	19	07.43 (14)	16.01	31	11.59 (1)	11.76 (1)	14.16			
Potential sun hours	621	513	394	302	192	125						
Total, worst case		62	487	2322	83							

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

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

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Shadow receptor:** G - Hamland

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June
1	10.18	09.03	12.28 (8) 07.28	09.01 (13) 06.35	04.46	03.01
	14.19	15.55	12.40 (8) 17.29	10.06 (12) 20.05	21.41	23.27
2	10.17	09.00	12.27 (8) 07.24	09.01 (13) 06.32	04.42	02.58
	14.21	15.58	12.42 (8) 17.32	10.05 (12) 20.08	21.44	23.30
3	10.16	08.57	12.26 (8) 07.21	09.00 (13) 06.28	04.39	02.55
	14.23	16.02	12.43 (8) 17.35	10.04 (12) 20.11	21.48	23.34
4	10.15	08.54	11.58 (9) 07.17	09.01 (13) 06.24	04.35	02.52
	14.25	16.05	13.12 (14) 17.38	10.03 (12) 20.14	21.51	23.37
5	10.13	08.50	11.18 (10) 07.13	09.01 (13) 06.21	04.32	02.50
	14.28	16.09	13.15 (14) 17.42	10.01 (12) 20.17	21.54	23.40
6	10.11	08.47	11.15 (10) 07.10	09.01 (13) 06.17	04.28	02.47
	14.30	16.12	13.17 (14) 17.45	09.59 (12) 20.20	21.58	23.43
7	10.10	08.44	11.14 (10) 07.06	09.01 (13) 06.13	04.24	02.44
	14.33	16.16	13.19 (14) 17.48	09.20 (13) 20.24	22.01	23.45
8	10.08	08.40	11.13 (10) 07.03	09.03 (13) 06.10	04.21	02.42
	14.36	16.19	13.20 (14) 17.51	09.19 (13) 20.27	22.05	23.48
9	10.06	08.37	11.12 (10) 06.59	09.04 (13) 06.06	04.17	02.40
	14.38	16.23	13.21 (14) 17.54	09.17 (13) 20.30	22.08	23.51
10	10.04	08.34	11.11 (10) 06.55	09.08 (13) 06.02	04.14	02.37
	14.41	16.26	13.22 (14) 17.57	09.12 (13) 20.33	22.12	23.53
11	10.02	08.30	10.32 (11) 06.52		04.10	02.35
	14.44	16.29	13.22 (14) 18.00		22.15	23.56
12	09.59	08.27	10.31 (11) 06.48		04.07	02.33
	14.47	16.33	13.23 (14) 18.03		22.19	23.58
13	09.57	08.24	10.29 (11) 06.45		04.03	02.31
	14.50	16.36	13.24 (14) 18.07		22.22	00.00
14	09.55	08.20	10.28 (11) 06.41		04.00	02.30
	14.54	16.40	13.24 (14) 18.10		22.26	00.02
15	09.52	08.17	10.27 (11) 06.37		03.56	02.28
	14.57	16.43	13.23 (14) 18.13		22.29	00.04
16	09.50	08.13	10.26 (11) 06.34		03.53	02.27
	15.00	16.46	13.23 (14) 18.16		22.33	00.05
17	09.47	08.10	10.25 (11) 06.30		03.49	02.26
	15.03	16.50	13.23 (14) 18.19		22.36	00.06
18	09.45	08.06	10.25 (11) 06.26		03.46	02.25
	15.07	16.53	13.22 (14) 18.22		22.40	00.08
19	09.42	08.03	09.50 (12) 06.23		03.43	02.24
	15.10	16.56	13.21 (14) 18.25		22.43	00.08
20	09.39	07.59	09.47 (12) 06.19		03.39	02.24
	15.13	17.00	13.20 (14) 18.28		22.46	00.09
21	09.36	07.56	09.46 (12) 06.15		03.36	02.24
	15.17	17.03	13.19 (14) 18.31		22.50	00.10
22	09.34	07.52	09.45 (12) 06.12		03.32	02.24
	15.20	17.06	13.17 (14) 18.34		22.53	00.10
23	09.31	07.49	09.43 (12) 06.08		03.29	02.24
	15.23	17.09	13.13 (14) 18.37		22.57	00.10
24	09.28	07.45	09.09 (13) 06.05		03.26	02.25
	15.27	17.13	10.45 (11) 18.40		23.00	00.09
25	09.25	07.42	09.06 (13) 06.01		03.23	02.25
	15.30	17.16	10.43 (11) 18.43		23.04	00.09
26	09.22	07.38	09.04 (13) 05.57		03.19	02.26
	15.34	17.19	10.40 (11) 18.47		23.07	00.08
27	09.19	07.35	09.03 (13) 05.54		03.16	02.28
	15.37	17.22	10.07 (12) 18.50		23.11	00.07
28	09.16	07.31	09.02 (13) 05.50		03.13	02.29
	15.41	17.26	10.07 (12) 18.53		23.14	00.06
29	09.13				03.10	02.31
	15.44				23.17	00.04
30	09.10				03.07	02.33
	15.48				23.21	00.03
31	09.06	12.30 (8)			03.04	
	15.51	12.38 (8)			23.24	
Potential sun hours	162	235	363	454	578	641
Total, worst case	8	1836	306			

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

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

SHADOW - Calendar

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **Shadow receptor:** G - Hamland

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October		November	December
1	02.35	04.12	05.52	07.22		07.59	10.42 (10)
	00.01	22.28	20.36	18.47		15.57	86 12.52 (14)
2	02.37	04.15	05.55	07.25		08.02	10.42 (10)
	23.59	22.25	20.33	18.43		15.54	84 12.51 (14)
3	02.39	04.19	05.58	07.28		08.06	10.43 (10)
	23.57	22.21	20.29	18.39		15.50	79 12.50 (14)
4	02.41	04.22	06.01	07.31		09.43 (13)	08.09 10.44 (10)
	23.55	22.18	20.25	18.36	10	09.53 (13)	15.47 73 12.49 (14)
5	02.44	04.25	06.04	07.34		09.40 (13)	08.12 10.46 (10)
	23.53	22.14	20.22	18.32	15	09.55 (13)	15.44 63 12.47 (14)
6	02.47	04.29	06.07	07.37		09.38 (13)	08.16 10.48 (10)
	23.50	22.11	20.18	18.29	18	09.56 (13)	15.40 51 12.45 (14)
7	02.49	04.32	06.10	07.40		09.37 (13)	08.19 11.30 (9)
	23.48	22.07	20.14	18.25	29	10.33 (12)	15.37 28 12.42 (14)
8	02.52	04.35	06.13	07.43		09.36 (13)	08.23 11.56 (8)
	23.45	22.03	20.11	18.21	36	10.35 (12)	15.34 16 12.12 (8)
9	02.55	04.39	06.16	07.46		09.35 (13)	08.26 11.58 (8)
	23.43	22.00	20.07	18.18	41	10.37 (12)	15.31 14 12.12 (8)
10	02.58	04.42	06.19	07.49		09.35 (13)	08.29 11.59 (8)
	23.40	21.56	20.03	18.14	44	10.38 (12)	15.27 12 12.11 (8)
11	03.01	04.45	06.22	07.52		09.34 (13)	08.33 12.01 (8)
	23.37	21.53	20.00	18.11	46	10.39 (12)	15.24 7 12.08 (8)
12	03.04	04.49	06.25	07.55		09.34 (13)	08.36 10.08
	23.34	21.49	19.56	18.07	47	10.39 (12)	15.21 14.09
13	03.08	04.52	06.28	07.58		09.35 (13)	08.40 10.10
	23.31	21.46	19.52	18.04	47	10.40 (12)	15.18 14.08
14	03.11	04.55	06.31	08.01		09.35 (13)	08.43 10.12
	23.28	21.42	19.49	18.00	46	10.39 (12)	15.15 14.07
15	03.14	04.59	06.34	08.04		09.35 (13)	08.46 10.13
	23.25	21.38	19.45	17.56	45	10.39 (12)	15.12 14.06
16	03.17	05.02	06.37	08.07		09.37 (13)	08.50 10.15
	23.22	21.35	19.41	17.53	53	11.14 (11)	15.09 14.05
17	03.21	05.05	06.40	08.10		09.38 (13)	08.53 10.16
	23.19	21.31	19.38	17.49	53	11.15 (11)	15.06 14.05
18	03.24	05.08	06.43	08.14		09.42 (13)	08.57 10.18
	23.16	21.27	19.34	17.46	48	11.17 (11)	15.03 14.05
19	03.27	05.11	06.46	08.17		10.14 (12)	09.00 10.19
	23.12	21.24	19.30	17.42	55	13.45 (14)	15.00 14.05
20	03.31	05.15	06.49	08.20		10.16 (12)	09.03 10.20
	23.09	21.20	19.27	17.39	58	13.48 (14)	14.57 14.05
21	03.34	05.18	06.52	08.23		10.16 (12)	09.07 10.21
	23.06	21.17	19.23	17.35	70	13.49 (14)	14.54 14.05
22	03.38	05.21	06.55	08.26		10.19 (12)	09.10 10.21
	23.02	21.13	19.19	17.32	74	13.51 (14)	14.51 14.05
23	03.41	05.24	06.58	08.30		10.21 (12)	09.14 10.22
	22.59	21.09	19.16	17.28	81	13.51 (14)	14.48 14.06
24	03.44	05.27	07.01	08.33		10.55 (11)	09.17 10.22
	22.56	21.06	19.12	17.25	83	13.52 (14)	14.45 14.06
25	03.48	05.30	07.04	07.36		09.55 (11)	09.20 10.22
	22.52	21.02	19.09	16.21	87	12.53 (14)	14.43 14.07
26	03.51	05.34	07.07	07.39		09.55 (11)	09.23 10.22
	22.49	20.58	19.05	16.18	89	12.52 (14)	14.40 14.08
27	03.55	05.37	07.10	07.42		09.56 (11)	09.27 10.22
	22.46	20.55	19.01	16.14	91	12.52 (14)	14.37 14.10
28	03.58	05.40	07.13	07.46		09.57 (11)	09.30 10.22
	22.42	20.51	18.58	16.11	100	12.53 (14)	14.35 14.11
29	04.02	05.43	07.16	07.49		09.58 (11)	09.33 10.21
	22.39	20.47	18.54	16.07	103	12.53 (14)	14.32 14.13
30	04.05	05.46	07.19	07.52		10.00 (11)	09.36 10.20
	22.35	20.44	18.50	16.04	100	12.53 (14)	14.30 14.14
31	04.08	05.49		07.56		10.03 (11)	10.20
	22.32	20.40		16.01	94	12.52 (14)	14.16
Potential sun hours	621	513	394	302		192	125
Total, worst case				1663		513	

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

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

Hundhammerfjellet Reetabling

NTE Energi AS

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Calculated:
20.12.2018 11.11/3.2.737

SHADOW - Calendar

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**Shadow receptor:** H - Myhrvang
Assumptions for shadow calculations

- The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December				
1	10.18	09.03	12.10 (10)	07.28	06.35	04.46	03.01	02.34	04.12	05.52	07.22	07.59	10.21 (12)	09.39		
	14.18	15.55	28	12.55 (9)	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	105	13.41 (14)	14.28
2	10.17	09.00		11.31 (11)	07.24	06.32	04.42	02.58	02.37	04.15	05.55	07.25	08.02		10.22 (12)	09.42
	14.21	15.58	42	12.57 (9)	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	104	13.40 (14)	14.26
3	10.16	08.57		11.29 (11)	07.21	06.28	04.39	02.55	02.39	04.19	05.58	07.28	08.06		10.25 (12)	09.45
	14.23	16.02	60	14.04 (14)	17.35	20.11	21.48	23.34	23.57	22.21	20.29	18.39	15.50	98	13.40 (14)	14.23
4	10.15	08.54		11.27 (11)	07.17	06.24	04.35	02.52	02.41	04.22	06.01	07.31	08.09		10.29 (12)	09.48
	14.25	16.05	69	14.05 (14)	17.38	20.14	21.51	23.37	23.55	22.18	20.25	18.36	15.47	88	13.39 (14)	14.21
5	10.13	08.50		11.26 (11)	07.13	06.21	04.32	02.49	02.44	04.25	06.04	07.34	08.12		10.56 (11)	09.51
	14.28	16.09	77	14.07 (14)	17.42	20.17	21.54	23.40	23.53	22.14	20.22	18.32	15.44	80	13.38 (14)	14.19
6	10.11	08.47		11.25 (11)	07.10	06.17	04.38	02.47	02.47	04.29	06.07	07.37	08.16		10.57 (11)	09.54
	14.30	16.12	81	14.08 (14)	17.45	20.20	21.58	23.43	23.50	22.11	20.18	18.29	15.40	73	13.37 (14)	14.17
7	10.10	08.44		10.57 (12)	07.06	06.13	04.24	02.44	02.49	04.32	06.10	07.40	08.19		10.58 (11)	09.56
	14.33	16.16	91	14.09 (14)	17.48	20.23	22.01	23.45	23.48	22.07	20.14	18.25	15.37	68	13.35 (14)	14.16
8	10.08	08.40		10.54 (12)	07.03	06.10	04.21	02.42	02.52	04.35	06.13	07.43	08.23		10.59 (11)	09.59
	14.36	16.19	99	14.10 (14)	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.21	15.34	58	13.33 (14)	14.14
9	10.06	08.37		10.52 (12)	06.59	06.06	04.17	02.39	02.55	04.39	06.16	07.46	08.26		11.02 (11)	10.01
	14.38	16.23	104	14.10 (14)	17.54	20.30	22.08	23.51	23.43	22.00	20.07	18.18	15.31	40	12.27 (9)	14.12
10	10.04	08.34		10.50 (12)	06.55	06.02	04.14	02.37	02.58	04.42	06.19	07.49	08.29		11.40 (10)	10.03
	14.41	16.26	106	14.10 (14)	17.57	20.33	22.12	23.53	23.40	21.56	20.03	18.14	15.27	28	12.26 (9)	14.11
11	10.02	08.30		10.49 (12)	06.52	05.59	04.10	02.35	03.01	04.45	06.22	07.52	08.33		11.41 (10)	10.06
	14.44	16.29	106	14.10 (14)	18.00	20.36	22.15	23.56	23.37	21.53	20.00	18.11	15.24	21	12.24 (9)	14.10
12	09.59	08.27		10.07 (13)	06.48	05.55	04.07	02.33	03.04	04.49	06.25	07.55	08.36		11.44 (10)	10.08
	14.47	16.33	110	14.10 (14)	18.03	20.39	22.19	23.58	23.34	21.49	19.56	18.07	15.21	11	11.55 (10)	14.09
13	09.57	08.24		10.05 (13)	06.45	05.51	04.03	02.31	03.08	04.52	06.28	07.58	08.40		11.46 (10)	10.10
	14.50	16.36	111	14.11 (14)	18.07	20.42	22.22	00.00	23.31	21.46	19.52	18.03	15.18	5	11.51 (10)	14.08
14	09.55	08.20		10.03 (13)	06.41	05.48	04.00	02.30	03.11	04.55	06.31	08.01	08.43		10.36 (13)	10.12
	14.54	16.40	104	14.11 (14)	18.10	20.45	22.26	00.02	23.28	21.42	19.49	18.00	13	10.49 (13)	15.15	14.07
15	09.52	08.17		10.02 (13)	06.37	05.44	03.56	02.28	03.14	04.59	06.34	08.04	08.46		10.34 (13)	10.13
	14.57	16.43	85	14.10 (14)	18.13	20.49	22.29	00.04	23.25	21.38	19.45	17.56	16	10.52 (13)	15.12	14.06
16	09.50	08.13		10.00 (13)	06.34	05.40	03.53	02.27	03.17	05.02	06.37	08.07	08.50		10.33 (13)	10.15
	15.00	16.46	84	14.09 (14)	18.16	20.52	22.33	00.05	23.22	21.35	19.41	17.53	19	10.53 (13)	15.09	14.05
17	09.47	08.10		10.00 (13)	06.30	05.37	03.49	02.26	03.21	05.05	06.40	08.10	08.53		10.31 (13)	10.16
	15.03	16.50	81	14.08 (14)	18.19	20.55	22.36	00.07	23.19	21.31	19.38	17.49	32	11.36 (12)	15.05	14.05
18	09.45	08.06		09.59 (13)	06.26	05.33	03.46	02.25	03.24	05.08	06.43	08.14	08.57		10.30 (13)	10.17
	15.07	16.53	71	14.06 (14)	18.22	20.58	22.40	00.08	23.16	21.27	19.34	17.46	39	11.40 (12)	15.02	14.08
19	09.42	08.03		09.58 (13)	06.23	05.29	03.43	02.24	03.27	05.11	06.46	08.17	08.57		10.29 (13)	10.19
	15.10	16.56	57	14.03 (14)	18.25	21.01	22.43	00.09	23.12	21.24	19.30	17.42	43	11.41 (12)	15.00	14.04
20	09.39	07.59		09.58 (13)	06.19	05.26	03.39	02.24	03.31	05.15	06.49	08.20	09.03		10.29 (13)	10.20
	15.13	17.00	49	11.12 (12)	18.28	21.05	22.46	00.09	23.09	21.20	19.27	17.39	46	11.42 (12)	14.57	14.05
21	09.36	07.56		09.58 (13)	06.15	05.22	03.36	02.24	03.34	05.18	06.52	08.23	09.07		10.29 (13)	10.21
	15.17	17.03	48	11.11 (12)	18.31	21.08	22.50	00.10	23.06	21.17	19.23	17.35	49	11.43 (12)	14.54	14.05
22	09.34	07.52		09.59 (13)	06.12	05.18	03.32	02.24	03.38	05.21	06.55	08.26	09.10		10.29 (13)	10.21
	15.20	17.06	45	11.11 (12)	18.34	21.11	22.53	00.10	23.02	21.13	19.19	17.32	50	11.44 (12)	14.51	14.05
23	09.31	07.49		09.59 (13)	06.08	05.15	03.29	02.24	03.41	05.24	06.58	08.29	09.14		10.28 (13)	10.22
	15.23	17.09	42	11.09 (12)	18.37	21.14	22.57	00.10	22.59	21.09	19.16	17.28	61	14.34 (14)	14.48	14.06
24	09.28	07.45		09.59 (13)	06.04	05.11	03.26	02.25	03.44	05.27	07.01	08.33	09.17		10.29 (13)	10.22
	15.27	17.13	37	11.07 (12)	18.40	21.18	23.00	00.09	22.56	21.06	19.12	17.25	75	14.36 (14)	14.45	14.06
25	09.25	07.42		10.00 (13)	06.01	05.08	03.23	02.25	03.48	05.30	07.04	07.36	08.20		10.29 (13)	10.22
	15.30	17.16	28	11.03 (12)	18.43	21.21	23.04	00.09	22.52	21.02	19.09	16.21	81	13.38 (14)	14.43	14.07
26	09.22	07.38		10.01 (13)	05.57	05.04	03.19	02.26	03.51	05.34	07.07	07.39	08.23		10.29 (13)	10.22
	15.34	17.19	18	10.19 (13)	18.46	21.24	23.07	00.08	22.49	20.58	19.05	16.18	83	13.38 (14)	14.40	14.08
27	09.19	07.35		10.03 (13)	05.54	05.00	03.16	02.28	03.55	05.37	07.10	07.42	08.27		10.29 (13)	10.22
	15.37	17.22	15	10.18 (13)	18.50	21.28	23.11	00.07	22.46	20.55	19.01	16.14	88	13.39 (14)	14.37	14.10
28	09.16	07.31		10.05 (13)	05.50	04.57	03.13	02.29	03.58	05.40	07.13	07.46	08.30		10.29 (13)	10.22
	15.41	17.26	10	10.15 (13)	18.53	21.31	23.14	00.06	22.42	20.51	18.58	16.11	108	13.40 (14)	14.35	14.11
29	09.13	12.14 (10)			06.46	04.53	03.10	02.31	04.02	05.43	07.16	07.49	08.33		09.35 (13)	09.33
	15.44	6	12.20 (10)		19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.07	111	13.40 (14)	14.32	14.12
30	09.10	12.12 (10)			06.43	04.49	03.07	02.32	04.05	05.46	07.19	07.52	08.36		09.39 (13)	09.36
	15.48	11	12.23 (10)		19.59	21.38	23.21	00.03	22.35	20.44	18.50	16.04	107	13.41 (14)	14.30	14.14
31	09.06	12.10 (10)			06.39		03.04		04.08	05.49		07.56	08.40		10.20 (12)	10.20
	15.51	21	12.52 (9)		20.02		23.24		22.32	20.40		16.01	106	13.41 (14)	14.30	14.16
Potential sun hours	162		235		363	454	578	641	621	513	394	302	1127		192	779
Total, worst case	38		1858													125

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

Day in month	Sun rise (hh:mm)	Minutes with flicker	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:

Hundhammerfjellet Reetablering

NTE Energi AS

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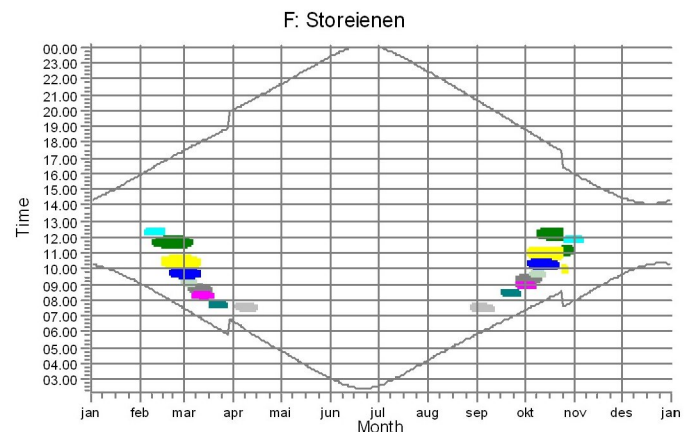
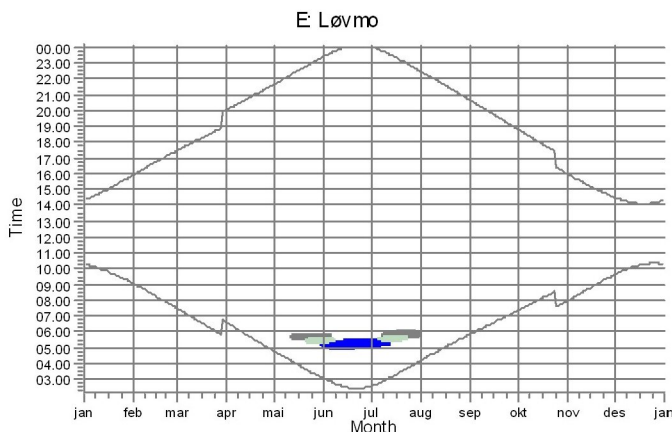
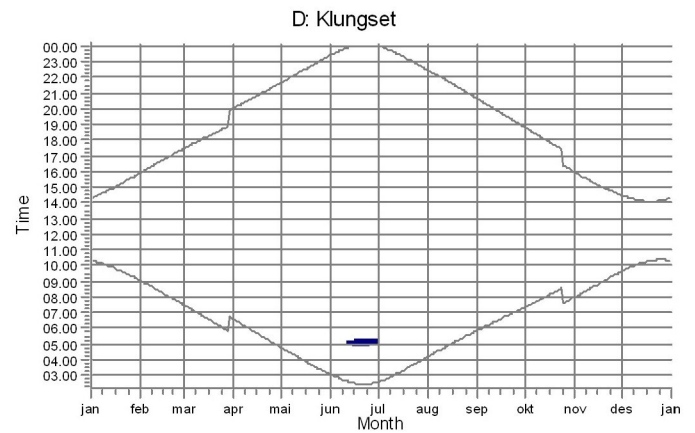
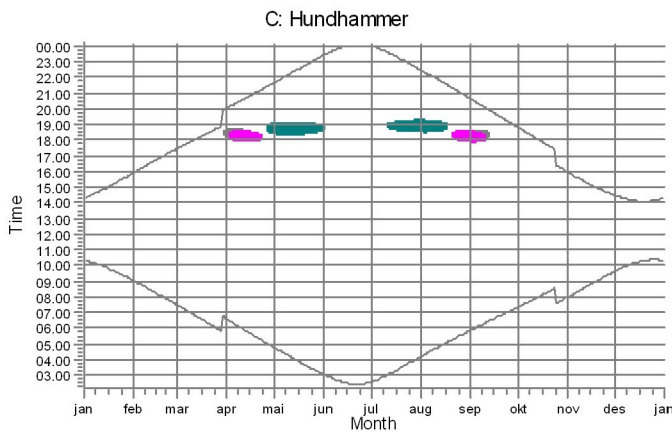
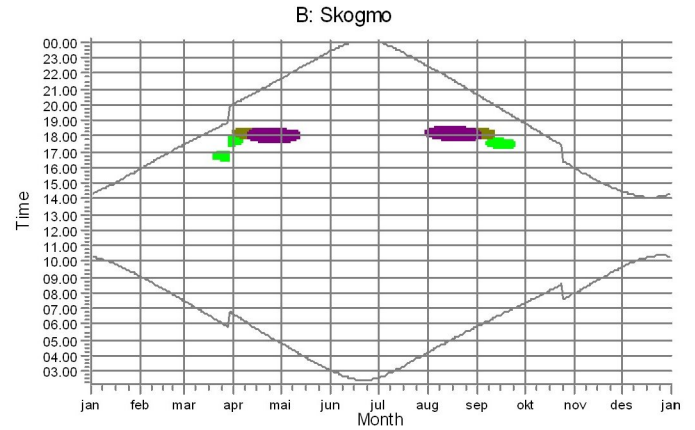
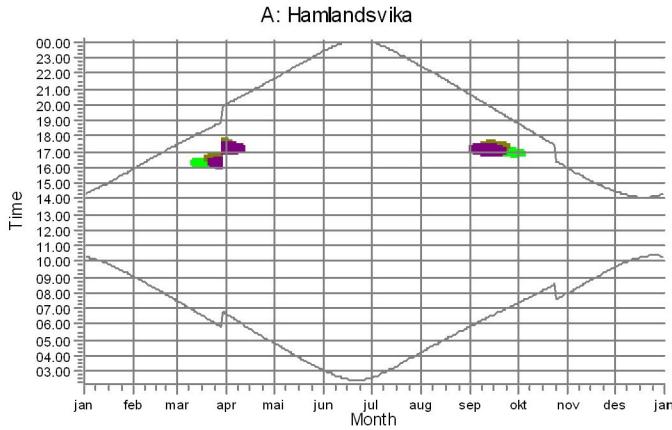
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

20.12.2018 11.11/3.2.737

SHADOW - Calendar, graphical

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6



WTGs

- 3: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (627)
- 4: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (628)
- 5: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)
- 6: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (630)
- 7: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (631)
- 8: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)
- 9: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)

- 11: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)
- 12: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)
- 13: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)
- 14: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)
- 1: M1-E-70 E4 2000 71.0
- 2: M5- E-70 E4 2,3 MW 2300

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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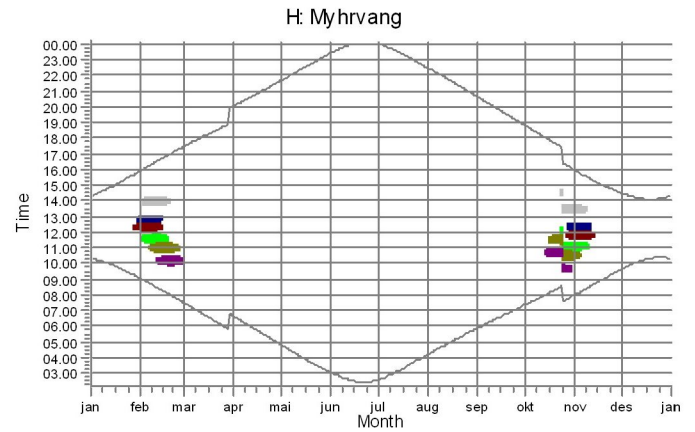
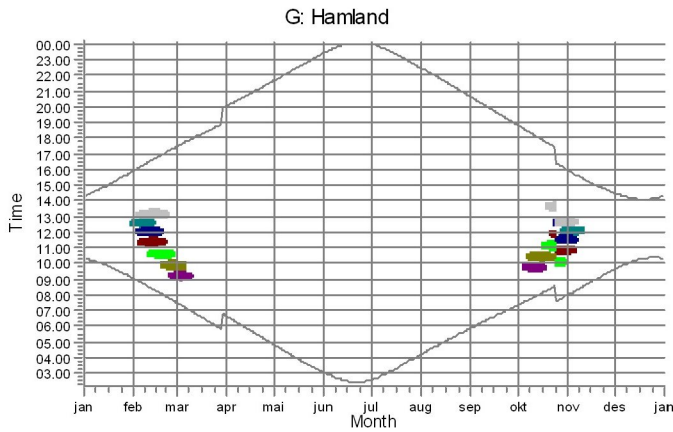
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:





20.12.2018 11.11/3.2.737




SHADOW - Calendar, graphical

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6



WTGs

	8: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)
	9: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)
	10: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (634)
	11: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)

	12: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)
	13: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)
	14: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v **WTG:** 3 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (627)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10.18 14.19	09.03 15.55	07.28 17.29	11.24-11.53/29 20.05	06.35 20.05	04.46 21.41	03.01 23.27	02.35 00.01	04.12 22.28	05.52 20.36	07.22 18.47	07.59 15.57	09.39 14.28
2	10.17 14.21	09.00 15.59	07.24 17.32	11.25-11.51/26 20.08	06.32 20.08	04.43 21.44	02.58 23.30	02.37 23.59	04.16 22.25	05.55 20.33	07.25 18.43	08.02 15.54	09.42 14.26
3	10.16 14.23	08.57 16.02	07.21 17.35	11.27-11.49/22 20.11	06.28 20.11	04.39 21.48	02.56 23.33	02.40 23.57	04.19 22.21	05.58 20.29	07.28 18.40	08.06 15.51	09.45 14.24
4	10.14 14.26	08.54 16.06	07.17 17.39	11.30-11.47/17 20.14	06.24 20.14	04.35 21.51	02.53 23.36	02.42 23.55	04.22 22.18	06.01 20.25	07.31 18.36	08.09 15.47	09.48 14.22
5	10.13 14.28	08.50 16.09	07.13 17.42	11.34-11.42/8 20.17	06.21 20.17	04.32 21.54	02.50 23.39	02.45 23.52	04.26 22.14	06.04 20.22	07.34 18.32	08.12 15.44	09.51 14.20
6	10.11 14.31	08.47 16.12	07.10 17.45	20.20	06.17 20.20	04.28 21.58	02.47 23.42	02.47 23.50	04.29 22.11	06.07 20.18	07.37 18.29	08.16 15.41	09.53 14.18
7	10.09 14.33	08.44 16.16	07.06 17.48	20.24	06.13 20.24	04.25 22.01	02.45 23.45	02.50 23.47	04.32 22.07	06.10 20.14	07.40 18.25	08.19 15.37	09.56 14.16
8	10.08 14.36	08.40 16.19	07.03 17.51	20.27	06.10 20.27	04.21 22.05	02.42 23.48	02.53 23.45	04.36 22.03	06.13 20.11	07.43 18.22	08.23 15.34	09.59 14.14
9	10.06 14.39	08.37 16.23	06.59 17.54	20.30	06.06 20.30	04.18 22.08	02.40 23.50	02.56 23.42	04.39 22.00	06.16 20.07	07.46 18.18	12.07-12.20/13 15.31	10.01 14.13
10	10.04 14.42	08.34 16.26	11.37-11.43/6 17.57	20.33	06.03 20.33	04.14 22.12	02.38 23.53	02.59 23.39	04.42 21.56	06.19 20.03	07.49 18.14	12.03-12.22/19 15.28	10.03 14.12
11	10.02 14.45	08.30 16.30	11.32-11.47/15 18.01	20.36	05.59 20.36	04.11 22.15	02.36 23.55	03.02 23.37	04.46 21.53	06.22 20.00	07.52 18.11	12.00-12.24/24 15.24	10.06 14.10
12	09.59 14.48	08.27 16.33	11.31-11.50/19 18.04	20.39	05.55 20.39	04.07 22.19	02.34 23.58	03.05 23.34	04.49 21.49	06.25 19.56	07.55 18.07	11.58-12.25/27 15.21	10.08 14.09
13	09.57 14.51	08.24 16.36	11.29-11.52/23 18.07	20.42	05.52 20.42	04.04 22.22	02.32 00.00	03.08 23.31	04.52 21.46	06.28 19.52	07.58 18.04	11.57-12.27/30 15.18	10.10 14.08
14	09.55 14.54	08.20 16.40	11.27-11.54/27 18.10	20.46	05.48 20.46	04.00 22.25	02.30 00.01	03.11 23.28	04.56 21.42	06.31 19.49	08.01 18.00	11.56-12.27/31 15.15	10.11 14.07
15	09.52 14.57	08.17 16.43	11.26-11.55/29 18.13	20.49	05.44 20.49	03.57 22.29	02.29 00.03	03.15 23.25	04.59 21.38	06.34 19.47	08.04 17.57	11.55-12.27/32 15.12	10.13 14.06
16	09.50 15.00	08.13 16.47	11.25-11.55/30 18.16	20.52	05.41 20.52	03.53 22.32	02.28 00.05	03.18 23.22	05.02 21.35	06.37 19.42	08.07 17.53	11.54-12.28/34 15.09	10.15 14.06
17	09.47 15.04	08.10 16.50	11.24-11.56/32 18.19	20.55	05.37 20.55	03.50 22.36	02.27 00.06	03.21 23.19	05.05 21.31	06.40 19.38	08.11 17.49	11.53-12.28/35 15.06	10.16 14.05
18	09.45 15.07	08.06 16.53	11.23-11.57/34 18.22	20.58	05.33 20.58	03.46 22.39	02.26 00.07	03.24 23.15	05.08 21.27	06.43 19.34	08.14 17.46	11.54-12.29/35 15.03	10.17 14.05
19	09.42 15.10	08.03 16.57	11.23-11.57/34 18.25	21.01	05.30 21.01	03.43 22.43	02.25 00.08	03.28 23.12	05.12 21.24	06.46 19.31	08.17 17.42	11.53-12.28/35 15.00	10.19 14.05
20	09.39 15.14	07.59 17.09	11.22-11.57/35 18.28	21.05	05.26 21.05	03.40 22.46	02.25 00.09	03.31 23.09	05.15 21.20	06.49 19.27	08.20 17.39	11.53-12.28/35 14.57	10.20 14.05
21	09.36 15.17	07.56 17.03	11.23-11.58/35 18.31	21.08	05.22 21.08	03.36 22.50	02.24 00.09	03.35 23.06	05.18 21.17	06.52 19.23	08.23 17.35	11.52-12.28/36 14.54	10.20 14.05
22	09.34 15.20	07.52 17.06	11.22-11.58/36 18.34	21.11	05.19 21.11	03.33 22.53	02.25 00.09	03.38 23.02	05.21 21.13	06.55 19.20	08.26 17.32	11.53-12.28/35 14.51	10.21 14.06
23	09.31 15.24	07.49 17.10	11.22-11.57/35 18.37	21.14	05.15 21.14	03.30 22.57	02.25 00.09	03.41 22.59	05.24 21.09	06.58 19.16	08.30 17.28	11.54-12.28/34 14.48	10.21 14.06
24	09.28 15.27	07.45 17.13	11.22-11.57/35 18.41	21.18	05.11 21.18	03.26 23.00	02.25 00.09	03.45 22.56	05.28 21.06	07.01 19.12	08.33 17.25	11.53-12.26/33 14.46	10.22 14.07
25	09.25 15.31	07.42 17.16	11.22-11.56/34 18.44	21.21	05.08 21.21	03.23 23.04	02.26 00.08	03.48 22.52	05.31 21.02	07.04 19.09	07.36 16.21	10.54-11.26/32 14.43	10.22 14.08
26	09.22 15.34	07.38 17.19	11.22-11.56/34 18.47	21.24	05.04 21.24	03.20 23.07	02.27 00.08	03.52 22.49	05.34 20.58	07.07 19.05	07.39 16.18	10.55-11.25/30 14.40	10.23 14.09
27	09.19 15.38	07.35 17.23	11.23-11.56/33 18.50	21.28	05.01 21.28	03.17 23.10	02.28 00.07	03.55 22.45	05.37 20.55	07.10 19.01	07.43 16.14	10.55-11.23/28 14.38	10.22 14.10
28	09.16 15.41	07.31 17.26	11.24-11.54/30 18.53	21.31	04.57 21.31	03.13 23.14	02.30 00.05	03.58 22.42	05.40 20.51	07.13 18.58	07.46 16.11	10.57-11.22/25 14.35	10.21 14.11
29	09.13 15.45	07.26 17.26	18.53 06.46	21.34	04.53 21.34	03.10 23.17	02.31 00.04	04.02 22.39	05.43 20.47	07.16 18.54	07.49 16.08	10.58-11.21/23 14.33	10.21 14.13
30	09.10 15.48	07.21 17.21	06.43 19.56	21.37	04.50 21.37	03.07 23.20	02.33 00.02	04.05 22.35	05.46 20.44	07.19 18.50	07.52 16.04	11.00-11.19/19 14.30	10.20 14.15
31	09.06 15.52	07.16 17.16	06.39 20.02	21.40	04.44 21.40	03.04 23.24	02.32 00.00	04.09 22.32	05.49 20.40	07.56 16.01	11.03-11.17/14 14.16	10.19 14.16	
	Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125
	Sum of minutes with flicker	0	556	102	0	0	0	0	0	0	659	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:

Hundhammerfjellet Reetabling

NTE Energi AS

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NO-0213 Oslo
+47 21 58 60 15
Helge Dalbu / helge.dalbu@multiconsult.no
Calculated:
20.12.2018 11.11/3.2.737

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v. **WTG:** 4 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (628)

Assumptions for shadow calculations

- The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December			
1	10.18	09.03	07.28	10.07-10.45/38	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	09.39		
	14.19	15.55	17.29		20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	14.28		
2	10.17	09.00	07.24	10.07-10.44/37	06.32	04.43	02.58	02.37	04.16	05.55	07.25	08.02	09.42		
	14.21	15.59	17.32		20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	14.26		
3	10.16	08.57	07.21	10.07-10.43/36	06.28	04.39	02.55	02.40	04.19	05.58	07.28	10.57-11.07/10	08.06	09.45	
	14.23	16.02	17.35		20.11	21.48	23.33	23.57	22.21	20.29	18.40	15.51	14.24		
4	10.14	08.54	07.17	10.08-10.43/35	06.24	04.35	02.53	02.42	04.22	06.01	07.31	10.52-11.10/18	08.09	09.48	
	14.26	16.05	17.39		20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47	14.22		
5	10.13	08.50	07.13	10.08-10.42/34	06.21	04.32	02.50	02.45	04.26	06.04	07.34	10.49-11.13/24	08.12	09.51	
	14.28	16.09	17.42		20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44	14.20		
6	10.11	08.47	07.10	10.09-10.40/31	06.17	04.28	02.47	02.47	04.29	06.07	07.37	10.47-11.14/27	08.16	09.53	
	14.31	16.12	17.45		20.20	21.58	23.42	23.50	22.11	20.18	18.29	15.41	14.18		
7	10.09	08.44	07.06	10.10-10.38/28	06.13	04.25	02.45	02.50	04.32	06.10	07.40	10.45-11.15/30	08.19	09.56	
	14.33	16.16	17.48		20.24	22.01	23.45	23.48	22.07	20.14	18.25	15.37	14.16		
8	10.08	08.40	07.03	10.12-10.37/25	06.10	04.21	02.42	02.53	04.36	06.13	07.43	10.44-11.16/32	08.23	09.59	
	14.36	16.19	17.51		20.27	22.05	23.48	23.45	22.03	20.11	18.22	15.34	14.14		
9	10.06	08.37	06.59	10.13-10.34/21	06.06	04.18	02.40	02.56	04.39	06.16	07.46	10.43-11.17/34	08.26	10.01	
	14.39	16.23	17.54		20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13		
10	10.04	08.34	06.55	10.16-10.30/14	06.02	04.14	02.38	02.59	04.42	06.19	07.49	10.42-11.18/36	08.29	10.03	
	14.42	16.26	17.57		20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.28	14.11		
11	10.02	08.30	06.52		05.59	04.11	02.36	03.02	04.46	06.22	07.52	10.41-11.18/37	08.33	10.06	
	14.45	16.30	18.01		20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10		
12	09.59	08.27	06.48		05.55	04.07	02.34	03.05	04.49	06.25	07.55	10.40-11.17/37	08.36	10.08	
	14.48	16.33	18.04		20.39	22.19	23.58	23.34	21.49	19.56	18.07	15.21	14.09		
13	09.57	08.24	06.45		05.52	04.04	02.32	03.08	04.52	06.28	07.58	10.40-11.18/38	08.40	10.10	
	14.51	16.36	18.07		20.42	22.22	00.00	23.31	21.46	19.52	18.04	15.18	14.08		
14	09.55	08.20	06.41		05.48	04.00	02.30	03.11	04.56	06.31	08.01	10.40-11.18/38	08.43	10.11	
	14.54	16.40	18.10		20.46	22.25	00.02	23.28	21.42	19.49	18.00	15.15	14.07		
15	09.52	08.17	10.20-10.35/15		06.37	05.44	03.57	02.29	03.14	04.59	06.34	08.04	10.39-11.17/38	08.46	10.13
	14.57	16.43	18.13		20.49	22.29	00.03	23.25	21.38	19.47	17.57	15.12	14.06		
16	09.50	08.13	10.17-10.37/20		06.34	05.41	03.53	02.28	03.18	05.02	06.37	08.07	10.39-11.17/38	08.50	10.15
	15.00	16.47	18.16		20.52	22.32	00.05	23.22	21.35	19.42	17.53	15.09	14.06		
17	09.47	08.10	10.15-10.39/24		06.30	05.37	03.50	02.27	03.21	05.05	06.40	08.11	10.39-11.17/38	08.53	10.16
	15.04	16.50	18.19		20.55	22.36	00.06	23.19	21.31	19.38	17.49	15.06	14.05		
18	09.45	08.06	10.13-10.41/28		06.26	05.33	03.46	02.26	03.24	05.08	06.43	08.14	10.40-11.17/37	08.57	10.17
	15.07	16.53	18.22		20.58	22.39	00.07	23.15	21.27	19.34	17.46	15.03	14.05		
19	09.42	08.03	10.12-10.42/30		06.23	05.30	03.43	02.25	03.28	05.12	06.46	08.17	10.39-11.15/36	09.00	10.19
	15.10	16.56	18.25		21.01	22.43	00.08	23.12	21.24	19.31	17.42	15.00	14.05		
20	09.39	07.59	10.11-10.43/32		06.19	05.26	03.40	02.25	03.31	05.15	06.49	08.20	10.40-11.15/35	09.03	10.20
	15.14	17.00	18.28		21.05	22.46	00.09	23.09	21.20	19.27	17.39	14.57	14.05		
21	09.36	07.56	10.10-10.44/34		06.16	05.22	03.36	02.24	03.35	05.18	06.52	08.23	10.40-11.14/34	09.07	10.20
	15.17	17.03	18.31		21.08	22.50	00.09	23.06	21.17	19.23	17.35	14.54	14.05		
22	09.34	07.52	10.09-10.45/36		06.12	05.19	03.33	02.24	03.38	05.21	06.55	08.26	10.42-11.13/31	09.10	10.21
	15.20	17.06	18.34		21.11	22.53	00.09	23.02	21.13	19.20	17.32	14.51	14.06		
23	09.31	07.49	10.09-10.45/36		06.08	05.15	03.30	02.25	03.41	05.24	06.58	08.30	10.43-11.12/29	09.13	10.21
	15.24	17.10	18.37		21.14	22.57	00.09	22.59	21.09	19.16	17.28	14.48	14.06		
24	09.28	07.45	10.08-10.45/37		06.05	05.11	03.26	02.25	03.45	05.27	07.01	08.33	10.44-11.10/26	09.17	10.22
	15.27	17.13	18.40		21.18	23.00	00.09	22.56	21.06	19.12	17.25	14.46	14.07		
25	09.25	07.42	10.07-10.45/38		06.01	05.08	03.23	02.26	03.48	05.31	07.04	07.36	09.46-10.09/23	09.20	10.22
	15.31	17.16	18.44		21.21	23.04	00.08	22.52	21.02	19.09	16.21	14.43	14.08		
26	09.22	07.38	10.07-10.45/38		05.57	05.04	03.20	02.27	03.52	05.34	07.07	07.39	09.48-10.07/19	09.23	10.22
	15.34	17.19	18.47		21.24	23.07	00.08	22.49	20.58	19.05	16.18	14.40	14.09		
27	09.19	07.35	10.07-10.46/39		05.54	05.01	03.17	02.28	03.55	05.37	07.10	07.43	09.50-10.03/13	09.27	10.22
	15.38	17.23	18.50		21.28	23.10	00.07	22.45	20.55	19.01	16.14	14.38	14.10		
28	09.16	07.31	10.07-10.45/38		05.50	04.57	03.13	02.30	03.58	05.40	07.13	07.46		09.30	10.21
	15.41	17.26	18.53		21.31	23.14	00.05	22.42	20.51	18.58	16.11	14.35	14.11		
29	09.13		06.46		04.53	03.10	02.31	04.02	05.43	07.16	07.49	09.33	10.21		
	15.45		19.56		21.34	23.17	00.04	22.39	20.47	18.54	16.08	14.33	14.13		
30	09.10		06.43		04.50	03.07	02.33	04.05	05.46	07.19	07.52	09.36	10.20		
	15.48		19.59		21.38	23.20	00.02	22.35	20.44	18.50	16.04	14.30	14.15		
31	09.06		06.39			03.04		04.09	05.49		07.56		10.19		
	15.52		20.02			23.24		22.32	20.40		16.01		14.16		
Potential sun hours	163	235	363	454	578	641	620	513	394	302	758	192	125		
Sum of minutes with flicker	0	445	299	0	0	0	0	0	0	0	758	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v60WTG: 5 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	
1	10.18 14.19	09.03 15.55	07.28 17.29	09.28-09.58/30 17.29	06.35 20.05	04.46 21.41	
2	10.17 14.21	09.00 15.58	07.24 17.32	09.28-09.57/29 17.32	06.32 20.08	04.43 21.44	
3	10.16 14.23	08.57 16.02	07.21 17.35	09.28-09.57/29 17.35	06.28 20.11	04.39 21.48	
4	10.14 14.26	08.54 16.05	07.17 17.39	09.28-09.57/29 17.39	06.24 20.14	04.35 21.51	
5	10.13 14.28	08.50 16.09	07.13 17.42	09.29-09.56/27 17.42	06.21 20.17	04.32 21.54	
6	10.11 14.31	08.47 16.12	07.10 17.45	09.29-09.55/26 17.45	06.17 20.20	04.28 21.58	
7	10.09 14.33	08.44 16.16	07.06 17.48	09.29-09.53/24 17.48	06.13 20.24	04.25 22.01	
8	10.08 14.36	08.40 16.19	07.03 17.51	09.31-09.52/21 17.51	06.10 20.27	04.21 22.05	
9	10.06 14.39	08.37 16.23	06.59 17.54	09.32-09.50/18 17.54	06.06 20.30	04.18 22.08	
10	10.04 14.42	08.34 16.26	06.55 17.57	09.35-09.46/11 17.57	06.02 20.33	04.14 22.12	
11	10.01 14.45	08.30 16.30	06.52 18.00		05.59 20.36	04.11 22.15	
12	09.59 14.48	08.27 16.33	06.48 18.04		05.55 20.39	04.07 22.19	
13	09.57 14.51	08.24 16.36	06.45 18.07		05.52 20.42	04.04 22.22	
14	09.55 14.54	08.20 16.40	06.41 18.10		05.48 20.45	04.00 22.25	
15	09.52 14.57	08.17 16.43	06.37 18.13		05.44 20.49	03.57 22.29	
16	09.50 15.00	08.13 16.46	06.34 18.16		05.41 20.52	03.53 22.32	
17	09.47 15.04	08.10 16.50	06.30 18.19		05.37 20.55	03.50 22.36	
18	09.45 15.07	08.06 16.53	06.26 18.22		05.33 20.58	03.46 22.39	
19	09.42 15.10	08.03 16.56	06.23 18.25		05.30 21.01	03.43 22.43	
20	09.39 15.14	07.59 17.00	06.19 18.28	09.41-09.47/6	05.26 21.05	03.40 22.46	
21	09.36 15.17	07.56 17.03	06.16 18.31	09.37-09.52/15	05.22 21.08	03.36 22.50	
22	09.34 15.20	07.52 17.06	06.12 18.34	09.35-09.53/18	05.19 21.11	03.33 22.53	
23	09.31 15.24	07.49 17.10	06.08 18.37	09.33-09.55/22	05.15 21.14	03.29 22.57	
24	09.28 15.27	07.45 17.13	06.05 18.40	09.31-09.56/25	05.11 21.18	03.26 23.00	
25	09.25 15.31	07.42 17.16	06.01 18.44	09.30-09.56/26	05.08 21.21	03.23 23.04	
26	09.22 15.34	07.38 17.19	05.57 18.47	09.29-09.57/28	05.04 21.24	03.20 23.07	
27	09.19 15.38	07.35 17.23	05.54 18.50	09.29-09.58/29	05.01 21.28	03.17 23.10	
28	09.16 15.41	07.31 17.26	05.50 18.53	09.29-09.58/29	04.57 21.31	03.13 23.14	
29	09.13 15.45		06.46 19.56		04.53 21.34	03.10 23.17	
30	09.10 15.48		06.43 19.59		04.50 21.38	03.07 23.20	
31	09.06 15.52		06.39 20.02			03.04 23.24	
	Potential sun hours	163	235	363	454	578	641
	Sum of minutes with flicker	0	198	244	0	1	600

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v60 WTG: 5 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35 05.05-05.26/21 00.01	04.12 22.28	05.52 20.36	07.22 18.47	07.59 15.57	09.39 14.28
2	02.37 05.06-05.26/20 23.59	04.15 22.25	05.55 20.33	07.25 18.43	08.02 15.54	09.42 14.26
3	02.40 05.06-05.26/20 23.57	04.19 22.21	05.58 20.29	07.28 18.40	10.15-10.22/7 08.06	09.45 14.24
4	02.42 05.07-05.26/19 23.55	04.22 22.18	06.01 20.25	07.31 18.36	10.11-10.26/15 08.09	09.48 14.22
5	02.45 05.07-05.25/18 23.52	04.26 22.14	06.04 20.22	07.34 18.32	10.09-10.28/19 08.12	09.51 14.20
6	02.47 05.08-05.25/17 23.50	04.29 22.11	06.07 20.18	07.37 18.29	10.07-10.29/22 08.16	09.53 14.18
7	02.50 05.09-05.25/16 23.47	04.32 22.07	06.10 20.14	07.40 18.25	10.05-10.30/25 08.19	09.56 14.16
8	02.53 05.09-05.24/15 23.45	04.36 22.03	06.13 20.11	07.43 18.22	10.04-10.30/26 08.23	09.59 14.14
9	02.56 05.10-05.24/14 23.42	04.39 22.00	06.16 20.07	07.46 18.18	10.04-10.31/27 08.26	10.01 14.13
10	02.59 05.11-05.23/12 23.39	04.42 21.56	06.19 20.03	07.49 18.14	10.03-10.31/28 08.29	10.03 14.11
11	03.02 05.13-05.22/9 23.37	04.46 21.53	06.22 20.00	07.52 18.11	10.02-10.31/29 08.33	10.06 14.10
12	03.05 05.15-05.20/5 23.34	04.49 21.49	06.25 19.56	07.55 18.07	10.01-10.31/30 08.36	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 19.52	07.58 18.04	10.02-10.31/29 08.40	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 19.49	08.01 18.00	10.01-10.30/29 08.43	10.11 14.07
15	03.14 23.25	04.59 21.38	06.34 19.45	08.04 17.57	10.01-10.29/28 08.46	10.13 14.06
16	03.18 23.22	05.02 21.35	06.37 19.41	08.07 17.53	10.02-10.29/27 08.50	10.15 14.06
17	03.21 23.19	05.05 21.31	06.40 19.38	08.10 17.49	10.02-10.28/26 08.53	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 19.34	08.14 17.46	10.04-10.27/23 08.57	10.17 14.05
19	03.28 23.12	05.12 21.24	06.46 19.31	08.17 17.42	10.04-10.25/21 09.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 19.27	08.20 17.39	10.06-10.24/18 09.03	10.20 14.05
21	03.35 23.06	05.18 21.17	06.52 19.23	08.23 17.35	10.08-10.20/12 09.07	10.20 14.05
22	03.38 23.02	05.21 21.13	06.55 19.20	08.26 17.32	09.10 14.51	10.21 14.06
23	03.41 22.59	05.24 21.09	06.58 19.16	08.30 17.28	09.13 14.48	10.21 14.06
24	03.45 22.56	05.27 21.06	07.01 19.12	08.33 17.25	09.17 14.46	10.22 14.07
25	03.48 22.52	05.31 21.02	07.04 19.09	07.36 16.21	09.20 14.43	10.22 14.08
26	03.52 22.49	05.34 20.58	07.07 19.05	07.39 16.18	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 20.55	07.10 19.01	07.42 16.14	09.27 14.38	10.22 14.10
28	03.58 22.42	05.40 20.51	07.13 18.58	07.46 16.11	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 20.47	07.16 18.54	07.49 16.08	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 20.44	07.19 18.50	07.52 16.04	09.36 14.30	10.20 14.15
31	04.09 22.32	05.49 20.40	07.22 18.46	07.56 16.01	09.39 14.27	10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	186	0	0	441	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v60WTG: 6 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (630)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June
1	10.18 14.19	09.03 15.55	07.28 17.29	06.35 18.20-18.35/15 20.05	04.46 21.41	03.01 05.35-05.48/13 23.27
2	10.17 14.21	09.00 15.58	07.24 17.32	06.32 18.18-18.36/18 20.08	04.43 21.44	02.58 05.37-05.48/11 23.30
3	10.16 14.23	08.57 16.02	07.21 17.35	06.28 18.17-18.37/20 20.11	04.39 21.48	02.55 05.38-05.46/8 23.33
4	10.14 14.26	08.54 16.05	07.17 17.39	06.24 18.15-18.37/22 20.14	04.35 21.51	02.53 05.39-05.45/6 23.36
5	10.13 14.28	08.50 16.09	07.13 17.42	06.21 18.15-18.38/23 20.17	04.32 21.54	02.50 23.39
6	10.11 14.31	08.47 16.12	07.10 17.45	06.17 18.14-18.38/24 20.20	04.28 21.58	02.47 23.42
7	10.09 14.33	08.44 16.16	07.06 17.48	06.13 18.14-18.38/24 20.23	04.25 22.01	02.45 23.45
8	10.08 14.36	08.40 16.19	07.03 17.51	06.10 18.14-18.37/23 20.27	04.21 22.05	02.42 23.48
9	10.06 14.39	08.37 16.23	06.59 17.54	06.06 18.14-18.37/23 20.30	04.18 22.08	02.40 23.50
10	10.04 14.42	08.34 16.26	06.55 17.57	06.02 18.14-18.36/22 20.33	04.14 22.12	02.38 23.53
11	10.01 14.45	08.30 16.30	06.52 18.00	05.59 18.14-18.34/20 20.36	04.11 22.15	02.36 23.55
12	09.59 14.48	08.27 16.33	06.48 18.04	05.55 18.16-18.33/17 20.39	04.07 05.38-05.44/6 22.18	02.34 23.57
13	09.57 14.51	08.24 16.36	06.45 18.07	05.51 18.17-18.32/15 20.42	04.04 05.36-05.46/10 22.22	02.32 00.00
14	09.55 14.54	08.20 16.40	06.41 18.10	05.48 18.19-18.29/10 20.45	04.00 05.34-05.47/13 22.25	02.30 00.01
15	09.52 14.57	08.17 16.43	06.37 18.13	05.44 20.49	03.57 05.33-05.48/15 22.29	02.29 00.03
16	09.50 15.00	08.13 16.46	06.34 18.16	05.41 08.35-08.48/13 20.52	03.53 05.33-05.49/16 22.32	02.28 00.05
17	09.47 15.04	08.10 16.50	06.30 18.19	05.37 20.55	03.50 05.32-05.49/17 22.36	02.27 00.06
18	09.44 15.07	08.06 16.53	06.26 18.22	05.33 20.58	03.46 05.31-05.49/18 22.39	02.26 00.07
19	09.42 15.10	08.03 16.56	06.23 18.25	05.30 21.01	03.43 05.31-05.50/19 22.43	02.25 00.08
20	09.39 15.14	07.59 17.00	06.19 18.28	05.26 21.05	03.39 05.31-05.50/19 22.46	02.25 00.09
21	09.36 15.17	07.56 17.03	06.16 18.31	05.22 21.08	03.36 05.31-05.51/20 22.50	02.24 00.09
22	09.33 15.20	07.52 17.06	06.12 18.34	05.19 21.11	03.33 05.31-05.50/19 22.53	02.24 00.09
23	09.31 15.24	07.49 17.10	06.08 18.37	05.15 21.14	03.29 05.31-05.51/20 22.57	02.25 00.09
24	09.28 15.27	07.45 17.13	06.05 18.40	05.11 21.18	03.26 05.32-05.51/19 23.00	02.25 00.09
25	09.25 15.31	07.42 17.16	06.01 18.43	05.08 21.21	03.23 05.31-05.50/19 23.04	02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 18.47	05.04 21.24	03.20 05.32-05.50/18 23.07	02.27 00.07
27	09.19 15.38	07.35 17.23	05.54 18.50	05.01 21.27	03.16 05.32-05.50/18 23.10	02.28 00.06
28	09.16 15.41	07.31 17.26	05.50 18.53	04.57 21.31	03.13 05.33-05.50/17 23.14	02.30 00.05
29	09.13 15.45		06.46 19.56	04.53 21.34	03.10 05.34-05.49/15 23.17	02.31 00.04
30	09.10 15.48		06.43 19.59	04.50 21.37	03.07 05.34-05.49/15 23.20	02.33 00.02
31	09.06 15.51		06.39 18.23-18.33/10 20.02		03.04 05.35-05.48/13 23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	0	258	276	326	38

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v. **WTG: 6 - VESTAS V136-4.2 4200 136.0 !O!** hub: 90,0 m (TOT: 158,0 m) (630)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 18.14-18.34/20 20.36	07.22 09.11-09.32/21 18.47	07.59 15.57	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 18.12-18.34/22 20.33	07.25 09.10-09.32/22 18.43	08.02 15.54	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 18.11-18.34/23 20.29	07.28 09.10-09.33/23 18.40	08.06 15.51	09.45 14.24
4	02.42 23.55	04.22 22.18	06.01 18.11-18.34/23 20.25	07.31 09.10-09.32/22 18.36	08.09 15.47	09.48 14.22
5	02.44 23.52	04.26 22.14	06.04 18.10-18.34/24 20.22	07.34 09.10-09.31/21 18.32	08.12 15.44	09.51 14.20
6	02.47 23.50	04.29 22.10	06.07 18.10-18.34/24 20.18	07.37 09.10-09.30/20 18.29	08.16 15.41	09.53 14.18
7	02.50 23.47	04.32 22.07	06.10 18.10-18.33/23 20.14	07.40 09.11-09.29/18 18.25	08.19 15.37	09.56 14.16
8	02.53 05.46-05.51/5 23.45	04.36 22.03	06.13 18.11-18.33/22 20.11	07.43 09.11-09.27/16 18.22	08.23 15.34	09.58 14.14
9	02.56 05.45-05.53/8 23.42	04.39 22.00	06.16 18.10-18.31/21 20.07	07.46 09.14-09.26/12 18.18	08.26 15.31	10.01 14.13
10	02.59 05.44-05.54/10 23.39	04.42 21.56	06.19 18.11-18.30/19 20.03	07.49 09.17-09.22/5 18.14	08.29 15.28	10.03 14.11
11	03.02 05.44-05.55/11 23.37	04.46 21.53	06.22 18.12-18.28/16 20.00	07.52 18.11	08.33 15.24	10.05 14.10
12	03.05 05.43-05.56/13 23.34	04.49 21.49	06.25 18.14-18.25/11 19.56	07.55 18.07	08.36 15.21	10.08 14.09
13	03.08 05.42-05.57/15 23.31	04.52 21.45	06.28 19.52	07.58 18.04	08.40 15.18	10.10 14.08
14	03.11 05.43-05.58/15 23.28	04.55 21.42	06.31 19.49	08.01 18.00	08.43 15.15	10.11 14.07
15	03.14 05.42-05.59/17 23.25	04.59 21.38	06.34 19.45	08.04 17.56	08.46 15.12	10.13 14.06
16	03.18 05.42-05.59/17 23.22	05.02 21.35	06.37 19.41	08.07 17.53	08.50 15.09	10.15 14.06
17	03.21 05.41-05.59/18 23.18	05.05 21.31	06.40 19.38	08.10 17.49	08.53 15.06	10.16 14.05
18	03.24 05.42-06.00/18 23.15	05.08 21.27	06.43 19.34	08.14 17.46	08.57 15.03	10.17 14.05
19	03.28 05.41-06.00/19 23.12	05.12 21.24	06.46 19.30	08.17 17.42	09.00 15.00	10.19 14.05
20	03.31 05.42-06.01/19 23.09	05.15 21.20	06.49 19.27	08.20 17.39	09.03 14.57	10.19 14.05
21	03.34 05.41-06.00/19 23.06	05.18 21.16	06.52 19.23	08.23 17.35	09.07 14.54	10.20 14.05
22	03.38 05.42-06.01/19 23.02	05.21 21.13	06.55 19.20	08.26 17.32	09.10 14.51	10.21 14.06
23	03.41 05.41-06.00/19 22.59	05.24 21.09	06.58 19.16	08.29 17.28	09.13 14.48	10.21 14.06
24	03.45 05.42-06.01/19 22.56	05.27 21.06	07.01 19.12	08.33 17.25	09.17 14.46	10.22 14.07
25	03.48 05.41-06.00/19 22.52	05.31 21.02	07.04 19.09	07.36 16.21	09.20 14.43	10.22 14.08
26	03.52 05.42-06.00/18 22.49	05.34 20.58	07.07 09.22-09.24/2 19.05	07.39 16.18	09.23 14.40	10.22 14.09
27	03.55 05.43-06.00/17 22.45	05.37 20.55	07.10 09.17-09.29/12 19.01	07.42 16.14	09.27 14.38	10.22 14.10
28	03.58 05.43-05.59/16 22.42	05.40 20.51	07.13 09.15-09.30/15 18.58	07.46 16.11	09.30 14.35	10.21 14.11
29	04.02 05.44-05.58/14 22.39	05.43 18.20-18.30/10 20.47	07.16 09.13-09.31/18 18.54	07.49 16.08	09.33 14.33	10.21 14.13
30	04.05 05.45-05.57/12 22.35	05.46 18.17-18.32/15 20.44	07.19 09.12-09.32/20 18.50	07.52 16.04	09.36 14.30	10.20 14.15
31	04.09 05.46-05.55/9 22.32	05.49 18.15-18.33/18 20.40		07.56 16.01		10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	366	43	315	180	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:

Hundhammerfjellet Reetabling

NTE Energi AS

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Calculated:
20.12.2018 11.11/3.2.737

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v **WTG:** 7 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (631)

Assumptions for shadow calculations

- The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December		
1	10.18	09.03	07.28	06.35	04.46	03.01	02.35	04.12	05.52	18.00-18.30/30	07.22	08.47-09.07/20	07.59	09.39
2	10.17	09.00	07.24	06.32	04.42	02.58	02.37	04.15	05.55	17.59-18.29/30	07.25	08.47-09.06/19	08.02	09.42
3	10.16	08.57	07.21	06.28	04.39	02.55	02.39	04.19	05.58	17.59-18.28/29	07.28	08.48-09.06/18	08.06	09.45
4	10.14	08.54	07.17	06.24	04.35	02.53	02.42	04.22	06.01	18.00-18.27/27	07.31	08.48-09.05/17	08.09	09.48
5	10.13	08.50	07.13	06.21	04.32	02.50	02.44	04.26	06.04	18.00-18.26/26	07.34	08.49-09.04/15	08.12	09.51
6	10.11	08.47	07.10	06.17	04.28	02.47	02.47	04.29	06.07	18.01-18.25/24	07.37	08.50-09.02/12	08.16	09.53
7	10.09	08.44	07.06	06.13	04.25	02.45	02.50	04.32	06.10	18.02-18.23/21	07.40	08.52-08.59/7	08.19	09.56
8	10.08	08.40	07.03	06.10	04.21	02.42	02.53	04.36	06.13	18.04-18.21/17	07.43		08.22	09.58
9	10.06	08.37	06.59	06.06	04.18	02.40	02.56	04.39	06.16	18.05-18.17/12	07.46		08.26	10.01
10	10.04	08.34	06.55	06.02	04.14	02.38	02.59	04.42	06.19		07.49		08.29	10.03
11	10.01	08.30	06.52	05.59	04.10	02.36	03.02	04.46	06.22		07.52		08.33	10.05
12	09.59	08.27	06.48	05.55	04.07	02.34	03.05	04.49	06.25		07.55		08.36	10.08
13	09.57	08.24	06.45	05.51	04.03	02.32	03.08	04.52	06.28		07.58		08.40	10.10
14	09.55	08.20	06.41	05.48	04.00	02.30	03.11	04.55	06.31		08.01		08.43	10.11
15	09.52	08.17	06.37	05.44	03.57	02.29	03.14	04.59	06.34		08.04		08.46	10.13
16	09.50	08.13	06.34	05.40	03.53	02.28	03.18	05.02	06.37		08.07		08.50	10.15
17	09.47	08.10	06.30	05.37	03.50	02.26	03.21	05.05	06.40		08.10		08.53	10.16
18	09.44	08.06	06.26	05.33	03.46	02.26	03.24	05.08	06.43		08.14		08.57	10.17
19	09.42	08.03	06.23	05.30	03.43	02.25	03.28	05.12	06.46		08.17		09.00	10.19
20	09.39	07.59	06.19	05.26	03.39	02.25	03.31	05.15	06.49		08.20		09.03	10.19
21	09.36	07.56	06.15	05.22	03.36	02.24	03.34	05.18	06.52	18.14-18.23/9	08.23		09.07	10.20
22	09.33	07.52	06.12	05.19	03.33	02.24	03.38	05.21	06.55	18.10-18.26/16	08.26		09.10	10.21
23	09.31	07.49	06.08	05.15	03.29	02.25	03.41	05.24	06.58	18.08-18.27/19	08.29		09.13	10.21
24	09.28	07.45	06.05	05.11	03.26	02.25	03.45	05.27	07.01	18.07-18.29/22	08.33		09.17	10.22
25	09.25	07.42	06.01	05.08	03.23	02.26	03.48	05.31	07.04	18.05-18.30/25	08.36		09.20	10.22
26	09.22	07.38	05.57	05.04	03.20	02.27	03.52	05.34	07.07	18.04-18.30/26	08.39	08.54-09.03/9	09.23	10.22
27	09.19	07.35	05.54	05.01	03.16	02.28	03.55	05.37	07.10	18.02-18.30/28	08.42	08.52-09.05/13	09.26	10.22
28	09.16	07.31	05.50	04.57	03.13	02.30	03.58	05.40	07.13	18.01-18.30/29	08.45	08.50-09.06/16	09.29	10.21
29	09.13	07.26	05.46	04.53	03.10	02.31	04.02	05.43	07.16	18.00-18.30/29	08.48	08.49-09.07/18	09.32	10.21
30	09.09	07.21	05.41	04.49	03.07	02.32	04.05	05.46	07.19	18.00-18.30/29	08.51	08.48-09.07/19	09.35	10.21
31	09.06	07.16	05.36	04.45	03.04	02.33	04.08	05.49	07.22	18.00-18.30/30	08.54		09.38	10.21
Potential sun hours	163	235	363	454	578	641	620	513	394	291	302	192	125	0
Sum of minutes with flicker	0	0	181	475	0	0	0	262	291	108	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v60WTG: 8 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June
1	10.18 14.19	09.03 12.28-12.40/12 15.55	07.28 17.29	06.35 20.05	04.46 18.31-18.59/28 21.41	03.01 18.45-18.49/4 23.27
2	10.17 14.21	09.00 12.27-12.42/15 15.58	07.24 17.32	06.32 20.08	04.42 18.29-18.59/30 21.44	02.58 23.30
3	10.16 14.23	08.57 12.26-12.43/17 16.02	07.20 17.35	06.28 20.11	04.39 18.28-19.00/32 21.48	02.55 23.33
4	10.14 14.25	08.54 12.25-12.43/18 16.05	07.17 17.38	06.24 20.14	04.35 18.28-19.01/33 21.51	02.53 23.36
5	10.13 14.28	08.50 12.25-12.43/18 16.09	07.13 17.42	06.21 20.17	04.32 18.27-19.01/34 21.54	02.50 23.39
6	10.11 14.30	08.47 12.24-12.44/20 16.12	07.10 17.45	06.17 20.20	04.28 18.26-19.02/36 21.58	02.47 23.42
7	10.09 14.33	08.44 12.24-12.44/20 16.16	07.06 17.48	06.13 20.23	04.25 18.26-19.02/36 22.01	02.45 23.45
8	10.08 14.36	08.40 12.25-12.44/19 16.19	07.03 17.51	06.10 20.27	04.21 18.26-19.02/36 22.05	02.42 23.48
9	10.06 14.39	08.37 12.25-12.44/19 16.23	06.59 17.54	06.06 20.30	04.18 18.26-19.02/36 22.08	02.40 23.50
10	10.04 14.42	08.34 12.25-12.44/19 16.26	06.55 17.57	06.02 20.33	04.14 18.25-19.03/38 22.12	02.38 23.53
11	10.01 14.45	08.30 12.26-12.43/17 16.29	06.52 18.00	05.59 20.36	04.10 18.25-19.02/37 22.15	02.36 23.55
12	09.59 14.48	08.27 12.28-12.43/15 16.33	06.48 18.04	05.55 20.39	04.07 18.25-19.02/37 22.18	02.34 23.57
13	09.57 14.51	08.24 12.30-12.41/11 16.36	06.45 18.07	05.51 20.42	04.03 18.26-19.03/37 22.22	02.32 00.00
14	09.55 14.54	08.20 12.32-12.38/6 16.40	06.41 18.10	05.48 20.45	04.00 18.26-19.03/37 22.25	02.30 00.01
15	09.52 14.57	08.17 16.43	06.37 18.13	05.44 20.49	03.56 18.26-19.02/36 22.29	02.29 00.03
16	09.50 15.00	08.13 16.46	06.34 18.16	05.40 20.52	03.53 18.26-19.02/36 22.32	02.27 00.05
17	09.47 15.03	08.10 16.50	06.30 07.40-07.50/10 18.19	05.37 20.55	03.50 18.27-19.02/35 22.36	02.26 00.06
18	09.44 15.07	08.06 16.53	06.26 07.38-07.51/13 18.22	05.33 20.58	03.46 18.27-19.01/34 22.39	02.26 00.07
19	09.42 15.10	08.03 16.56	06.23 07.37-07.53/16 18.25	05.30 21.01	03.43 18.27-19.01/34 22.43	02.25 00.08
20	09.39 15.13	07.59 17.00	06.19 07.36-07.53/17 18.28	05.26 21.05	03.39 18.29-19.01/32 22.46	02.24 00.09
21	09.36 15.17	07.56 17.03	06.15 07.35-07.53/18 18.31	05.22 21.08	03.36 18.29-19.00/31 22.50	02.24 00.09
22	09.33 15.20	07.52 17.06	06.12 07.35-07.53/18 18.34	05.19 21.11	03.33 18.30-19.00/30 22.53	02.24 00.09
23	09.31 15.24	07.49 17.10	06.08 07.35-07.52/17 18.37	05.15 21.14	03.29 18.31-19.00/29 22.57	02.25 00.09
24	09.28 15.27	07.45 17.13	06.05 07.34-07.51/17 18.40	05.11 21.18	03.26 18.31-18.58/27 23.00	02.25 00.09
25	09.25 15.31	07.42 17.16	06.01 07.36-07.51/15 18.43	05.08 21.21	03.23 18.33-18.58/25 23.04	02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 07.36-07.49/13 18.47	05.04 21.24	03.20 18.34-18.58/24 23.07	02.27 00.07
27	09.19 15.37	07.35 17.23	05.54 07.38-07.46/8 18.50	05.00 18.38-18.51/13 21.27	03.16 18.35-18.57/22 23.10	02.28 00.07
28	09.16 15.41	07.31 17.26	05.50 18.53	04.57 18.35-18.54/19 21.31	03.13 18.37-18.56/19 23.14	02.30 00.05
29	09.13 15.44		06.46 19.56	04.53 18.33-18.56/23 21.34	03.10 18.38-18.55/17 23.17	02.31 00.04
30	09.09 15.48		06.43 19.59	04.50 18.32-18.58/26 21.37	03.07 18.40-18.54/14 23.20	02.33 00.02
31	09.06 12.30-12.38/8 15.51		06.39 20.02		03.04 18.42-18.52/10 23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	8	226	162	81	942	4

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v. **WTG: 8 - VESTAS V136-4.2 4200 136.0 !O!** hub: 90,0 m (TOT: 158,0 m) (632)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35	04.12 18.36-19.13/37	05.52	07.22	07.59 11.56-12.14/18	09.39
	00.01	22.28	20.36	18.47	15.57	14.28
2	02.37	04.15 18.36-19.13/37	05.55	07.25	08.02 11.55-12.14/19	09.42
	23.59	22.25	20.33	18.43	15.54	14.26
3	02.39	04.19 18.35-19.12/37	05.58	07.28	08.06 11.55-12.15/20	09.45
	23.57	22.21	20.29	18.40	15.51	14.24
4	02.42	04.22 18.36-19.12/36	06.01	07.31	08.09 11.55-12.15/20	09.48
	23.55	22.18	20.25	18.36	15.47	14.22
5	02.44	04.26 18.36-19.12/36	06.04	07.34	08.12 11.55-12.14/19	09.51
	23.52	22.14	20.22	18.32	15.44	14.20
6	02.47	04.29 18.36-19.12/36	06.07	07.37	08.16 11.55-12.14/19	09.53
	23.50	22.10	20.18	18.29	15.41	14.18
7	02.50	04.32 18.37-19.12/35	06.10	07.40	08.19 11.55-12.13/18	09.56
	23.47	22.07	20.14	18.25	15.37	14.16
8	02.53	04.36 18.36-19.10/34	06.13	07.43	08.22 11.56-12.12/16	09.58
	23.45	22.03	20.11	18.21	15.34	14.14
9	02.56	04.39 18.37-19.10/33	06.16	07.46	08.26 11.58-12.12/14	10.01
	23.42	22.00	20.07	18.18	15.31	14.13
10	02.59	04.42 18.37-19.09/32	06.19	07.49	08.29 11.59-12.11/12	10.03
	23.39	21.56	20.03	18.14	15.28	14.11
11	03.02	04.46 18.38-19.08/30	06.22	07.52	08.33 12.01-12.08/7	10.05
	23.37	21.53	20.00	18.11	15.24	14.10
12	03.05 18.51-18.59/8	04.49 18.39-19.07/28	06.25	07.55	08.36	10.08
	23.34	21.49	19.56	18.07	15.21	14.09
13	03.08 18.49-19.01/12	04.52 18.41-19.06/25	06.28	07.58	08.40	10.10
	23.31	21.45	19.52	18.04	15.18	14.08
14	03.11 18.47-19.02/15	04.55 18.41-19.03/22	06.31	08.01	08.43	10.11
	23.28	21.42	19.49	18.00	15.15	14.07
15	03.14 18.45-19.04/19	04.59 18.43-19.01/18	06.34	08.04	08.46	10.13
	23.25	21.38	19.45	17.56	15.12	14.06
16	03.18 18.45-19.06/21	05.02 18.46-18.58/12	06.37 08.28-08.34/6	08.07	08.50	10.15
	23.22	21.35	19.41	17.53	15.09	14.06
17	03.21 18.44-19.06/22	05.05	06.40 08.25-08.37/12	08.10	08.53	10.16
	23.18	21.31	19.38	17.49	15.06	14.05
18	03.24 18.42-19.07/25	05.08	06.43 08.24-08.38/14	08.14	08.57	10.17
	23.15	21.27	19.34	17.46	15.03	14.05
19	03.28 18.42-19.08/26	05.12	06.46 08.21-08.38/17	08.17	09.00	10.19
	23.12	21.24	19.30	17.42	15.00	14.05
20	03.31 18.41-19.09/28	05.15	06.49 08.21-08.38/17	08.20	09.03	10.19
	23.09	21.20	19.27	17.39	14.57	14.05
21	03.34 18.41-19.10/29	05.18	06.52 08.20-08.38/18	08.23	09.07	10.20
	23.06	21.16	19.23	17.35	14.54	14.05
22	03.38 18.39-19.10/31	05.21	06.55 08.20-08.38/18	08.26	09.10	10.21
	23.02	21.13	19.19	17.32	14.51	14.06
23	03.41 18.39-19.11/32	05.24	06.58 08.20-08.37/17	08.29	09.13	10.21
	22.59	21.09	19.16	17.28	14.48	14.06
24	03.45 18.38-19.11/33	05.27	07.01 08.20-08.36/16	08.33	09.17	10.22
	22.56	21.06	19.12	17.25	14.46	14.07
25	03.48 18.38-19.12/34	05.31	07.04 08.21-08.35/14	07.36	09.20	10.22
	22.52	21.02	19.09	16.21	14.43	14.08
26	03.51 18.38-19.12/34	05.34	07.07 08.22-08.33/11	07.39	09.23	10.22
	22.49	20.58	19.05	16.18	14.40	14.09
27	03.55 18.37-19.12/35	05.37	07.10 08.24-08.30/6	07.42	09.26	10.22
	22.45	20.55	19.01	16.14	14.38	14.10
28	03.58 18.37-19.13/36	05.40	07.13	07.46 12.00-12.08/8	09.30	10.21
	22.42	20.51	18.58	16.11	14.35	14.11
29	04.02 18.37-19.13/36	05.43	07.16	07.49 11.58-12.11/13	09.33	10.21
	22.39	20.47	18.54	16.07	14.33	14.13
30	04.05 18.36-19.13/37	05.46	07.19	07.52 11.57-12.12/15	09.36	10.20
	22.35	20.44	18.50	16.04	14.30	14.14
31	04.09 18.36-19.13/37	05.49		07.56 11.56-12.13/17		10.19
	22.32	20.40		16.01		14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	550	488	166	53	182	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:

Hundhammerfjellet Reetabling

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 Calculated:
 20.12.2018 11.11/3.2.737

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v. **WTG: 9 - VESTAS V136-4.2 4200 136.0 !O!** hub: 90,0 m (TOT: 158,0 m) (633)

Assumptions for shadow calculations

- The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.18	09.03 12.44-12.55/11	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59 12.11-12.30/19	09.39
2	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57 11.21-11.42/21	14.28
3	10.17	09.00 12.43-12.57/14	07.24	06.32	04.42	02.58	02.37	04.15	05.55	07.25	08.02 12.10-12.30/20	09.42
4	14.21	15.58	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54 11.22-11.42/20	14.26
5	10.16	08.57 12.42-12.58/16	07.20	06.28	04.39	02.55	02.39	04.19	05.58	07.28	08.06 12.10-12.30/20	09.45
6	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.39	15.50 11.23-11.41/18	14.24
7	10.14	08.54 12.41-12.58/17	07.17	06.24	04.35	02.53	02.42	04.22	06.01	07.31	08.09 12.10-12.30/20	09.48
8	14.25	16.05 11.58-12.03/5	17.38	20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47 11.23-11.40/17	14.22
9	10.13	08.50 12.40-12.59/19	07.13	06.21	04.32	02.50	02.44	04.26	06.04	07.34	08.12 12.10-12.30/20	09.51
10	14.28	16.09 11.55-12.07/12	17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44 11.25-11.39/14	14.20
11	10.11	08.47 12.40-12.59/19	07.10	06.17	04.28	02.47	02.47	04.29	06.07	07.37	08.16 12.11-12.29/18	09.53
12	14.30	16.12 11.54-12.09/15	17.45	20.20	21.58	23.42	23.50	22.10	20.18	18.29	15.41 11.26-11.37/11	14.18
13	10.09	08.44 12.40-13.00/20	07.06	06.13	04.25	02.45	02.50	04.32	06.10	07.40	08.19 12.11-12.29/18	09.56
14	14.33	16.16 11.53-12.10/17	17.48	20.23	22.01	23.45	23.47	22.07	20.14	18.25	15.37 11.30-11.33/3	14.16
15	10.08	08.40 12.40-13.00/20	07.03	06.10	04.21	02.42	02.53	04.36	06.13	07.43	08.22 12.12-12.28/16	09.58
16	14.36	16.19 11.52-12.11/19	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.21	15.34	14.14
17	10.06	08.37 12.40-13.00/20	06.59	06.06	04.17	02.40	02.55	04.39	06.16	07.46	08.26 12.14-12.27/13	10.01
18	14.39	16.23 11.51-12.12/21	17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13
19	10.04	08.34 12.41-12.59/18	06.55	06.02	04.14	02.38	02.58	04.42	06.19	07.49	08.29 12.15-12.26/11	10.03
20	14.42	16.26 11.51-12.12/21	17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.27	14.11
21	10.01	08.30 12.41-12.59/18	06.52	05.59	04.10	02.36	03.02	04.46	06.22	07.52	08.33 12.17-12.23/6	10.05
22	14.44	16.29 11.51-12.12/21	18.00	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10
23	09.59	08.27 12.42-12.58/16	06.48	05.55	04.07	02.34 05.04-05.05/1	03.05	04.49	06.25	07.55	08.36	10.08
24	14.48	16.33 11.52-12.13/21	18.03	20.39	22.18	23.58	23.34	21.49	19.56	18.07	15.21	14.09
25	09.57	08.23 12.44-12.57/13	06.45	05.51	04.03	02.32 05.02-05.06/4	03.08	04.52	06.28	07.58	08.40	10.10
26	14.51	16.36 11.52-12.13/21	18.07	20.42	22.22	00.00	03.31	21.45	19.52	18.04	15.18	14.08
27	09.55	08.20 12.47-12.55/6	06.41	05.48	04.00	02.30 05.02-05.08/6	03.11	04.55	06.31	08.01	08.43	10.11
28	14.54	16.40 11.52-12.13/21	18.10	20.45	22.25	00.01	03.28	21.42	19.49	18.00	15.15	14.07
29	09.52	08.17 11.52-12.12/20	06.37	05.44	03.56	02.29 05.01-05.08/7	03.14	04.59	06.34	08.04	08.46	10.13
30	14.57	16.43	18.13	20.49	22.29	00.03	03.25	21.38	19.45	17.56	15.12	14.06
31	09.50	08.13 11.53-12.11/18	06.34	05.40	03.53	02.27 05.01-05.09/8	03.18	05.02	06.37	08.07	08.50	10.15
1	15.00	16.46	18.16	20.52	22.32	00.05	03.22	21.35	19.41	17.53	15.09	14.06
2	09.47	08.10 11.54-12.10/16	06.30	05.37	03.50	02.26 05.00-05.09/9	03.21	05.05	06.40	08.10	08.53	10.16
3	15.03	16.50	18.19	20.55	22.36	00.06	03.18	21.31	19.38	17.49	15.06	14.05
4	09.44	08.06 11.55-12.08/13	06.26	05.33	03.46	02.25 05.00-05.10/10	03.24	05.08	06.43	08.14	08.57	10.17
5	15.07	16.53	18.22	20.58	22.39	00.07	03.15	21.27	19.34	17.46	15.03	14.05
6	09.42	08.03 11.58-12.05/7	06.23	05.29	03.43	02.25 05.01-05.10/9	03.28	05.12	06.46	08.17	09.00	10.19
7	15.10	16.56	18.25	21.01	22.43	00.08	03.12	21.24	19.30	17.42	15.00	14.05
8	09.39	07.59	06.19	05.26	03.39	02.24 05.01-05.10/9	03.31	05.15	06.49	08.20	09.03	10.19
9	15.13	17.00	18.28	21.05	22.46	00.09	03.09	21.20	19.27	17.39	14.57	14.05
10	09.36	07.56	06.15	05.22	03.36	02.24 05.01-05.11/10	03.34	05.18	06.52	08.23	09.07	10.20
11	15.17	17.03	18.31	21.08	22.50	00.09	03.06	21.16	19.23	17.35	14.54	14.05
12	09.33	07.52	06.12	05.19	03.33	02.24 05.02-05.12/10	03.38	05.21	06.55	08.26	09.10	10.21
13	15.20	17.06	18.34	21.11	22.53	00.09	03.02	21.13	19.19	17.32	14.51	14.05
14	09.31	07.49	06.08	05.15	03.29	02.25 05.02-05.11/9	03.41	05.24	06.58	08.29 12.27-12.36/9	09.13	10.21
15	15.24	17.10	18.37	21.14	22.57	00.09	03.29	21.09	19.16	17.28	14.48	14.06
16	09.28	07.45	06.05	05.11	03.26	02.25 05.01-05.11/10	03.45	05.27	07.01	08.33 12.25-12.39/14	09.17	10.22
17	15.27	17.13	18.40	21.18	23.00	00.09	03.26	21.06	19.12	17.25	14.46	14.07
18	09.25	07.42	06.01	05.08	03.23	02.26 05.02-05.11/9	03.48	05.30	07.04	07.36 11.24-11.40/16	09.20	10.22
19	15.31	17.16	18.43	21.21	23.04	00.08	03.22	21.02	19.09	16.21	14.43	14.08
20	09.22	07.38	05.57	05.04	03.20	02.27 05.03-05.12/9	03.51	05.34	07.07	07.39 11.22-11.40/18	09.23	10.22
21	15.34	17.19	18.46	21.24	23.07	00.08	03.28	21.05	19.05	16.18	14.40	14.09
22	09.19	07.35	05.54	05.00	03.16	02.28 05.03-05.11/8	03.55	05.37	07.10	07.42 11.21-11.41/20	09.26	10.22
23	15.37	17.22	18.50	21.27	23.10	00.07	03.25	21.05	19.01	16.14	14.38	14.10
24	09.16	07.31	05.50	04.57	03.13	02.29 05.04-05.11/7	03.58	05.40	07.13	07.46 12.15-12.25/10	09.30	10.21
25	15.41	17.26	18.53	21.31	23.14	00.05	03.22	21.01	18.58	16.11 11.21-11.42/21	14.35	14.11
26	09.13		06.46	04.53	03.10	02.31 05.05-05.10/5	04.02	05.43	07.16	07.49 12.13-12.27/14	09.33	10.21
27	15.44		19.56	21.34	23.17	00.04	03.29	21.07	18.54	16.07 11.21-11.42/21	14.33	14.13
28	09.09		06.43	04.50	03.07	02.33 05.06-05.09/3	04.05	05.46	07.19	07.52 12.12-12.28/16	09.36	10.20
29	15.48		19.59	21.37	23.20	00.02	03.25	21.04	18.50	16.04 11.21-11.42/21	14.30	14.14
30	09.06	12.46-12.52/6	06.39		03.04		04.09	05.49		07.56 12.11-12.29/18		10.19
31	15.51		20.02		23.24		02.32	21.00		16.01 11.21-11.42/21		14.16
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125
Sum of minutes with flicker	6	497	0	0	0	143	0	0	0	219	285	0

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

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



SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 10 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (634)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.18	09.03 12.10-12.27/17	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59 11.38-11.59/21	09.39
	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57 10.42-11.03/21	14.28
2	10.17	09.00 12.09-12.28/19	07.24	06.32	04.42	02.58	02.37	04.15	05.55	07.25	08.02 11.38-12.00/22	09.42
	14.21	15.58	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54 10.42-11.03/21	14.26
3	10.16	08.57 12.09-12.29/20	07.20	06.28	04.39	02.55	02.39	04.19	05.58	07.28	08.06 11.38-12.00/22	09.45
	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.39	15.50 10.43-11.02/19	14.24
4	10.14	08.54 12.07-12.28/21	07.17	06.24	04.35	02.52	02.42	04.22	06.01	07.31	08.09 11.38-12.00/22	09.48
	14.25	16.05	17.38	20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47 10.44-11.00/16	14.22
5	10.13	08.50 12.07-12.29/22	07.13	06.21	04.32	02.50	02.44	04.25	06.04	07.34	08.12 11.38-12.00/22	09.51
	14.28	16.09 11.18-11.26/8	17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44 10.46-10.59/13	14.20
6	10.11	08.47 12.07-12.29/22	07.10	06.17	04.28	02.47	02.47	04.29	06.07	07.37	08.16 11.38-11.59/21	09.53
	14.30	16.12 11.15-11.28/13	17.45	20.20	21.58	23.42	23.50	22.10	20.18	18.29	15.40 10.48-10.56/8	14.18
7	10.09	08.44 12.07-12.29/22	07.06	06.13	04.25	02.45	02.50	04.32	06.10	07.40	08.19 11.38-11.59/21	09.56
	14.33	16.16 11.14-11.30/16	17.48	20.23	22.01	23.45	23.47	22.07	20.14	18.25	15.37	14.16
8	10.08	08.40 12.07-12.29/22	07.03	06.10	04.21	02.42	02.53	04.36	06.13	07.43	08.22 11.38-11.58/20	09.58
	14.36	16.19 11.13-11.31/18	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.21	15.34	14.14
9	10.06	08.37 12.08-12.29/21	06.59	06.06	04.17	02.40	02.55	04.39	06.16	07.46	08.26 11.40-11.58/18	10.01
	14.39	16.23 11.12-11.32/20	17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13
10	10.04	08.34 12.08-12.29/21	06.55	06.02	04.14	02.38	02.58	04.42	06.19	07.49	08.29 11.40-11.57/17	10.03
	14.41	16.26 11.11-11.33/22	17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.27	14.11
11	10.01	08.30 12.09-12.28/19	06.52	05.59	04.10	02.35	03.02	04.46	06.22	07.52	08.33 11.41-11.56/15	10.05
	14.44	16.29 11.11-11.33/22	18.00	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10
12	09.59	08.27 12.10-12.27/17	06.48	05.55	04.07	02.34	03.05	04.49	06.25	07.55	08.36 11.44-11.55/11	10.08
	14.47	16.33 11.11-11.35/24	18.03	20.39	22.18	23.58	23.34	21.49	19.56	18.07	15.21	14.09
13	09.57	08.23 12.12-12.27/15	06.44	05.51	04.03	02.32	03.08	04.52	06.28	07.58	08.40 11.46-11.51/5	10.10
	14.51	16.36 11.11-11.35/24	18.07	20.42	22.22	00.00	23.31	21.45	19.52	18.04	15.18	14.08
14	09.55	08.20 12.14-12.24/10	06.41	05.48	04.00	02.30	03.11	04.55	06.31	08.01	08.43	10.11
	14.54	16.40 11.11-11.35/24	18.10	20.45	22.25	00.02	23.28	21.42	19.49	18.00	15.15	14.07
15	09.52	08.17 11.11-11.34/23	06.37	05.44	03.56	02.29	03.14	04.59	06.34	08.04	08.46	10.13
	14.57	16.43	18.13	20.49	22.29	00.03	23.25	21.38	19.45	17.56	15.12	14.06
16	09.50	08.13 11.12-11.34/22	06.34	05.40	03.53	02.27	03.18	05.02	06.37	08.07	08.50	10.15
	15.00	16.46	18.16	20.52	22.32	00.05	23.22	21.35	19.41	17.53	15.09	14.06
17	09.47	08.10 11.12-11.33/21	06.30	05.37	03.50	02.26	03.21	05.05	06.40	08.10	08.53	10.16
	15.03	16.50	18.19	20.55	22.36	00.06	23.19	21.31	19.38	17.49	15.06	14.05
18	09.44	08.06 11.13-11.32/19	06.26	05.33	03.46	02.25	03.24	05.08	06.43	08.14	08.57	10.17
	15.07	16.53	18.22	20.58	22.39	00.07	23.15	21.27	19.34	17.46	15.03	14.05
19	09.42	08.03 11.14-11.30/16	06.23	05.29	03.43	02.25	03.28	05.11	06.46	08.17	09.00	10.19
	15.10	16.56	18.25	21.01	22.43	00.08	23.12	21.24	19.30	17.42	15.00	14.05
20	09.39	07.59 11.15-11.28/13	06.19	05.26	03.39	02.24	03.31	05.15	06.49	08.20	09.03	10.20
	15.13	17.00	18.28	21.05	22.46	00.09	23.09	21.20	19.27	17.39	14.57	14.05
21	09.36	07.56 11.20-11.25/5	06.15	05.22	03.36	02.24	03.34	05.18	06.52	08.23 11.48-11.57/9	09.07	10.20
	15.17	17.03	18.31	21.08	22.50	00.09	23.06	21.16	19.23	17.35	14.54	14.05
22	09.33	07.52	06.12	05.19	03.33	02.24	03.38	05.21	06.55	08.26 11.46-12.00/14	09.10	10.21
	15.20	17.06	18.34	21.11	22.53	00.09	23.02	21.13	19.19	17.32	14.51	14.05
23	09.31	07.49	06.08	05.15	03.29	02.24	03.41	05.24	06.58	08.29 11.43-12.01/18	09.13	10.21
	15.24	17.09	18.37	21.14	22.57	00.09	22.59	21.09	19.16	17.28	14.48	14.06
24	09.28	07.45	06.04	05.11	03.26	02.25	03.45	05.27	07.01	08.33 11.42-12.02/20	09.17	10.22
	15.27	17.13	18.40	21.18	23.00	00.09	22.56	21.06	19.12	17.25	14.45	14.07
25	09.25	07.42	06.01	05.08	03.23	02.26	03.48	05.30	07.04	07.36 10.42-11.03/21	09.20	10.22
	15.30	17.16	18.43	21.21	23.04	00.08	22.52	21.02	19.09	16.21	14.43	14.08
26	09.22	07.38	05.57	05.04	03.20	02.27	03.51	05.34	07.07	07.39 10.41-11.03/22	09.23	10.22
	15.34	17.19	18.46	21.24	23.07	00.08	22.49	20.58	19.05	16.18	14.40	14.09
27	09.19	07.35	05.54	05.00	03.16	02.28	03.55	05.37	07.10	07.42 11.47-11.49/2	09.26	10.22
	15.37	17.22	18.50	21.27	23.10	00.07	22.45	20.55	19.01	16.14 10.40-11.03/23	14.38	14.10
28	09.16	07.31	05.50	04.57	03.13	02.29	03.58	05.40	07.13	07.46 11.43-11.54/11	09.30	10.21
	15.41	17.26	18.53	21.31	23.14	00.05	22.42	20.51	18.58	16.11 10.40-11.04/24	14.35	14.11
29	09.13	12.14-12.20/6	06.46	04.53	03.10	02.31	04.02	05.43	07.16	07.49 11.41-11.56/15	09.33	10.21
	15.44		19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.07 10.40-11.04/24	14.33	14.13
30	09.09	12.12-12.23/11	06.43	04.50	03.07	02.33	04.05	05.46	07.19	07.52 11.40-11.57/17	09.36	10.20
	15.48		19.59	21.37	23.20	00.02	22.35	20.44	18.50	16.04 10.41-11.04/23	14.30	14.14
31	09.06	12.10-12.25/15	06.39	04.53	03.04	02.32	04.09	05.49	07.22	07.56 11.39-11.58/19	09.37	10.19
	15.51		20.02	21.37	23.24	00.02	22.32	20.40	18.50	16.01 10.41-11.04/23	14.26	14.16
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125
Sum of minutes with flicker	32	578	0	0	0	0	0	0	0	285	335	0

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 11 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June
1	10.18	09.03	07.28	06.35 17.30-17.53/23	04.46	03.01
	14.19	15.55	17.29	20.05	21.41	23.27
2	10.17	09.00 11.31-11.40/9	07.24	06.32 17.31-17.51/20	04.42	02.58
	14.21	15.58	17.32	20.08	21.44	23.30
3	10.16	08.57 11.29-11.43/14	07.20	06.28 17.33-17.50/17	04.39	02.55
	14.23	16.02	17.35	20.11	21.48	23.33
4	10.14	08.53 11.27-11.44/17	07.17	06.24 17.34-17.47/13	04.35	02.52
	14.25	16.05	17.38	20.14	21.51	23.36
5	10.13	08.50 11.26-11.45/19	07.13	06.21 17.39-17.43/4	04.32	02.50
	14.28	16.09	17.42	20.17	21.54	23.39
6	10.11	08.47 11.25-11.46/21	07.10	06.17	04.28	02.47
	14.30	16.12	17.45	20.20	21.58	23.42
7	10.09	08.44 11.25-11.47/22	07.06	06.13	04.24	02.45
	14.33	16.16	17.48	20.23	22.01	23.45
8	10.08	08.40 11.25-11.47/22	07.03	06.10	04.21	02.42
	14.36	16.19	17.51	20.27	22.05	23.48
9	10.06	08.37 11.24-11.47/23	06.59	06.06	04.17	02.40
	14.39	16.23	17.54	20.30	22.08	23.50
10	10.04	08.34 11.24-11.48/24	06.55 16.13-16.23/10	06.02	04.14	02.38
	14.41	16.26	17.57	20.33	22.12	23.53
11	10.01	08.30 11.24-11.48/24	06.52 16.10-16.25/15	05.59	04.10	02.35
	14.44	16.29 10.32-10.41/9	18.00	20.36	22.15	23.55
12	09.59	08.27 11.24-11.47/23	06.48 16.08-16.26/18	05.55	04.07	02.33
	14.47	16.33 10.31-10.44/13	18.03	20.39	22.18	23.58
13	09.57	08.23 11.26-11.48/22	06.44 16.07-16.27/20	05.51	04.03	02.32
	14.51	16.36 10.29-10.46/17	18.07	20.42	22.22	00.00
14	09.55	08.20 11.26-11.47/21	06.41 16.06-16.28/22	05.48	04.00	02.30
	14.54	16.40 10.28-10.47/19	18.10	20.45	22.25	00.02
15	09.52	08.17 11.27-11.46/19	06.37 16.05-16.27/22	05.44	03.56	02.29
	14.57	16.43 10.27-10.48/21	18.13	20.49	22.29	00.03
16	09.50	08.13 11.28-11.45/17	06.34 16.04-16.27/23	05.40	03.53	02.27
	15.00	16.46 10.26-10.48/22	18.16	20.52	22.32	00.05
17	09.47	08.10 11.29-11.43/14	06.30 16.04-16.28/24	05.37	03.49	02.26
	15.03	16.50 10.25-10.48/23	18.19	20.55	22.36	00.06
18	09.44	08.06 11.32-11.40/8	06.26 16.04-16.27/23	05.33	03.46	02.25
	15.07	16.53 10.25-10.48/23	18.22	20.58	22.39	00.07
19	09.42	08.03 10.25-10.48/23	06.23 16.04-16.26/22	05.29	03.43	02.25
	15.10	16.56	18.25	21.01	22.43	00.08
20	09.39	07.59 10.25-10.48/23	06.19 16.39-16.51/12	05.26	03.39	02.24
	15.13	17.00	18.28 16.05-16.25/20	21.05	22.46	00.09
21	09.36	07.56 10.26-10.48/22	06.15 16.36-16.53/17	05.22	03.36	02.24
	15.17	17.03	18.31 16.06-16.24/18	21.08	22.50	00.09
22	09.33	07.52 10.26-10.48/22	06.12 16.34-16.54/20	05.19	03.33	02.24
	15.20	17.06	18.34 16.07-16.21/14	21.11	22.53	00.09
23	09.31	07.49 10.27-10.47/20	06.08 16.33-16.56/23	05.15	03.29	02.24
	15.24	17.09	18.37 16.10-16.19/9	21.14	22.57	00.09
24	09.28	07.45 10.27-10.45/18	06.04 16.32-16.56/24	05.11	03.26	02.25
	15.27	17.13	18.40	21.18	23.00	00.09
25	09.25	07.42 10.29-10.43/14	06.01 16.30-16.56/26	05.08	03.23	02.26
	15.30	17.16	18.43	21.21	23.04	00.08
26	09.22	07.38 10.31-10.40/9	05.57 16.30-16.57/27	05.04	03.19	02.27
	15.34	17.19	18.46	21.24	23.07	00.08
27	09.19	07.35	05.54 16.29-16.56/27	05.00	03.16	02.28
	15.37	17.22	18.50	21.27	23.10	00.07
28	09.16	07.31	05.50 16.29-16.56/27	04.57	03.13	02.29
	15.41	17.26	18.53	21.31	23.14	00.05
29	09.13		06.46 17.29-17.56/27	04.53	03.10	02.31
	15.44		19.56	21.34	23.17	00.04
30	09.09		06.43 17.29-17.55/26	04.50	03.07	02.33
	15.48		19.59	21.37	23.20	00.02
31	09.06		06.39 17.30-17.55/25		03.04	
	15.51		20.02		23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	617	541	77	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 11 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 20.36	07.22 16.47-17.06/19 18.47	07.59 10.55-11.18/23 15.57	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 20.33	07.25 16.47-17.04/17 18.43	08.02 10.55-11.18/23 15.54	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 20.29	07.28 16.49-17.02/13 18.39	08.06 10.55-11.17/22 15.50	09.45 14.24
4	02.42 23.55	04.22 22.18	06.01 20.25	07.31 16.52-16.58/6 18.36	08.09 10.55-11.17/22 15.47	09.48 14.21
5	02.44 23.52	04.25 22.14	06.04 20.22	07.34 18.32	08.12 10.56-11.16/20 15.44	09.51 14.19
6	02.47 23.50	04.29 22.10	06.07 20.18	07.37 18.29	08.16 10.57-11.15/18 15.40	09.53 14.18
7	02.50 23.47	04.32 22.07	06.10 17.35-17.37/2 20.14	07.40 18.25	08.19 10.58-11.14/16 15.37	09.56 14.16
8	02.52 23.45	04.36 22.03	06.13 17.29-17.41/12 20.11	07.43 18.21	08.22 10.59-11.12/13 15.34	09.58 14.14
9	02.55 23.42	04.39 22.00	06.16 17.26-17.43/17 20.07	07.46 18.18	08.26 11.02-11.11/9 15.31	10.01 14.13
10	02.58 23.39	04.42 21.56	06.19 17.24-17.45/21 20.03	07.49 18.14	08.29 15.27	10.03 14.11
11	03.01 23.37	04.45 21.53	06.22 17.23-17.45/22 20.00	07.52 18.11	08.33 15.24	10.05 14.10
12	03.05 23.34	04.49 21.49	06.25 17.22-17.46/24 19.56	07.55 18.07	08.36 15.21	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 17.21-17.46/25 19.52	07.58 18.03	08.39 15.18	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 17.20-17.46/26 19.49	08.01 18.00	08.43 15.15	10.11 14.07
15	03.14 23.25	04.59 21.38	06.34 17.19-17.46/27 19.45	08.04 17.56	08.46 15.12	10.13 14.06
16	03.18 23.22	05.02 21.35	06.37 17.18-17.45/27 19.41	08.07 11.02-11.14/12 17.53	08.50 15.09	10.15 14.06
17	03.21 23.19	05.05 21.31	06.40 17.18-17.45/27 19.38	08.10 11.00-11.15/15 17.49	08.53 15.06	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 17.18-17.44/26 19.34	08.14 10.59-11.17/18 17.46	08.57 15.03	10.17 14.05
19	03.28 23.12	05.11 21.24	06.46 17.18-17.43/25 19.30	08.17 10.57-11.18/21 17.42	09.00 15.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 17.19-17.42/23 19.27	08.20 10.57-11.19/22 17.39	09.03 14.57	10.20 14.05
21	03.34 23.06	05.18 21.16	06.52 17.20-17.41/21 19.23	08.23 10.55-11.18/23 17.35	09.07 14.54	10.20 14.05
22	03.38 23.02	05.21 21.13	06.55 17.21-17.39/18 19.19	08.26 10.55-11.19/24 17.32	09.10 14.51	10.21 14.05
23	03.41 22.59	05.24 21.09	06.58 17.22-17.36/14 19.16	08.29 10.55-11.18/23 17.28	09.13 14.48	10.21 14.06
24	03.45 22.56	05.27 21.06	07.01 17.26-17.32/6 19.12	08.33 12.01-12.11/10 17.25	09.17 14.45	10.22 14.07
25	03.48 22.52	05.30 21.02	07.04 16.47-17.10/23 19.08	08.36 10.59-11.14/15 16.21	09.20 14.43	10.22 14.08
26	03.51 22.49	05.34 20.58	07.07 16.47-17.10/23 19.05	07.39 10.57-11.14/17 16.18	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 20.55	07.10 16.46-17.09/23 19.01	07.42 10.56-11.16/20 16.14	09.26 14.38	10.22 14.10
28	03.58 22.42	05.40 20.51	07.13 16.46-17.09/23 18.58	07.46 10.55-11.17/22 16.11	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 20.47	07.16 16.46-17.08/22 18.54	07.49 10.55-11.17/22 16.07	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 20.44	07.19 16.46-17.07/21 18.50	07.52 10.55-11.18/23 16.04	09.36 14.30	10.20 14.14
31	04.08 22.32	05.49 20.40		07.56 10.54-11.18/24 16.01		10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	0	0	576	511	166	0

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 12 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June		
1	10.18 14.19	09.03 15.55	07.28 17.29	09.41-10.06/25	06.35 20.05	18.14-18.16/2 17.23-17.45/22	04.46 21.41	03.01 23.27
2	10.17 14.21	09.00 15.58	07.24 17.32	09.41-10.05/24	06.32 20.08	18.07-18.21/14 17.24-17.43/19	04.42 21.44	02.58 23.30
3	10.16 14.23	08.57 16.02	07.20 17.35	09.42-10.04/22	06.28 20.11	18.05-18.24/19 17.26-17.41/15	04.39 21.48	02.55 23.33
4	10.14 14.25	08.53 16.05	07.17 17.38	09.43-10.03/20	06.24 20.14	18.02-18.25/23 17.29-17.37/8	04.35 21.51	02.52 23.36
5	10.13 14.28	08.50 16.09	07.13 17.42	09.44-10.01/17	06.21 20.17	18.01-18.27/26	04.32 21.54	02.50 23.39
6	10.11 14.30	08.47 16.12	07.10 17.45	09.46-09.59/13	06.17 20.20	17.59-18.27/28	04.28 21.58	02.47 23.42
7	10.09 14.33	08.44 16.16	07.06 17.48		06.13 20.23	17.58-18.27/29	04.24 22.01	02.44 23.45
8	10.08 14.36	08.40 16.19	07.03 17.51		06.10 20.27	17.57-18.28/31	04.21 22.05	02.42 23.48
9	10.06 14.39	08.37 16.23	06.59 17.54		06.06 20.30	17.56-18.28/32	04.17 22.08	02.40 23.50
10	10.04 14.41	08.34 16.26	06.55 17.57		06.02 20.33	17.56-18.28/32	04.14 22.12	02.37 23.53
11	10.01 14.44	08.30 16.29	06.52 18.00		05.59 20.36	17.55-18.28/33	04.10 22.15	02.35 23.55
12	09.59 14.47	08.27 16.33	06.48 18.03		05.55 20.39	17.55-18.28/33	04.07 22.18	02.33 23.58
13	09.57 14.50	08.23 16.36	06.44 18.07		05.51 20.42	17.55-18.27/32	04.03 22.22	02.32 00.00
14	09.55 14.54	08.20 16.40	06.41 18.10		05.48 20.45	17.55-18.27/32	04.00 22.25	02.30 00.02
15	09.52 14.57	08.17 16.43	06.37 18.13		05.44 20.49	17.55-18.26/31	03.56 22.29	02.28 00.03
16	09.50 15.00	08.13 16.46	06.34 18.16		05.40 20.52	17.56-18.26/30	03.53 22.32	02.27 00.05
17	09.47 15.03	08.10 16.50	06.30 18.19		05.37 20.55	17.57-18.25/28	03.49 22.36	02.26 00.06
18	09.44 15.07	08.06 16.53	06.26 18.22		05.33 20.58	17.57-18.23/26	03.46 22.39	02.25 00.07
19	09.42 15.10	08.03 16.56	06.23 18.25	16.31-16.43/12	05.29 21.01	17.58-18.22/24	03.43 22.43	02.25 00.08
20	09.39 15.13	07.59 17.00	06.19 18.28	16.29-16.46/17	05.26 21.05	17.59-18.20/21	03.39 22.46	02.24 00.09
21	09.36 15.17	07.56 17.03	06.15 18.31	16.27-16.47/20	05.22 21.08	18.01-18.18/17	03.36 22.50	02.24 00.09
22	09.33 15.20	07.52 17.06	06.12 18.34	16.25-16.48/23	05.19 21.11	18.05-18.16/11	03.33 22.53	02.24 00.09
23	09.31 15.24	07.49 17.09	06.08 18.37	16.24-16.49/25	05.15 21.14		03.29 22.57	02.24 00.09
24	09.28 15.27	07.45 17.13	06.04 18.40	16.23-16.49/26	05.11 21.18		03.26 23.00	02.25 00.09
25	09.25 15.30	07.42 17.16	06.01 18.43	16.22-16.49/27	05.08 21.21		03.23 23.04	02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 18.46	16.22-16.49/27	05.04 21.24		03.19 23.07	02.27 00.08
27	09.19 15.37	07.35 17.22	05.54 18.50	16.21-16.49/28	05.00 21.27		03.16 23.10	02.28 00.07
28	09.16 15.41	07.31 17.26	05.50 18.53	16.21-16.48/27	04.57 21.31		03.13 23.14	02.29 00.05
29	09.13 15.44		06.46 19.56	17.21-17.48/27	04.53 21.34		03.10 23.17	02.31 00.04
30	09.09 15.48		06.43 19.59	17.21-17.47/26	04.50 21.37		03.07 23.20	02.33 00.03
31	09.06 15.51		06.39 20.02	17.22-17.46/24			03.04 23.24	
Potential sun hours	163	235	363	454	578	641		
Sum of minutes with flicker	0	605	430	618	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 12 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 17.55-18.28/33 20.36	07.21 18.47	07.59 10.21-10.40/19 15.57	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 17.54-18.26/32 20.33	07.24 18.43	08.02 10.22-10.39/17 15.54	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 17.54-18.26/32 20.29	07.27 18.39	08.06 10.25-10.37/12 15.50	09.45 14.23
4	02.42 23.55	04.22 22.18	06.01 17.54-18.25/31 20.25	07.30 18.36	08.09 10.29-10.33/4 15.47	09.48 14.21
5	02.44 23.52	04.25 22.14	06.04 17.55-18.24/29 20.22	07.34 18.32	08.12 15.44	09.51 14.19
6	02.47 23.50	04.29 22.10	06.07 17.55-18.23/28 20.18	07.37 18.29	08.16 15.40	09.53 14.18
7	02.50 23.48	04.32 22.07	06.10 17.56-18.22/26 20.14	07.40 10.24-10.33/9 18.25	08.19 15.37	09.56 14.16
8	02.52 23.45	04.35 22.03	06.13 17.56-18.20/24 20.11 17.23-17.31/8	07.43 10.20-10.35/15 18.21	08.22 15.34	09.59 14.14
9	02.55 23.42	04.39 22.00	06.16 17.58-18.17/19 20.07 17.19-17.34/15	07.46 10.18-10.37/19 18.18	08.26 15.31	10.01 14.13
10	02.58 23.39	04.42 21.56	06.19 18.00-18.15/15 20.03 17.17-17.36/19	07.49 10.17-10.38/21 18.14	08.29 15.27	10.03 14.11
11	03.01 23.37	04.45 21.53	06.22 18.05-18.10/5 20.00 17.15-17.37/22	07.52 10.16-10.39/23 18.11	08.33 15.24	10.06 14.10
12	03.05 23.34	04.49 21.49	06.25 17.14-17.38/24 19.56	07.55 10.15-10.39/24 18.07	08.36 15.21	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 17.13-17.38/25 19.52	07.58 10.15-10.40/25 18.03	08.40 15.18	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 17.12-17.39/27 19.49	08.01 10.14-10.39/25 18.00	08.43 15.15	10.11 14.07
15	03.14 23.25	04.59 21.38	06.34 17.11-17.39/28 19.45	08.04 10.13-10.39/26 17.56	08.46 15.12	10.13 14.06
16	03.17 23.22	05.02 21.35	06.37 17.10-17.37/27 19.41	08.07 10.14-10.39/25 17.53	08.50 15.09	10.15 14.05
17	03.21 23.19	05.05 21.31	06.40 17.10-17.37/27 19.38	08.10 11.26-11.36/10 17.49 10.13-10.38/25	08.53 15.06	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 17.09-17.37/28 19.34	08.14 11.24-11.40/16 17.46 10.14-10.38/24	08.57 15.03	10.17 14.05
19	03.27 23.12	05.11 21.24	06.46 17.10-17.36/26 19.30	08.17 11.22-11.41/19 17.42 10.14-10.37/23	09.00 15.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 17.10-17.35/25 19.27	08.20 11.21-11.42/21 17.39 10.16-10.36/20	09.03 14.57	10.20 14.05
21	03.34 23.06	05.18 18.09-18.21/12 21.16	06.52 17.10-17.34/24 19.23	08.23 11.19-11.43/24 17.35 10.16-10.34/18	09.07 14.54	10.20 14.05
22	03.38 23.02	05.21 18.06-18.23/17 21.13	06.55 17.11-17.32/21 19.19	08.26 11.19-11.44/25 17.32 10.19-10.32/13	09.10 14.51	10.21 14.05
23	03.41 22.59	05.24 18.03-18.25/22 21.09	06.58 17.12-17.31/19 19.16	08.29 11.17-11.43/26 17.28 10.21-10.28/7	09.13 14.48	10.21 14.06
24	03.44 22.56	05.27 18.02-18.26/24 21.06	07.01 17.14-17.28/14 19.12	08.33 11.17-11.44/27 17.25	09.17 14.45	10.22 14.07
25	03.48 22.52	05.30 18.00-18.27/27 21.02	07.04 17.18-17.24/6 19.08	07.36 10.17-10.44/27 16.21	09.20 14.43	10.22 14.07
26	03.51 22.49	05.34 17.58-18.27/29 20.58	07.07 19.05	07.39 10.17-10.43/26 16.18	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 17.57-18.27/30 20.55	07.10 19.01	07.42 10.17-10.43/26 16.14	09.27 14.38	10.22 14.10
28	03.58 22.42	05.40 17.57-18.28/31 20.51	07.13 18.58	07.46 10.17-10.43/26 16.11	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 17.56-18.28/32 20.47	07.16 18.54	07.49 10.18-10.43/25 16.07	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 17.56-18.28/32 20.44	07.19 18.50	07.52 10.19-10.42/23 16.04	09.36 14.30	10.20 14.14
31	04.08 22.32	05.49 17.55-18.28/33 20.40	 	07.56 10.20-10.41/21 16.01	 	10.19 14.16
Potential sun hours	621	513	394	302	192	125
Sum of minutes with flicker	0	289	659	684	52	0

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 13 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June		
1	10.18 14.19	09.03 15.55	07.28 17.29	09.01-09.23/22 17.38	06.35 20.05	16.58-17.34/36 21.41	04.46 23.27	17.41-18.23/42 23.30
2	10.17 14.21	09.00 15.58	07.24 17.32	09.01-09.23/22 20.08	06.32 20.08	16.58-17.33/35 21.44	04.42 23.30	17.42-18.22/40 23.33
3	10.16 14.23	08.57 16.02	07.20 17.35	09.00-09.23/23 20.11	06.28 20.11	16.58-17.33/35 21.48	04.39 23.33	17.43-18.22/39 23.36
4	10.14 14.25	08.53 16.05	07.17 17.38	09.01-09.24/23 20.14	06.24 20.14	16.58-17.32/34 21.51	04.35 23.36	17.43-18.21/38 23.39
5	10.13 14.28	08.50 16.09	07.13 17.42	09.01-09.23/22 20.17	06.21 20.17	16.59-17.32/33 21.54	04.32 23.39	17.44-18.20/36 23.42
6	10.11 14.30	08.47 16.12	07.10 17.45	09.01-09.22/21 20.20	06.17 20.20	16.59-17.30/31 21.58	04.28 23.42	17.46-18.20/34 23.45
7	10.09 14.33	08.44 16.16	07.06 17.48	09.01-09.20/19 20.23	06.13 20.23	17.00-17.29/29 22.01	04.24 23.45	17.47-18.18/31 23.48
8	10.08 14.36	08.40 16.19	07.02 17.51	09.03-09.19/16 20.27	06.10 20.27	17.01-17.28/27 22.05	04.21 23.48	17.48-18.17/29 23.50
9	10.06 14.38	08.37 16.23	06.59 17.54	09.04-09.17/13 20.30	06.06 20.30	17.02-17.26/24 22.08	04.17 23.50	17.50-18.16/26 23.53
10	10.04 14.41	08.34 16.26	06.55 17.57	09.08-09.12/4 20.33	06.02 20.33	17.59-18.13/14 22.12	04.14 23.53	17.52-18.14/22 23.55
11	10.01 14.44	08.30 16.29	06.52 18.00	09.08-09.12/4 20.36	05.59 20.36	17.55-18.16/21 17.08-17.20/12	04.10 22.15	17.54-18.12/18 23.55
12	09.59 14.47	08.27 16.33	06.48 18.03	10.07-10.14/7 18.03	05.55 20.39	17.52-18.19/27 22.18	04.07 23.58	17.57-18.08/11 23.58
13	09.57 14.50	08.23 16.36	06.44 18.07	10.05-10.18/13 18.07	05.51 20.42	17.50-18.20/30 22.22	04.03 23.58	17.58-18.19/27 23.58
14	09.55 14.54	08.20 16.40	06.41 18.10	10.03-10.20/17 18.10	05.48 20.45	17.48-18.22/34 22.25	04.00 23.58	17.58-18.19/27 23.58
15	09.52 14.57	08.17 16.43	06.37 18.13	10.02-10.21/19 18.13	05.44 20.49	17.46-18.22/36 22.29	03.56 23.58	17.58-18.19/27 23.58
16	09.50 15.00	08.13 16.46	06.34 18.16	10.00-10.22/22 18.16	05.40 20.52	17.46-18.24/38 22.32	03.53 23.58	17.58-18.19/27 23.58
17	09.47 15.03	08.10 16.50	06.30 18.19	10.00-10.23/23 18.19	05.37 20.55	17.45-18.25/40 22.36	03.49 23.58	17.58-18.19/27 23.58
18	09.44 15.07	08.06 16.53	06.26 18.22	09.59-10.23/24 18.22	05.33 20.58	17.43-18.25/42 22.39	03.46 23.58	17.58-18.19/27 23.58
19	09.42 15.10	08.03 16.56	06.23 18.25	09.58-10.23/25 18.25	05.29 21.01	17.43-18.25/42 22.43	03.43 23.58	17.58-18.19/27 23.58
20	09.39 15.13	07.59 17.00	06.19 18.28	09.58-10.23/25 18.28	05.26 21.05	17.42-18.25/43 22.46	03.39 23.58	17.58-18.19/27 23.58
21	09.36 15.17	07.56 17.03	06.15 18.31	09.58-10.23/25 18.31	05.22 21.08	17.41-18.26/45 22.50	03.36 23.58	17.58-18.19/27 23.58
22	09.33 15.20	07.52 17.06	06.12 18.34	16.09-16.29/20 18.34	05.18 21.11	17.41-18.26/45 22.53	03.33 23.58	17.58-18.19/27 23.58
23	09.31 15.23	07.49 17.09	06.08 18.37	16.07-16.31/24 18.37	05.15 21.14	17.40-18.25/45 22.57	03.29 23.58	17.58-18.19/27 23.58
24	09.28 15.27	07.45 17.13	06.04 18.40	09.59-10.22/23 18.40	05.11 21.18	17.40-18.26/46 23.00	03.26 23.58	17.58-18.19/27 23.58
25	09.25 15.30	07.42 17.16	06.01 18.43	10.00-10.21/21 18.43	05.08 21.21	17.40-18.26/46 23.04	03.23 23.58	17.58-18.19/27 23.58
26	09.22 15.34	07.38 17.19	05.57 18.46	10.01-10.19/18 18.46	05.04 21.24	17.40-18.25/45 23.07	03.19 23.58	17.58-18.19/27 23.58
27	09.19 15.37	07.35 17.22	05.53 18.49	10.03-10.18/15 18.49	05.00 21.27	17.40-18.25/45 23.10	03.16 23.58	17.58-18.19/27 23.58
28	09.16 15.41	07.31 17.26	05.50 18.53	10.05-10.15/10 18.53	04.57 21.31	17.40-18.25/45 23.14	03.13 23.58	17.58-18.19/27 23.58
29	09.13 15.44	07.26 17.26	05.46 18.56	09.02-09.23/21 18.56	04.53 21.34	17.41-18.25/44 23.17	03.10 23.58	17.58-18.19/27 23.58
30	09.09 15.48	07.21 17.21	05.43 18.59	16.59-17.34/35 18.59	04.50 21.37	17.41-18.24/43 23.20	03.07 23.58	17.58-18.19/27 23.58
31	09.06 15.51	07.16 17.16	05.39 19.02	16.59-17.35/36 19.02	04.47 21.40	17.41-18.24/43 23.23	03.04 23.58	17.58-18.19/27 23.58
Potential sun hours	163	235	363	454	578	641	0	0
Sum of minutes with flicker	0	416	505	1131	366	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 13 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35	04.12 18.06-18.21/15	05.52 17.55-18.16/21	07.21	07.59	09.39
	00.01	22.28	20.36 17.07-17.20/13	18.47	15.57	14.28
2	02.37	04.15 18.03-18.22/19	05.55 17.57-18.11/14	07.24	08.02	09.42
	23.59	22.25	20.33 17.03-17.22/19	18.43	15.54	14.26
3	02.39	04.19 18.01-18.25/24	05.58 17.00-17.24/24	07.27	08.06	09.45
	23.57	22.21	20.29	18.39	15.50	14.23
4	02.42	04.22 17.59-18.26/27	06.01 16.59-17.25/26	07.30 09.43-09.53/10	08.09	09.48
	23.55	22.18	20.25	18.36	15.47	14.21
5	02.44	04.25 17.58-18.28/30	06.04 16.57-17.26/29	07.33 09.40-09.55/15	08.12	09.51
	23.52	22.14	20.22	18.32	15.44	14.19
6	02.47	04.29 17.56-18.29/33	06.07 16.56-17.27/31	07.37 09.38-09.56/18	08.16	09.53
	23.50	22.10	20.18	18.29	15.40	14.18
7	02.50	04.32 17.54-18.29/35	06.10 16.54-17.27/33	07.40 09.37-09.57/20	08.19	09.56
	23.48	22.07	20.14	18.25	15.37	14.16
8	02.52	04.35 17.53-18.30/37	06.13 16.53-17.26/33	07.43 09.36-09.57/21	08.22	09.58
	23.45	22.03	20.11	18.21	15.34	14.14
9	02.55	04.39 17.52-18.31/39	06.16 16.52-17.27/35	07.46 09.35-09.57/22	08.26	10.01
	23.42	22.00	20.07	18.18	15.31	14.13
10	02.58	04.42 17.51-18.31/40	06.19 16.51-17.27/36	07.49 09.35-09.58/23	08.29	10.03
	23.39	21.56	20.03	18.14	15.27	14.11
11	03.01	04.45 17.51-18.32/41	06.22 16.51-17.27/36	07.52 09.34-09.57/23	08.33	10.05
	23.37	21.53	20.00	18.11	15.24	14.10
12	03.04	04.49 17.50-18.32/42	06.25 16.50-17.26/36	07.55 09.34-09.57/23	08.36	10.08
	23.34	21.49	19.56	18.07	15.21	14.09
13	03.08	04.52 17.48-18.32/44	06.28 16.50-17.26/36	07.58 09.35-09.57/22	08.39	10.10
	23.31	21.45	19.52	18.03	15.18	14.08
14	03.11	04.55 17.48-18.32/44	06.31 16.50-17.25/35	08.01 10.36-10.49/13	08.43	10.11
	23.28	21.42	19.49	18.00	15.15	14.07
15	03.14	04.59 17.48-18.32/44	06.34 16.50-17.25/35	08.04 10.34-10.50/16	08.46	10.13
	23.25	21.38	19.45	17.56	15.12	14.06
16	03.17	05.02 17.47-18.32/45	06.37 16.50-17.23/33	08.07 10.33-10.52/19	08.50	10.15
	23.22	21.35	19.41	17.53	15.09	14.05
17	03.21	05.05 17.47-18.32/45	06.40 16.50-17.22/32	08.10 10.31-10.53/22	08.53	10.16
	23.19	21.31	19.38	17.49	15.06	14.05
18	03.24	05.08 17.47-18.32/45	06.43 16.51-17.21/30	08.13 10.31-10.54/23	08.57	10.17
	23.15	21.27	19.34	17.46	15.03	14.05
19	03.27	05.11 17.47-18.32/45	06.46 16.51-17.19/28	08.17 10.30-10.54/24	09.00	10.19
	23.12	21.24	19.30	17.42	15.00	14.05
20	03.31	05.15 17.46-18.31/45	06.49 16.53-17.17/24	08.20 10.29-10.54/25	09.03	10.20
	23.09	21.20	19.27	17.39	14.57	14.05
21	03.34	05.18 17.46-18.31/45	06.52 16.54-17.15/21	08.23 10.29-10.54/25	09.07	10.20
	23.06	21.16	19.23	17.35	14.54	14.05
22	03.38	05.21 17.46-18.30/44	06.55 16.56-17.12/16	08.26 10.29-10.54/25	09.10	10.21
	23.02	21.13	19.19	17.32	14.51	14.05
23	03.41	05.24 17.46-18.30/44	06.58 17.01-17.07/6	08.29 10.28-10.53/25	09.13	10.21
	22.59	21.09	19.16	17.28	14.48	14.06
24	03.44	05.27 17.47-18.29/42	07.01	08.33 10.29-10.53/24	09.17	10.22
	22.56	21.05	19.12	17.25	14.45	14.07
25	03.48	05.30 17.47-18.28/41	07.04	07.36 09.30-09.52/22	09.20	10.22
	22.52	21.02	19.08	16.21	14.43	14.07
26	03.51	05.33 17.47-18.26/39	07.07	07.39 09.30-09.51/21	09.23	10.22
	22.49	20.58	19.05	16.18	14.40	14.09
27	03.55	05.37 17.47-18.25/38	07.10	07.42 09.31-09.50/19	09.26	10.22
	22.45	20.55	19.01	16.14	14.37	14.10
28	03.58	05.40 17.48-18.24/36	07.13	07.46 09.32-09.49/17	09.30	10.21
	22.42	20.51	18.58	16.11	14.35	14.11
29	04.02	05.43 17.49-18.22/33	07.16	07.49 09.35-09.47/12	09.33	10.21
	22.39	20.47	18.54	16.07	14.33	14.13
30	04.05	05.46 17.51-18.21/30	07.18	07.52 09.39-09.43/4	09.36	10.20
	22.35	20.44	18.50	16.04	14.30	14.14
31	04.08 18.12-18.15/3	05.49 17.52-18.19/27		07.56		10.19
	22.32	20.40		16.01		14.16
Potential sun hours	621	513	394	302	192	125
Sum of minutes with flicker	3	1158	682	608	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 14 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June
1	10.18	09.03	07.28	06.35	04.46	03.01
	14.19	15.55	17.29	20.05	21.41	23.27
2	10.17	09.00	07.24	06.32	07.34-07.40/6	04.42
	14.21	15.58	17.32	20.08	21.44	23.30
3	10.16	08.57	13.54-14.04/10	07.21	06.28	07.30-07.43/13
	14.23	16.02	17.35	20.11	21.48	23.33
4	10.14	08.54	13.51-14.05/14	07.17	06.24	07.28-07.44/16
	14.25	16.05	13.04-13.12/8	17.38	20.14	21.51
5	10.13	08.50	13.50-14.07/17	07.13	06.21	07.27-07.45/18
	14.28	16.09	13.01-13.15/14	17.42	20.17	21.54
6	10.11	08.47	13.49-14.08/19	07.10	06.17	07.25-07.45/20
	14.30	16.12	13.00-13.17/17	17.45	20.20	21.58
7	10.09	08.44	13.48-14.09/21	07.06	06.13	07.25-07.46/21
	14.33	16.16	12.58-13.19/21	17.48	20.23	22.01
8	10.08	08.40	13.48-14.10/22	07.03	06.10	07.24-07.45/21
	14.36	16.19	12.57-13.20/23	17.51	20.27	22.05
9	10.06	08.37	13.47-14.10/23	06.59	06.06	07.24-07.45/21
	14.39	16.23	12.57-13.21/24	17.54	20.30	22.08
10	10.04	08.34	13.47-14.10/23	06.55	06.02	07.23-07.45/22
	14.42	16.26	12.56-13.22/26	17.57	20.33	22.12
11	10.02	08.30	13.47-14.10/23	06.52	05.59	07.24-07.44/20
	14.44	16.29	12.55-13.22/27	18.00	20.36	22.15
12	09.59	08.27	13.47-14.10/23	06.48	05.55	07.24-07.43/19
	14.48	16.33	12.56-13.23/27	18.04	20.39	22.19
13	09.57	08.24	13.48-14.11/23	06.45	05.51	07.25-07.42/17
	14.51	16.36	12.56-13.24/28	18.07	20.42	22.22
14	09.55	08.20	13.49-14.11/22	06.41	05.48	07.26-07.40/14
	14.54	16.40	12.56-13.24/28	18.10	20.45	22.25
15	09.52	08.17	13.49-14.10/21	06.37	05.44	07.28-07.38/10
	14.57	16.43	12.56-13.23/27	18.13	20.49	22.29
16	09.50	08.13	13.50-14.09/19	06.34	05.40	03.53
	15.00	16.46	12.56-13.23/27	18.16	20.52	22.32
17	09.47	08.10	13.51-14.08/17	06.30	05.37	03.50
	15.03	16.50	12.56-13.23/27	18.19	20.55	22.36
18	09.45	08.06	13.53-14.06/13	06.26	05.33	03.46
	15.07	16.53	12.56-13.22/26	18.22	20.58	22.39
19	09.42	08.03	13.56-14.03/7	06.23	05.30	03.43
	15.10	16.56	12.57-13.21/24	18.25	21.01	22.43
20	09.39	07.59	12.58-13.20/22	06.19	05.26	03.39
	15.13	17.00	18.28	21.05	22.46	00.09
21	09.36	07.56	13.00-13.19/19	06.15	05.22	03.36
	15.17	17.03	18.31	21.08	22.50	00.09
22	09.34	07.52	13.02-13.17/15	06.12	05.19	03.33
	15.20	17.06	18.34	21.11	22.53	00.09
23	09.31	07.49	13.05-13.13/8	06.08	05.15	03.29
	15.24	17.10	18.37	21.14	22.57	00.09
24	09.28	07.45	06.05	05.11	03.26	02.25
	15.27	17.13	18.40	21.18	23.00	00.09
25	09.25	07.42	06.01	05.08	03.23	02.26
	15.31	17.16	18.43	21.21	23.04	00.08
26	09.22	07.38	05.57	05.04	03.20	02.27
	15.34	17.19	18.47	21.24	23.07	00.08
27	09.19	07.35	05.54	05.00	03.16	02.28
	15.37	17.22	18.50	21.28	23.10	00.07
28	09.16	07.31	05.50	04.57	03.13	02.29
	15.41	17.26	18.53	21.31	23.14	00.05
29	09.13		06.46	04.53	03.10	02.31
	15.44		19.56	21.34	23.17	00.04
30	09.10		06.43	04.50	03.07	02.33
	15.48		19.59	21.38	23.20	00.03
31	09.06		06.39		03.04	
	15.51		20.02		23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	755	0	238	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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6 **WTG:** 14 - VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 07.23-07.43/20 20.36	07.22 18.47	07.59 13.18-13.41/23 15.57 12.26-12.52/26	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 07.22-07.43/21 20.33	07.25 18.43	08.02 13.18-13.40/22 15.54 12.27-12.51/24	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 07.22-07.44/22 20.29	07.28 18.40	08.06 13.18-13.40/22 15.51 12.28-12.50/22	09.45 14.24
4	02.42 23.55	04.22 22.18	06.01 07.21-07.42/21 20.25	07.31 18.36	08.09 13.19-13.39/20 15.47 12.29-12.49/20	09.48 14.22
5	02.44 23.52	04.26 22.14	06.04 07.21-07.42/21 20.22	07.34 18.32	08.12 13.20-13.38/18 15.44 12.30-12.47/17	09.51 14.20
6	02.47 23.50	04.29 22.11	06.07 07.21-07.41/20 20.18	07.37 18.29	08.16 13.21-13.37/16 15.41 12.32-12.45/13	09.53 14.18
7	02.50 23.48	04.32 22.07	06.10 07.22-07.40/18 20.14	07.40 18.25	08.19 13.22-13.35/13 15.37 12.35-12.42/7	09.56 14.16
8	02.53 23.45	04.36 22.03	06.13 07.23-07.39/16 20.11	07.43 18.21	08.23 13.24-13.33/9 15.34	09.59 14.14
9	02.55 23.42	04.39 22.00	06.16 07.24-07.37/13 20.07	07.46 18.18	08.26 15.31	10.01 14.13
10	02.58 23.40	04.42 21.56	06.19 07.26-07.33/7 20.03	07.49 18.14	08.29 15.27	10.03 14.11
11	03.02 23.37	04.46 21.53	06.22 20.00	07.52 18.11	08.33 15.24	10.06 14.10
12	03.05 23.34	04.49 21.49	06.25 19.56	07.55 18.07	08.36 15.21	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 19.52	07.58 18.04	08.40 15.18	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 19.49	08.01 18.00	08.43 15.15	10.12 14.07
15	03.14 23.25	04.59 21.38	06.34 19.45	08.04 17.56	08.46 15.12	10.13 14.06
16	03.18 23.22	05.02 21.35	06.37 19.41	08.07 17.53	08.50 15.09	10.15 14.06
17	03.21 23.19	05.05 21.31	06.40 19.38	08.10 17.49	08.53 15.06	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 19.34	08.14 17.46	08.57 15.03	10.18 14.05
19	03.28 23.12	05.12 21.24	06.46 19.30	08.17 13.34-13.45/11 17.42	09.00 15.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 19.27	08.20 13.32-13.48/16 17.39	09.03 14.57	10.20 14.05
21	03.34 23.06	05.18 21.17	06.52 19.23	08.23 13.29-13.49/20 17.35	09.07 14.54	10.20 14.05
22	03.38 23.02	05.21 21.13	06.55 19.19	08.26 13.28-13.51/23 17.32	09.10 14.51	10.21 14.05
23	03.41 22.59	05.24 21.09	06.58 19.16	08.29 14.24-14.34/10 17.28 13.27-13.51/24	09.13 14.48	10.21 14.06
24	03.45 22.56	05.27 21.06	07.01 19.12	08.33 14.22-14.36/14 17.25 13.26-13.52/26	09.17 14.46	10.22 14.07
25	03.48 22.52	05.30 21.02	07.04 19.09	07.36 13.21-13.38/17 16.21 12.26-12.53/27	09.20 14.43	10.22 14.08
26	03.51 22.49	05.34 20.58	07.07 19.05	07.39 13.19-13.38/19 16.18 12.25-12.52/27	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 20.55	07.10 19.01	07.42 13.18-13.39/21 16.14 12.25-12.52/27	09.27 14.38	10.22 14.10
28	03.58 22.42	05.40 07.28-07.39/11 20.51	07.13 18.58	07.46 13.18-13.40/22 16.11 12.25-12.53/28	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 07.26-07.41/15 20.47	07.16 18.54	07.49 13.17-13.40/23 16.07 12.25-12.53/28	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 07.25-07.42/17 20.44	07.19 18.50	07.52 13.17-13.41/24 16.04 12.25-12.53/28	09.36 14.30	10.20 14.14
31	04.09 22.32	05.49 07.24-07.43/19 20.40	 	07.56 13.17-13.41/24 16.01 12.26-12.52/26	 	10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	0	62	179	485	272	0

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**WTG:** 1 - M1-E-70 E4 2000 71.0

Assumptions for shadow calculations

- The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	10.18	09.03	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	11.42-11.59/17	09.39
	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	14.28	14.28
2	10.17	09.00	07.24	06.32	04.43	02.58	02.37	04.16	05.55	07.25	08.02	11.42-11.59/17	09.42
	14.21	15.59	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	14.26	14.26
3	10.16	08.57	07.21	06.28	04.39	02.56	02.40	04.19	05.58	07.28	08.06	11.43-11.58/15	09.45
	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.40	15.51	14.24	14.24
4	10.14	08.54	07.17	06.24	04.35	02.53	02.42	04.22	06.01	07.31	08.09	11.43-11.57/14	09.48
	14.26	16.06	17.39	20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47	14.22	14.22
5	10.13	08.50	12.15-12.24/9	07.13	06.21	04.32	02.50	02.45	04.26	06.04	07.34	11.44-11.56/12	09.51
	14.28	16.09		17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44	14.20
6	10.11	08.47	12.14-12.26/12	07.10	06.17	04.28	02.47	02.47	04.29	06.07	07.37	11.46-11.54/8	09.53
	14.31	16.12		17.45	20.20	21.58	23.42	23.50	22.11	20.18	18.29	15.41	14.18
7	10.09	08.44	12.13-12.27/14	07.06	06.14	04.25	02.45	02.50	04.32	06.10	07.40		09.56
	14.33	16.16		17.48	20.24	22.01	23.45	23.47	22.07	20.14	18.25	15.37	14.16
8	10.08	08.40	12.12-12.28/16	07.03	06.10	04.21	02.42	02.53	04.36	06.13	07.43		09.59
	14.36	16.19		17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.22	15.34	14.15
9	10.06	08.37	12.12-12.28/16	06.59	06.06	04.18	02.40	02.56	04.39	06.16	07.46		10.01
	14.39	16.23		17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13
10	10.04	08.34	12.12-12.28/16	06.55	06.03	04.14	02.38	02.59	04.42	06.19	07.49		10.03
	14.42	16.26		17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.28	14.12
11	10.02	08.30	12.12-12.28/16	06.52	05.59	04.11	02.36	03.02	04.46	06.22	07.52		10.06
	14.45	16.30		18.01	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10
12	09.59	08.27	12.13-12.29/16	06.48	05.55	04.07	02.34	03.05	04.49	06.25	07.55		10.08
	14.48	16.33		18.04	20.39	22.19	23.57	23.34	21.49	19.56	18.07	15.21	14.09
13	09.57	08.24	12.13-12.29/16	06.45	05.52	04.04	02.32	03.08	04.52	06.28	07.58		10.10
	14.51	16.36		18.07	20.42	22.22	00.00	23.31	21.46	19.53	18.04	15.18	14.08
14	09.55	08.20	12.14-12.28/14	06.41	05.48	04.00	02.30	03.11	04.56	06.31	08.01		10.11
	14.54	16.40		18.10	20.46	22.25	00.01	23.28	21.42	19.49	18.00	15.15	14.07
15	09.52	08.17	12.15-12.26/11	06.37	05.44	03.57	02.29	03.15	04.59	06.34	08.04		10.13
	14.57	16.43		18.13	20.49	22.29	00.03	23.25	21.38	19.45	17.57	15.12	14.06
16	09.50	08.13	12.17-12.24/7	06.34	05.41	03.53	02.28	03.18	05.02	06.37	08.07		10.15
	15.00	16.47		18.16	20.52	22.32	00.05	23.22	21.35	19.42	17.53	15.09	14.06
17	09.47	08.10		06.30	05.37	03.50	02.27	03.21	05.05	06.40	08.11		10.16
	15.04	16.50		18.19	20.55	22.36	00.06	23.19	21.31	19.38	17.49	15.06	14.05
18	09.45	08.06		06.27	05.33	03.46	02.26	03.24	05.09	06.43	08.14		10.17
	15.07	16.53		18.22	20.58	22.39	00.07	23.15	21.27	19.34	17.46	15.03	14.05
19	09.42	08.03		06.23	05.30	03.43	02.25	03.28	05.12	06.46	08.17		10.19
	15.10	16.57		18.25	21.01	22.43	00.08	23.12	21.24	19.31	17.42	15.00	14.05
20	09.39	07.59		06.19	05.26	03.40	02.25	03.31	05.15	06.49	08.20		10.20
	15.14	17.00		18.28	21.05	22.46	00.09	23.09	21.20	19.27	17.39	14.57	14.05
21	09.36	07.56		06.16	05.22	03.36	02.25	03.35	05.18	06.52	08.23		10.20
	15.17	17.03		18.31	21.08	22.50	00.09	23.06	21.17	19.23	17.35	14.54	14.05
22	09.34	07.52		06.12	05.19	03.33	02.25	03.38	05.21	06.55	08.26		10.21
	15.20	17.06		18.34	21.11	22.53	00.09	23.02	21.13	19.20	17.32	14.51	14.06
23	09.31	07.49		06.08	05.15	03.30	02.25	03.41	05.24	06.58	08.30		10.21
	15.24	17.10		18.37	21.14	22.57	00.09	22.59	21.09	19.16	17.28	14.48	14.06
24	09.28	07.45		06.05	05.12	03.26	02.25	03.45	05.28	07.01	08.33		10.22
	15.27	17.13		18.41	21.18	23.00	00.09	22.56	21.06	19.12	17.25	14.46	14.07
25	09.25	07.42		06.01	05.08	03.23	02.26	03.48	05.31	07.04	07.36		10.22
	15.31	17.16		18.44	21.21	23.04	00.08	22.52	21.02	19.09	16.21	14.43	14.08
26	09.22	07.38		05.57	05.04	03.20	02.27	03.52	05.34	07.07	07.39	11.47-11.55/8	09.23
	15.34	17.19		18.47	21.24	23.07	00.07	22.49	20.58	19.05	16.18	14.40	14.09
27	09.19	07.35		05.54	05.01	03.17	02.28	03.55	05.37	07.10	07.43	11.44-11.56/12	09.27
	15.38	17.23		18.50	21.28	23.10	00.07	22.45	20.55	19.01	16.14	14.38	14.10
28	09.16	07.31		05.50	04.57	03.13	02.30	03.59	05.40	07.13	07.46	11.43-11.57/14	09.30
	15.41	17.26		18.53	21.31	23.14	00.05	22.42	20.51	18.58	16.11	14.35	14.12
29	09.13			06.46	04.53	03.10	02.31	04.02	05.43	07.16	07.49	11.42-11.58/16	09.33
	15.45			19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.08	14.33	14.13
30	09.10			06.43	04.50	03.07	02.33	04.05	05.46	07.19	07.52	11.42-11.58/16	09.36
	15.48			19.59	21.38	23.20	00.02	22.35	20.44	18.51	16.04	14.31	14.15
31	09.06			06.39		03.04		04.09	05.49		07.56	11.42-11.59/17	10.19
	15.52			20.02		23.24		22.32	20.40		16.01		14.17
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	83	125
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	83	83	0

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**WTG:** 2 - M5- E-70 E4 2,3 MW 2300

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June
1	10.18 14.19	09.03 15.55	07.28 17.29	09.02-09.11/9 06.35 20.05	04.46 21.41	03.01 23.27
2	10.17 14.21	09.00 15.58	07.24 17.32	09.00-09.12/12 06.32 20.08	04.43 21.44	02.58 23.30
3	10.16 14.23	08.57 16.02	07.21 17.35	08.59-09.12/13 06.28 20.11	04.39 21.48	02.55 23.33
4	10.14 14.26	08.54 16.05	07.17 17.39	09.00-09.13/13 06.24 20.14	04.35 21.51	02.53 23.36
5	10.13 14.28	08.50 16.09	07.13 17.42	08.59-09.13/14 06.21 20.17	04.32 21.54	02.50 23.39
6	10.11 14.31	08.47 16.12	07.10 17.45	08.59-09.12/13 06.17 20.20	04.28 21.58	02.47 23.42
7	10.09 14.33	08.44 16.16	07.06 17.48	09.00-09.10/10 06.13 20.24	04.25 22.01	02.45 23.45
8	10.08 14.36	08.40 16.19	07.03 17.51	09.02-09.09/7 06.10 20.27	04.21 22.05	02.42 23.48
9	10.06 14.39	08.37 16.23	06.59 17.54	06.06 20.30	04.18 22.08	02.40 23.50
10	10.04 14.42	08.34 16.26	06.55 17.57	06.02 20.33	04.14 22.12	02.38 23.53
11	10.01 14.45	08.30 16.30	06.52 18.00	05.59 20.36	04.11 22.15	02.36 23.55
12	09.59 14.48	08.27 16.33	06.48 18.04	05.55 20.39	04.07 22.18	02.34 23.57
13	09.57 14.51	08.24 16.36	06.45 18.07	05.51 20.42	04.04 22.22	02.32 00.00
14	09.55 14.54	08.20 16.40	06.41 18.10	05.48 20.45	04.00 22.25	02.30 00.01
15	09.52 14.57	08.17 16.43	06.37 18.13	05.44 20.49	03.57 22.29	02.29 00.03
16	09.50 15.00	08.13 16.46	06.34 18.16	05.41 20.52	03.53 22.32	02.28 00.05
17	09.47 15.04	08.10 16.50	06.30 18.19	05.37 20.55	03.50 22.36	02.27 00.06
18	09.45 15.07	08.06 16.53	06.26 18.22	05.33 20.58	03.46 22.39	02.26 00.07
19	09.42 15.10	08.03 16.56	06.23 18.25	05.30 21.01	03.43 22.43	02.25 00.08
20	09.39 15.14	07.59 17.00	06.19 18.28	05.26 21.05	03.39 22.46	02.25 00.09
21	09.36 15.17	07.56 17.03	06.16 18.31	05.22 21.08	03.36 22.50	05.24-05.28/4 02.24 00.09
22	09.34 15.20	07.52 17.06	06.12 18.34	05.19 21.11	03.33 22.53	05.22-05.29/7 02.24 00.09
23	09.31 15.24	07.49 17.10	06.08 18.37	05.15 21.14	03.29 22.57	05.21-05.30/9 02.25 00.09
24	09.28 15.27	07.45 17.13	06.05 18.40	05.11 21.18	03.26 23.00	05.21-05.31/10 02.25 00.09
25	09.25 15.31	07.42 17.16	06.01 18.44	05.08 21.21	03.23 23.04	05.20-05.31/11 02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 18.47	05.04 21.24	03.20 23.07	05.20-05.31/11 02.27 00.07
27	09.19 15.38	07.35 17.23	05.54 18.50	05.01 21.28	03.17 23.10	05.20-05.32/12 02.28 00.07
28	09.16 15.41	07.31 17.26	05.50 18.53	04.57 21.31	03.13 23.14	05.20-05.32/12 02.30 00.05
29	09.13 15.45		06.46 19.56	04.53 21.34	03.10 23.17	05.20-05.32/12 02.31 00.04
30	09.10 15.48		06.43 19.59	04.50 21.38	03.07 23.20	05.21-05.32/11 02.33 00.02
31	09.06 15.52		06.39 20.02		03.04 23.24	05.21-05.32/11
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	3	91	0	110	55

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

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

SHADOW - Calendar per WTG

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6**WTG:** 2 - M5- E-70 E4 2,3 MW 2300

Assumptions for shadow calculations

The calculated times are "worst case" given by the following assumptions:

- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

	July	August	September	October	November	December
1	02.35	04.12	05.52	07.22	07.59	09.39
	00.01	22.28	20.36	18.47	15.57	14.28
2	02.37	04.15	05.55	07.25	08.02	09.42
	23.59	22.25	20.33	18.43	15.54	14.26
3	02.40	04.19	05.58	07.28	08.06	09.45
	23.57	22.21	20.29	18.40	15.51	14.24
4	02.42	04.22	06.01	07.31	08.09	09.48
	23.55	22.18	20.25	18.36	15.47	14.22
5	02.44	05.32-05.34/2	04.26	06.04	07.34	09.41-09.43/2
	23.52	22.14	20.22	18.32	15.44	14.20
6	02.47	05.31-05.36/5	04.29	06.07	07.37	09.37-09.46/9
	23.50	22.11	20.18	18.29	15.41	14.18
7	02.50	05.31-05.37/6	04.32	06.10	07.40	09.35-09.47/12
	23.47	22.07	20.14	18.25	15.37	14.16
8	02.53	05.30-05.37/7	04.36	06.13	07.43	09.34-09.47/13
	23.45	22.03	20.11	18.22	15.34	14.14
9	02.56	05.29-05.38/9	04.39	06.16	07.46	09.34-09.48/14
	23.42	22.00	20.07	18.18	15.31	14.13
10	02.59	05.29-05.39/10	04.42	06.19	07.49	09.34-09.47/13
	23.39	21.56	20.03	18.14	15.28	14.11
11	03.02	05.29-05.39/10	04.46	06.22	07.52	09.34-09.46/12
	23.37	21.53	20.00	18.11	15.24	14.10
12	03.05	05.29-05.40/11	04.49	06.25	07.55	09.34-09.45/11
	23.34	21.49	19.56	18.07	15.21	14.09
13	03.08	05.29-05.40/11	04.52	06.28	07.58	09.37-09.44/7
	23.31	21.45	19.52	18.04	15.18	14.08
14	03.11	05.30-05.41/11	04.55	06.31	08.01	08.43
	23.28	21.42	19.49	18.00	15.15	14.07
15	03.14	05.29-05.41/12	04.59	06.34	08.04	08.46
	23.25	21.38	19.45	17.56	15.12	14.06
16	03.18	05.29-05.41/12	05.02	06.37	08.07	08.50
	23.22	21.35	19.41	17.53	15.09	14.06
17	03.21	05.29-05.41/12	05.05	06.40	08.10	08.53
	23.19	21.31	19.38	17.49	15.06	14.05
18	03.24	05.30-05.41/11	05.08	06.43	08.14	08.57
	23.15	21.27	19.34	17.46	15.03	14.05
19	03.28	05.30-05.40/10	05.12	06.46	08.17	09.00
	23.12	21.24	19.30	17.42	15.00	14.05
20	03.31	05.31-05.41/10	05.15	06.49	08.20	09.03
	23.09	21.20	19.27	17.39	14.57	14.05
21	03.34	05.31-05.40/9	05.18	06.52	08.23	09.07
	23.06	21.17	19.23	17.35	14.54	14.05
22	03.38	05.33-05.39/6	05.21	06.55	08.26	09.10
	23.02	21.13	19.20	17.32	14.51	14.06
23	03.41		05.24	06.58	08.30	09.13
	22.59		21.09	19.16	17.28	14.48
24	03.45		05.27	07.01	08.33	09.17
	22.56		21.06	19.12	17.25	14.46
25	03.48		05.31	07.04	07.36	09.20
	22.52		21.02	19.09	16.21	14.43
26	03.52		05.34	07.07	07.39	09.23
	22.49		20.58	19.05	16.18	14.40
27	03.55		05.37	07.10	07.42	09.27
	22.45		20.55	19.01	16.14	14.38
28	03.58		05.40	07.13	07.46	09.30
	22.42		20.51	18.58	16.11	14.35
29	04.02		05.43	07.16	07.49	09.33
	22.39		20.47	18.54	16.08	14.33
30	04.05		05.46	07.19	07.52	09.36
	22.35		20.44	18.50	16.04	14.30
31	04.09		05.49		07.56	
	22.32		20.40		16.01	
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	164	0	0	93	0	0

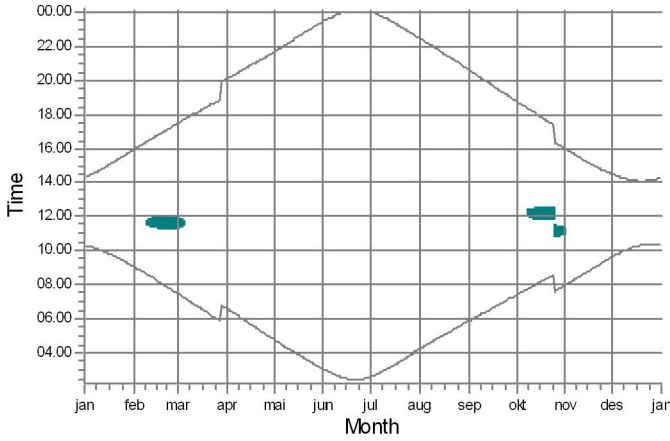
Table layout: For each day in each month the following matrix apply

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

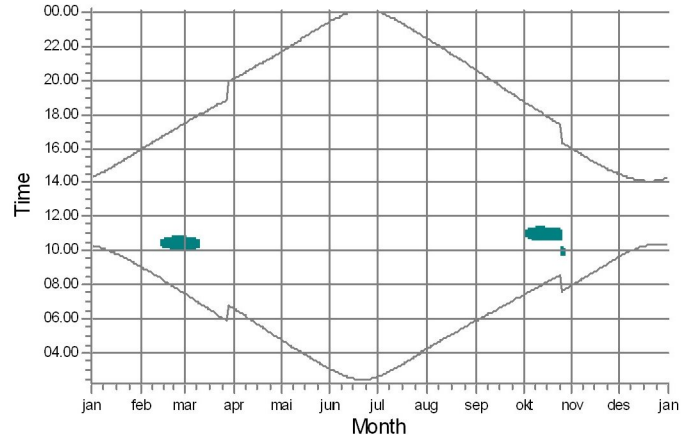
SHADOW - Calendar per WTG, graphical

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6

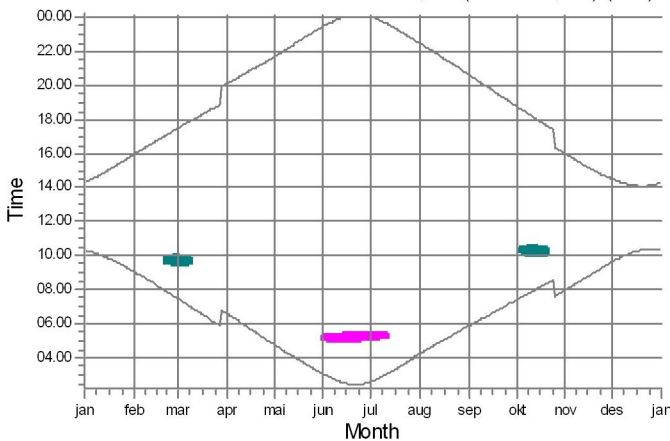
3: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (627)



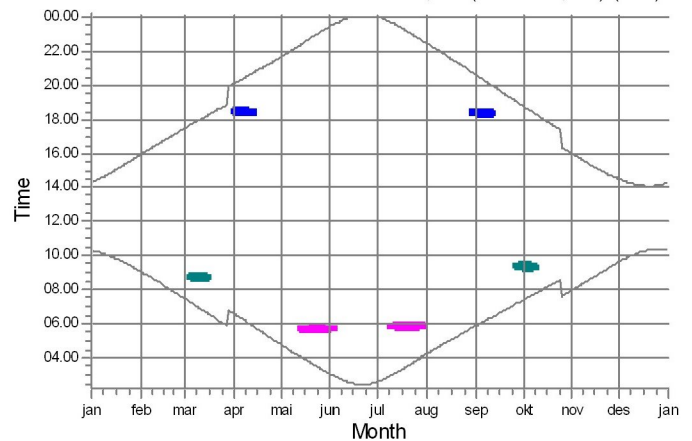
4: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (628)



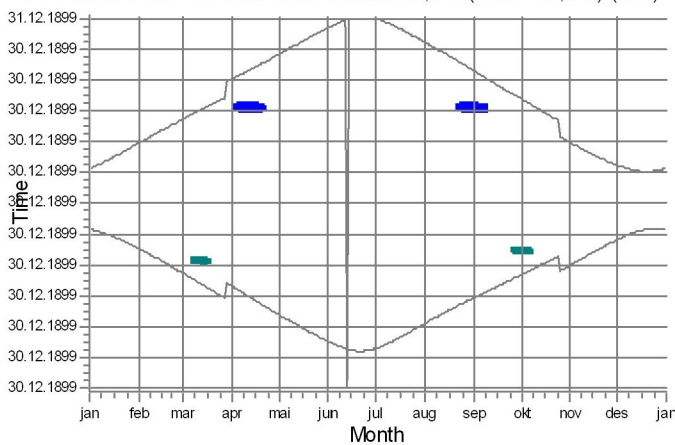
5: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)



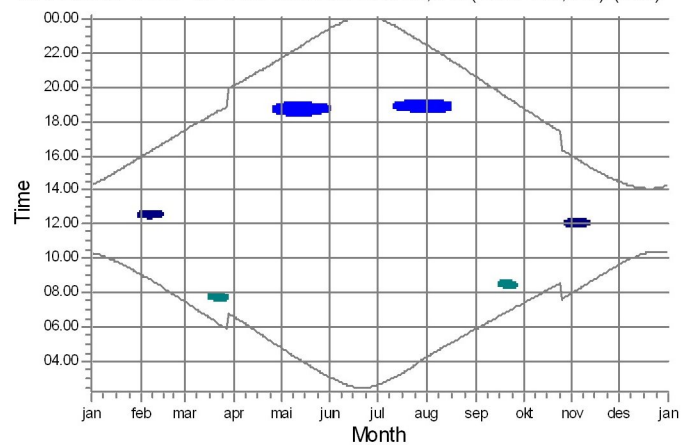
6: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (630)



7: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (631)



8: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)



Shadow receptors



C: Hundhammer



E: Løvmo



F: Storeienen

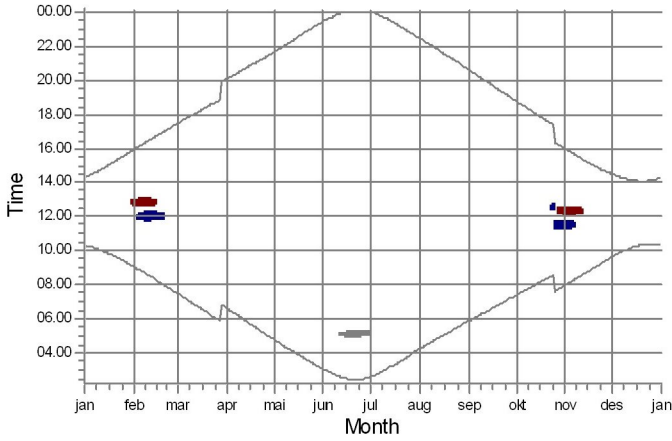


G: Hamland

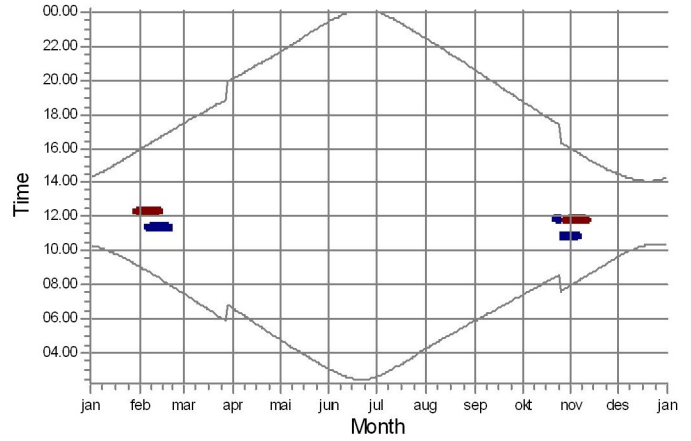
SHADOW - Calendar per WTG, graphical

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6

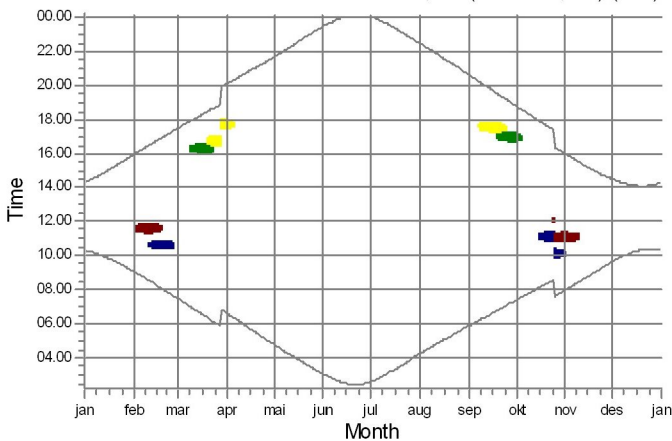
9: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)



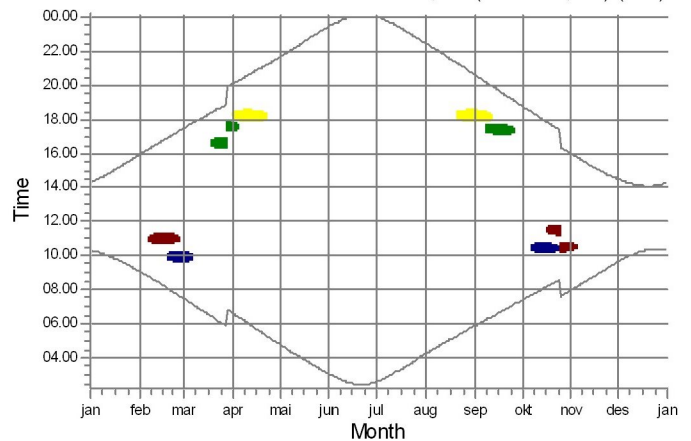
10: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (634)



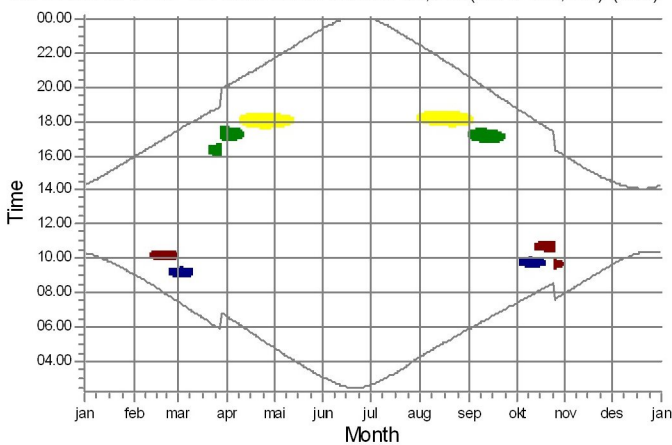
11: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)



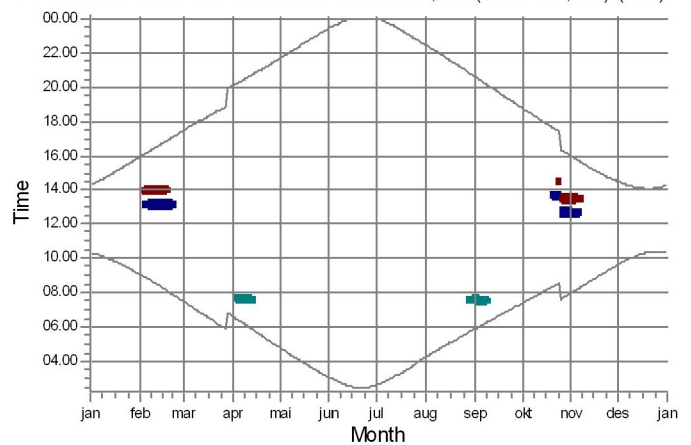
12: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)



13: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)



14: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)



Shadow receptors



A: Hamlandsvika

B: Skogmo



D: Klungset

F: Storeienen



G: Hamland

H: Myhrvang

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

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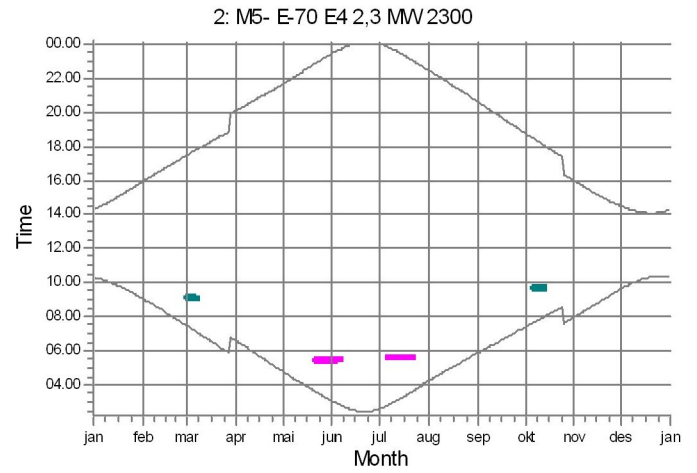
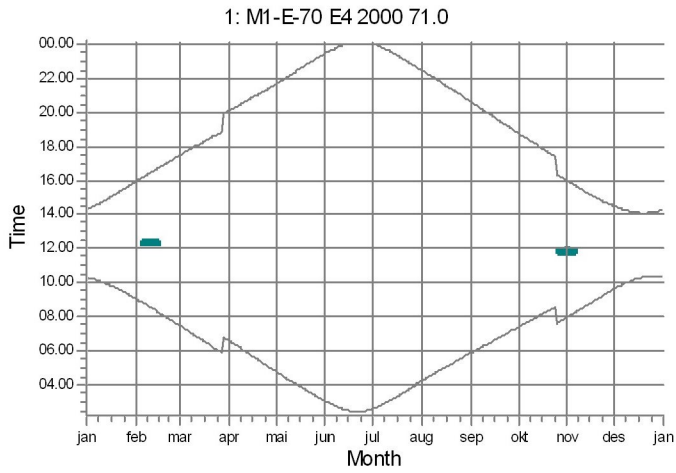
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

20.12.2018 11.11/3.2.737

SHADOW - Calendar per WTG, graphical

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6



Shadow receptors



E: Løvmo



F: Storeien

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

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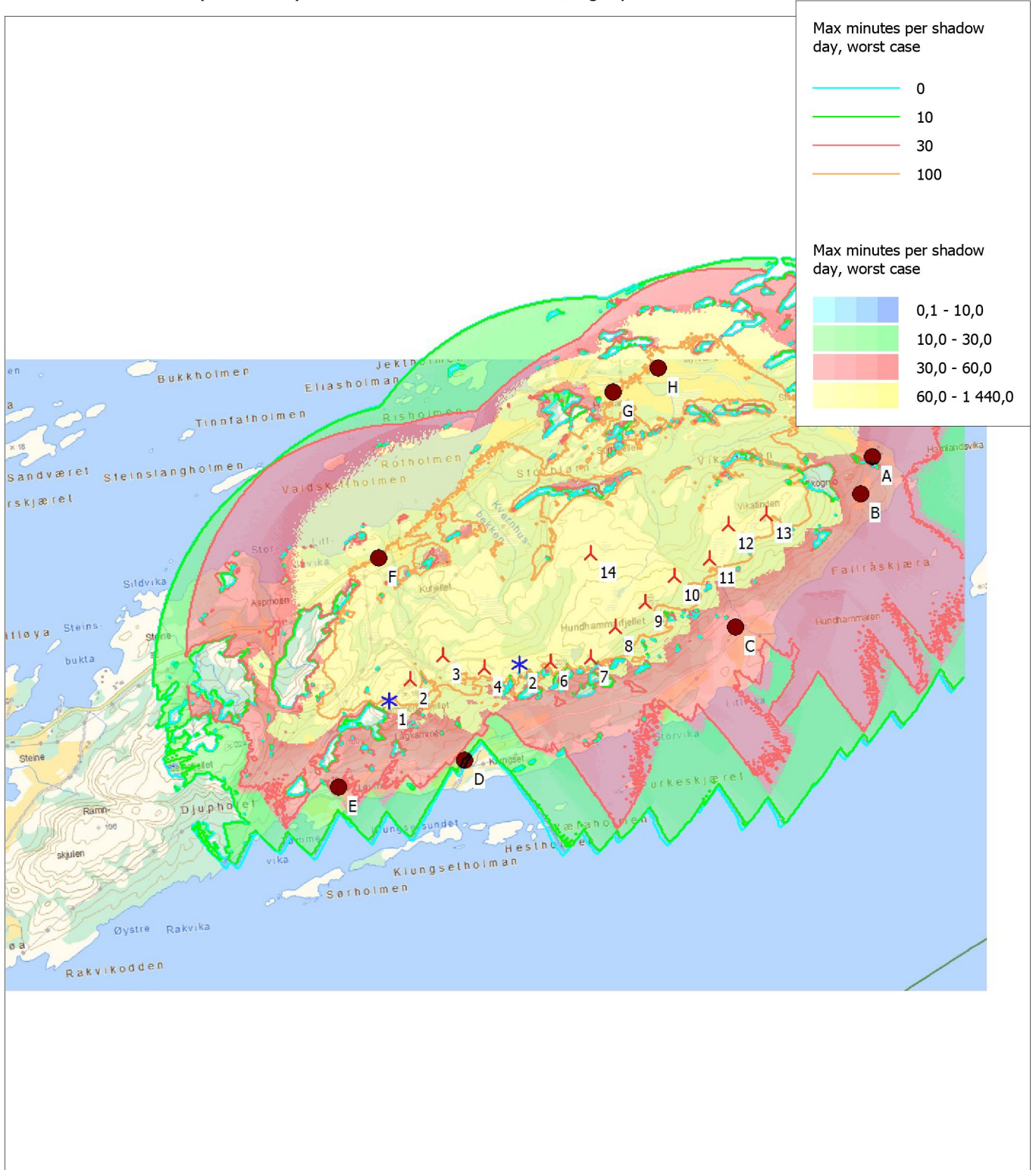
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

20.12.2018 11.11/3.2.737

SHADOW - Map

Calculation: Teoretisk (worst case) 12 x V136 + 2 x E70 minutter/dag layout v6



0 500 1000 1500 2000 m

Map: HHF , Print scale 1:40 000, Map center ETRS 89 Zone: 32 East: 612 510 North: 7 183 590

▲ New WTG

* Existing WTG

☼ Shadow receptor

Flicker map level: Height Contours 2013

SHADOW - Main Result

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6**Assumptions for shadow calculations**

Maximum distance for influence

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

Please look in WTG table

Minimum sun height over horizon for influence

3 °

Day step for calculation

1 days

Time step for calculation

1 minutes

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
336	290	258	618	1 095	913	457	524	726	653	632	498	7 000

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: Height Contours 2013

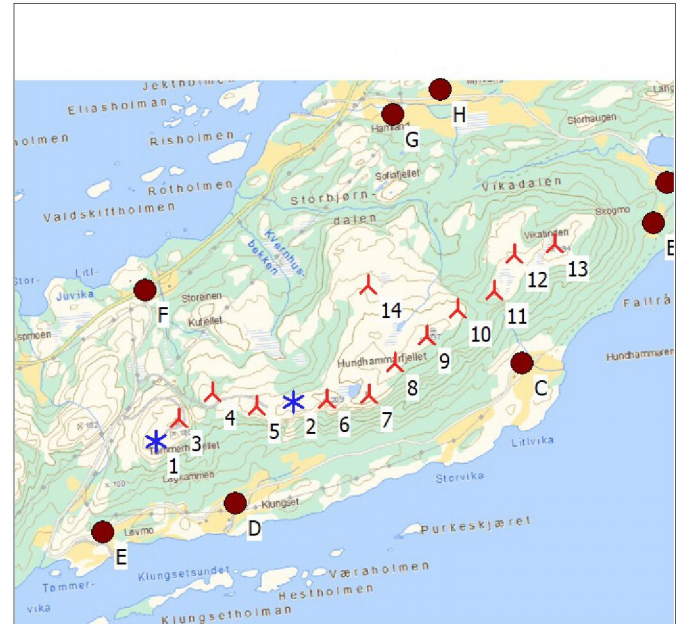
Obstacles used in calculation

Eye height for map: 1,5 m

Grid resolution: 10,0 m

All coordinates are in

ETRS 89 Zone: 32



Scale 1:50 000

New WTG

Existing WTG

Shadow receptor

WTGs

	X(East)	Y(North)	Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
					Valid	Manufact.	Type-generator				Calculation distance [m]	RPM [RPM]
1	611 350	7 182 825	170,0	M1-E-70 E4 2000 71.0	Yes	ENERCON	E-70 E4-2 000	2 000	71,0	65,0	1 644	20,0
2	612 257	7 183 083	190,0	M5- E-70 E4 2,3 MW 2300	Yes	ENERCON	E-70 E4 2,3 MW-2 300	2 300	71,0	64,0	1 644	20,0
3	611 497	7 182 974	178,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
4	611 722	7 183 142	145,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
5	612 015	7 183 056	170,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
6	612 478	7 183 097	205,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
7	612 757	7 183 128	199,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
8	612 927	7 183 340	225,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
9	613 136	7 183 515	234,1	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
10	613 342	7 183 694	199,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
11	613 584	7 183 818	198,3	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
12	613 714	7 184 057	184,6	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
13	613 981	7 184 127	174,1	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4
14	612 753	7 183 853	175,0	VESTAS V136-4.2 4200 13...	Yes	VESTAS	V136-4.2-4 200	4 200	136,0	90,0	1 803	10,4

Shadow receptor-Input

No.	Name	X(East)	Y(North)	Z	Width	Height	Elevation	Slope of	Direction mode	Eye height
		[m]	[m]	[m]	[m]	[m]	a.g.l. [m]	window [°]		(ZVI) a.g.l. [m]
A	Hamlandsvika	614 724	7 184 531	10,9	2,0	2,0	2,0	90,0	"Green house mode"	4,0
B	Skogmo	614 639	7 184 269	27,7	2,0	2,0	2,0	90,0	"Green house mode"	4,0
C	Hundhammer	613 767	7 183 342	24,9	2,0	2,0	2,0	90,0	"Green house mode"	4,0
D	Klungset	611 876	7 182 409	10,1	2,0	2,0	2,0	90,0	"Green house mode"	4,0
E	Løvmo	610 998	7 182 220	11,2	2,0	2,0	2,0	90,0	"Green house mode"	4,0
F	Storeienen	611 279	7 183 824	36,8	2,0	2,0	2,0	90,0	"Green house mode"	4,0
G	Hamlad	612 913	7 184 983	22,7	2,0	2,0	2,0	90,0	"Green house mode"	4,0
H	Myhrvang	613 230	7 185 147	33,2	2,0	2,0	2,0	90,0	"Green house mode"	4,0

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen
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 +47 21 58 60 15
 Helge Dalbu / helge.dalbu@multiconsult.no
 Calculated:
 20.12.2018 10.43/3.2.737

SHADOW - Main Result**Calculation:** Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6**Calculation Results**

Shadow receptor

No.	Name	Shadow, expected values	
		Shadow hours	per year
			[h/year]
A	Hamlandsvika	9:38	
B	Skogmo	16:28	
C	Hundhammer	15:19	
D	Klungset	0:34	
E	Løvmø	7:43	
F	Storeienen	25:31	
G	Hamlend	17:38	
H	Myhrvang	15:05	

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

No.	Name	Worst case	Expected
		[h/year]	[h/year]
1	M1-E-70 E4 2000 71.0	5:29	1:16
2	M5- E-70 E4 2,3 MW 2300	8:36	2:14
3	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (627)	21:57	5:06
4	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (628)	25:02	6:30
5	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)	27:50	7:05
6	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (630)	30:02	8:07
7	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (631)	21:57	6:05
8	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)	47:42	13:10
9	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)	19:10	4:26
10	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (634)	20:30	4:50
11	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)	41:28	10:30
12	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)	55:37	14:40
13	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)	81:09	21:51
14	VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)	33:11	7:49

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

SHADOW - Calendar

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6
Shadow receptor: A - Hamlandsvika
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Assumptions for shadow calculations

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
336	290	258	618	1 095	913	457	524	726	653	632	498	7 000

	January	February	March	April	May	June	July	August	September	October	November	December							
1	10.18	09.03	07.27	06.35	16.58 (13)	04.46	03.01	02.35	04.12	05.52	17.07 (13)	07.21	16.47 (11)	07.59	09.39				
	14.18	15.55	17.29	20.05	47	17.45 (12)	21.41	23.27	00.01	22.28	20.36	13	17.20 (13)	18.47	19	17.06 (11)	15.57	14.28	
2	10.17	09.00	07.24	06.31	16.58 (13)	04.42	02.58	02.37	04.15	05.55	17.03 (13)	07.24	16.47 (11)	08.02	09.42				
	14.21	15.58	17.32	20.08	45	17.43 (12)	21.44	23.30	23.59	22.25	20.33	19	17.22 (13)	18.43	17	17.04 (11)	15.54	14.25	
3	10.16	08.57	07.20	06.28	16.58 (13)	04.39	02.55	02.39	04.19	05.58	17.00 (13)	07.27	16.49 (11)	08.06	09.45				
	14.23	16.02	17.35	20.11	43	17.41 (12)	21.47	23.33	23.57	22.21	20.29	24	17.24 (13)	18.39	13	17.02 (11)	15.50	14.23	
4	10.14	08.53	07.17	06.24	16.58 (13)	04.35	02.52	02.41	04.22	06.01	16.59 (13)	07.30	16.52 (11)	08.09	09.48				
	14.25	16.05	17.38	20.14	39	17.37 (12)	21.51	23.36	23.55	22.18	20.25	26	17.25 (13)	18.36	6	16.58 (11)	15.47	14.21	
5	10.13	08.50	07.13	06.20	16.59 (13)	04.31	02.49	02.44	04.25	06.04	16.57 (13)	07.33		08.12	09.51				
	14.28	16.09	17.41	20.17	33	17.32 (13)	21.54	23.39	23.52	22.14	20.22	29	17.26 (13)	18.32		15.44	14.19		
6	10.11	08.47	07.10	06.17	16.59 (13)	04.28	02.47	02.47	04.29	06.07	16.56 (13)	07.36		08.16	09.53				
	14.30	16.12	17.45	20.20	31	17.30 (13)	21.58	23.42	23.50	22.10	20.18	31	17.27 (13)	18.28		15.40	14.17		
7	10.09	08.44	07.06	06.13	17.00 (13)	04.24	02.44	02.49	04.32	06.10	16.54 (13)	07.39		08.19	09.56				
	14.33	16.16	17.48	20.23	29	17.29 (13)	22.01	23.45	23.48	22.07	20.14	33	17.27 (13)	18.25		15.37	14.16		
8	10.08	08.40	07.02	06.10	17.01 (13)	04.21	02.42	02.52	04.35	06.13	16.53 (13)	07.43		08.22	09.58				
	14.36	16.19	17.51	20.26	27	17.28 (13)	22.05	23.48	23.45	22.03	20.11	38	17.31 (12)	18.21		15.34	14.14		
9	10.06	08.37	06.59	06.06	17.02 (13)	04.17	02.39	02.55	04.39	06.16	16.52 (13)	07.46		08.26	10.01				
	14.38	16.22	17.54	20.30	24	17.26 (13)	22.08	23.50	23.42	22.00	20.07	42	17.34 (12)	18.18		15.31	14.12		
10	10.04	08.34	06.55	16.13 (11)	06.02	17.05 (13)	04.14	02.37	02.58	04.42	06.19		16.51 (13)	07.49		08.29	10.03		
	14.41	16.26	17.57	10	16.23 (11)	20.33	19	17.24 (13)	22.11	23.53	23.39	21.56	20.03	45	17.36 (12)	18.14		15.27	14.11
11	10.01	08.30	06.52	16.10 (11)	05.59	17.08 (13)	04.10	02.35	03.01	04.45	06.22		16.51 (13)	07.52		08.33		10.05	
	14.44	16.29	18.00	15	16.25 (11)	20.36	12	17.20 (13)	22.15	23.55	23.37	21.53	20.00	46	17.37 (12)	18.11		15.24	14.10
12	09.59	08.27	06.48	16.08 (11)	05.55		04.07	02.33	03.04	04.49	06.25		16.50 (13)	07.55		08.36		10.08	
	14.47	16.33	18.03	18	16.26 (11)	20.39		22.18	23.58	23.34	21.49		17.38 (12)	18.07		15.21		14.09	
13	09.57	08.23	06.44	16.07 (11)	05.51		04.03	02.31	03.08	04.52	06.28		16.50 (13)	07.58		08.39		10.10	
	14.50	16.36	18.06	20	16.27 (11)	20.42		22.22	00.00	23.31	21.45		17.38 (12)	18.03		15.18		14.08	
14	09.55	08.20	06.41	16.06 (11)	05.48		04.00	02.30	03.11	04.55	06.31		16.50 (13)	08.01		08.43		10.11	
	14.53	16.39	18.10	22	16.28 (11)	20.45		22.25	00.02	23.28	21.42		17.39 (12)	18.00		15.15		14.07	
15	09.52	08.17	06.37	16.05 (11)	05.44		03.56	02.28	03.14	04.58	06.34		16.50 (13)	08.04		08.46		10.13	
	14.57	16.43	18.13	22	16.27 (11)	20.48		22.29	00.03	23.25	21.38		17.39 (12)	17.56		15.12		14.06	
16	09.50	08.13	06.34	16.04 (11)	05.40		03.53	02.27	03.17	05.02	06.37		16.50 (13)	08.07		08.50		10.15	
	15.00	16.46	18.16	23	16.27 (11)	20.52		22.32	00.05	23.22	21.35		17.37 (12)	17.53		15.08		14.05	
17	09.47	08.10	06.30	16.04 (11)	05.37		03.49	02.26	03.21	05.05	06.40		16.50 (13)	08.10		08.53		10.16	
	15.03	16.50	18.19	24	16.28 (11)	20.55		22.36	00.06	23.19	21.31		17.37 (12)	17.49		15.05		14.05	
18	09.44	08.06	06.26	16.04 (11)	05.33		03.46	02.25	03.24	05.08	06.43		16.51 (13)	08.13		08.57		10.17	
	15.06	16.53	18.22	23	16.27 (11)	20.58		22.39	00.07	23.15	21.27		17.37 (12)	17.46		15.02		14.05	
19	09.42	08.03	06.23	16.04 (11)	05.29		03.42	02.24	03.27	05.11	06.46		16.51 (13)	08.17		09.00		10.19	
	15.10	16.56	18.25	34	16.43 (12)	21.01		22.43	00.08	23.12	21.24		17.36 (12)	17.42		14.59		14.04	
20	09.39	07.59	06.19	16.05 (11)	05.26		03.39	02.24	03.31	05.15	06.49		16.53 (13)	08.20		09.03		10.20	
	15.13	16.59	18.28	37	16.46 (12)	21.04		22.46	00.09	23.09	21.20		17.35 (12)	17.39		14.57		14.05	
21	09.36	07.56	06.15	16.06 (11)	05.22		03.36	02.24	03.34	05.18	06.52		16.53 (11)	08.23		09.07		10.20	
	15.17	17.03	18.31	40	16.47 (12)	21.08		22.50	00.09	23.06	21.16		17.34 (12)	17.35		14.54		14.05	
22	09.33	07.52	06.12	16.07 (11)	05.18		03.32	02.24	03.37	05.21	06.55		16.51 (11)	08.26		09.10		10.21	
	15.20	17.06	18.34	41	16.48 (12)	21.11		22.53	00.09	23.02	21.13		17.32 (12)	17.32		14.51		14.05	
23	09.31	07.49	06.08	16.07 (13)	05.15		03.29	02.24	03.41	05.24	06.58		16.50 (11)	08.29		09.13		10.21	
	15.23	17.09	18.37	42	16.49 (12)	21.14		22.57	00.09	22.59	21.09		17.31 (12)	17.28		14.48		14.06	
24	09.28	07.45	06.04	16.05 (13)	05.11		03.26	02.25	03.44	05.27	07.01		16.48 (11)	08.33		09.17		10.22	
	15.27	17.13	18.40	44	16.49 (12)	21.17		23.00	00.09	22.56	21.05		17.28 (12)	17.25		14.45		14.06	
25	09.25	07.42	06.01	16.03 (13)	05.07		03.23	02.25	03.48	05.30	07.04		16.47 (11)	07.36		09.20		10.22	
	15.30	17.16	18.43	46	16.49 (12)	21.21		23.04	00.08	22.52	21.02		17.24 (12)	16.21		14.43		14.07	
26	09.22	07.38	05.57	16.02 (13)	05.04		03.19	02.26	03.51	05.33	07.07		16.47 (11)	07.39		09.23		10.22	
	15.34	17.19	18.46	47	16.49 (12)	21.24		23.07	00.08	22.49	20.58		17.10 (11)	16.18		14.40		14.08	
27	09.19	07.35	05.53	16.01 (13)	05.00		03.16	02.28	03.55	05.37	07.09		16.46 (11)	07.42		09.26		10.22	
	15.37	17.22	18.49	48	16.49 (12)	21.27		23.10	00.07	22.45	20.54		17.09 (11)	16.14		14.37		14.10	
28	09.16	07.31	05.50	16.00 (13)	04.57		03.13	02.29	03.58	05.40	07.12		16.46 (11)	07.46		09.30		10.21	
	15.41	17.26	18.52	48	16.48 (12)	21.31		23.14	00.05	22.42	20.51		17.09 (11)	16.11		14.35		14.11	
29	09.13	07.28	05.46	17.00 (13)	04.53		03.10	02.31	04.01	05.43	07.15		16.46 (11)	07.49		09.33		10.21	
	15.44	17.21	18.47	48	17.48 (12)	21.34		23.17	00.04	22.39	20.47		17.08 (11)	16.07		14.32		14.12	
30	09.09	07.24	05.42	16.59 (13)	04.49		03.07	02.33	04.05	05.46	07.18		16.46 (11)	07.52		09.36		10.20	
	15.48	17.19	18.45	48	17.47 (12)	21.37		23.20	00.03	22.35	20.44		17.07 (11)	16.04		14.30		14.14	
31	09.06	07.21	05.39	16.59 (13)	04.44		03.04	02.34	04.08	05.49	07.16			07.56				10.19	
	15.51	17.16	18.42	47	17.46 (12)	21.34		23.24	00.04	22.32	20.40			16.00				14.16	
Potential sun hours	163	235	363	454	349	578	641	621	513	394	1063	302	55	192	125				
Total, worst case			747		349						1063		55						
Sun reduction			0,50		0,50						0,50		0,50						
Oper. time red.			0,80																

SHADOW - Calendar

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5
Assumptions for shadow calculations

12 x V136 + 2 x E70 timer/år layout v6
 Shadow receptor: B - Skogmo
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June
1	10.18	09.03	07.27	06.35	17.30 (11)	04.46
	14.19	15.55	17.29	20.05	25	18.16 (12)
2	10.17	09.00	07.24	06.31	17.31 (11)	04.42
	14.21	15.58	17.32	20.08	34	18.21 (12)
3	10.16	08.57	07.20	06.28	17.33 (11)	04.39
	14.23	16.02	17.35	20.11	36	18.24 (12)
4	10.14	08.53	07.17	06.24	17.34 (11)	04.35
	14.25	16.05	17.38	20.14	36	18.25 (12)
5	10.13	08.50	07.13	06.21	17.39 (11)	04.32
	14.28	16.09	17.41	20.17	30	18.27 (12)
6	10.11	08.47	07.10	06.17	17.59 (12)	04.28
	14.30	16.12	17.45	20.20	28	18.27 (12)
7	10.09	08.44	07.06	06.13	17.58 (12)	04.24
	14.33	16.16	17.48	20.23	29	18.27 (12)
8	10.08	08.40	07.02	06.10	17.57 (12)	04.21
	14.36	16.19	17.51	20.26	31	18.28 (12)
9	10.06	08.37	06.59	06.06	17.56 (12)	04.17
	14.38	16.22	17.54	20.30	32	18.28 (12)
10	10.04	08.34	06.55	06.02	17.56 (12)	04.14
	14.41	16.26	17.57	20.33	32	18.28 (12)
11	10.01	08.30	06.52	05.59	17.55 (13)	04.10
	14.44	16.29	18.00	20.36	33	18.28 (12)
12	09.59	08.27	06.48	05.55	17.52 (13)	04.07
	14.47	16.33	18.03	20.39	36	18.28 (12)
13	09.57	08.23	06.44	05.51	17.50 (13)	04.03
	14.50	16.36	18.06	20.42	37	18.27 (12)
14	09.55	08.20	06.41	05.48	17.48 (13)	04.00
	14.54	16.39	18.10	20.45	39	18.27 (12)
15	09.52	08.17	06.37	05.44	17.46 (13)	03.56
	14.57	16.43	18.13	20.48	40	18.26 (12)
16	09.50	08.13	06.34	05.40	17.46 (13)	03.53
	15.00	16.46	18.16	20.52	40	18.26 (12)
17	09.47	08.10	06.30	05.37	17.45 (13)	03.49
	15.03	16.50	18.19	20.55	40	18.25 (13)
18	09.44	08.06	06.26	05.33	17.43 (13)	03.46
	15.07	16.53	18.22	20.58	42	18.25 (13)
19	09.42	08.03	06.23	05.29	17.43 (13)	03.43
	15.10	16.56	18.25	21.01	42	18.25 (13)
20	09.39	07.59	06.19	16.39 (11)	05.26	17.42 (13)
	15.13	17.00	18.28	16.51 (11)	21.04	43
21	09.36	07.56	06.15	16.36 (11)	05.22	17.41 (13)
	15.17	17.03	18.31	16.53 (11)	21.08	45
22	09.33	07.52	06.12	16.34 (11)	05.18	17.41 (13)
	15.20	17.06	18.34	16.54 (11)	21.11	45
23	09.31	07.49	06.08	16.33 (11)	05.15	17.40 (13)
	15.23	17.09	18.37	16.56 (11)	21.14	45
24	09.28	07.45	06.04	16.32 (11)	05.11	17.40 (13)
	15.27	17.13	18.40	16.56 (11)	21.17	46
25	09.25	07.42	06.01	16.30 (11)	05.08	17.40 (13)
	15.30	17.16	18.43	16.56 (11)	21.21	46
26	09.22	07.38	05.57	16.30 (11)	05.04	17.40 (13)
	15.34	17.19	18.46	16.57 (11)	21.24	45
27	09.19	07.35	05.53	16.29 (11)	05.00	17.40 (13)
	15.37	17.22	18.49	16.56 (11)	21.27	45
28	09.16	07.31	05.50	16.29 (11)	04.57	17.40 (13)
	15.41	17.26	18.52	16.56 (11)	21.31	45
29	09.13		06.46	17.29 (11)	04.53	17.41 (13)
	15.44		19.56	17.56 (11)	21.34	44
30	09.09		06.42	17.29 (11)	04.49	17.41 (13)
	15.48		19.59	17.55 (11)	21.37	43
31	09.06		06.39	17.30 (11)		03.04
	15.51		20.02	17.55 (11)		23.24
Potential sun hours	163	235	363	454	578	641
Total, worst case			281	1154		366
Sun reduction			0,50	0,50		0,50
Oper. time red.			0,80	0,80		0,80
Wind dir. red.			0,67	0,68		0,69
Total reduction			0,27	0,27		0,27
Total, real			75	316		100

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

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

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **Shadow receptor:** B - Skogmo
Assumptions for shadow calculations Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35	04.12	18.06 (13)	05.52	17.55 (13)	07.21
	00.01	22.28	15 18.21 (13)	20.36	33 18.28 (12)	18.47
2	02.37	04.15	18.03 (13)	05.55	17.54 (12)	07.24
	23.59	22.25	19 18.22 (13)	20.33	32 18.26 (12)	18.43
3	02.39	04.19	18.01 (13)	05.58	17.54 (12)	07.27
	23.57	22.21	24 18.25 (13)	20.29	32 18.26 (12)	18.39
4	02.41	04.22	17.59 (13)	06.01	17.54 (12)	07.30
	23.55	22.17	27 18.26 (13)	20.25	31 18.25 (12)	18.36
5	02.44	04.25	17.58 (13)	06.04	17.55 (12)	07.33
	23.52	22.14	30 18.28 (13)	20.22	29 18.24 (12)	18.32
6	02.47	04.29	17.56 (13)	06.07	17.55 (12)	07.36
	23.50	22.10	33 18.29 (13)	20.18	28 18.23 (12)	18.29
7	02.49	04.32	17.54 (13)	06.10	17.35 (11)	07.39
	23.47	22.07	35 18.29 (13)	20.14	28 18.22 (12)	18.25
8	02.52	04.35	17.53 (13)	06.13	17.29 (11)	07.43
	23.45	22.03	37 18.30 (13)	20.11	36 18.20 (12)	18.21
9	02.55	04.39	17.52 (13)	06.16	17.26 (11)	07.46
	23.42	22.00	39 18.31 (13)	20.07	36 18.17 (12)	18.18
10	02.58	04.42	17.51 (13)	06.19	17.24 (11)	07.49
	23.39	21.56	40 18.31 (13)	20.03	36 18.15 (12)	18.14
11	03.01	04.45	17.51 (13)	06.22	17.23 (11)	07.52
	23.37	21.53	41 18.32 (13)	20.00	27 18.10 (12)	18.11
12	03.04	04.49	17.50 (13)	06.25	17.22 (11)	07.55
	23.34	21.49	42 18.32 (13)	19.56	24 17.46 (11)	18.07
13	03.08	04.52	17.48 (13)	06.28	17.21 (11)	07.58
	23.31	21.45	44 18.32 (13)	19.52	25 17.46 (11)	18.03
14	03.11	04.55	17.48 (13)	06.31	17.20 (11)	08.01
	23.28	21.42	44 18.32 (13)	19.49	26 17.46 (11)	18.00
15	03.14	04.58	17.48 (13)	06.34	17.19 (11)	08.04
	23.25	21.38	44 18.32 (13)	19.45	27 17.46 (11)	17.56
16	03.17	05.02	17.47 (13)	06.37	17.18 (11)	08.07
	23.22	21.35	45 18.32 (13)	19.41	27 17.45 (11)	17.53
17	03.21	05.05	17.47 (13)	06.40	17.18 (11)	08.10
	23.18	21.31	45 18.32 (13)	19.38	27 17.45 (11)	17.49
18	03.24	05.08	17.47 (13)	06.43	17.18 (11)	08.13
	23.15	21.27	45 18.32 (13)	19.34	26 17.44 (11)	17.46
19	03.27	05.11	17.47 (13)	06.46	17.18 (11)	08.17
	23.12	21.24	45 18.32 (13)	19.30	25 17.43 (11)	17.42
20	03.31	05.15	17.46 (13)	06.49	17.19 (11)	08.20
	23.09	21.20	45 18.31 (13)	19.27	23 17.42 (11)	17.39
21	03.34	05.18	17.46 (13)	06.52	17.20 (11)	08.23
	23.06	21.16	45 18.31 (13)	19.23	21 17.41 (11)	17.35
22	03.38	05.21	17.46 (13)	06.55	17.21 (11)	08.26
	23.02	21.13	44 18.30 (13)	19.19	18 17.39 (11)	17.32
23	03.41	05.24	17.46 (13)	06.58	17.22 (11)	08.29
	22.59	21.09	44 18.30 (13)	19.16	14 17.36 (11)	17.28
24	03.44	05.27	17.47 (13)	07.01	17.26 (11)	08.33
	22.56	21.05	42 18.29 (13)	19.12	6 17.32 (11)	17.25
25	03.48	05.30	17.47 (13)	07.04		07.36
	22.52	21.02	41 18.28 (13)	19.08		16.21
26	03.51	05.33	17.47 (13)	07.07		07.39
	22.49	20.58	40 18.27 (12)	19.05		16.18
27	03.55	05.37	17.47 (13)	07.09		07.42
	22.45	20.54	40 18.27 (12)	19.01		16.14
28	03.58	05.40	17.48 (13)	07.12		07.46
	22.42	20.51	40 18.28 (12)	18.57		16.11
29	04.02	05.43	17.49 (13)	07.15		07.49
	22.38	20.47	39 18.28 (12)	18.54		16.07
30	04.05	05.46	17.51 (13)	07.18		07.52
	22.35	20.44	37 18.28 (12)	18.50		16.04
31	04.08	18.12 (13)	05.49	17.52 (13)		07.55
	22.32	18.15 (13)	20.40	18.28 (12)		16.00
Potential sun hours	621	513	394	302	192	125
Total, worst case	3	1187	637			
Sun reduction	0,50	0,50	0,50			
Oper. time red.	0,80	0,80	0,80			
Wind dir. red.	0,69	0,69	0,67			
Total reduction	0,27	0,27	0,27			
Total, real	1	326	172			

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

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

SHADOW - Calendar

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6
Shadow receptor: C - Hundhammer
 Sunshine probability S/50 (Sun hours/Possible sun hours) []

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	
1	10.18	09.03	07.28	06.35	18.20 (6)	04.46	18.31 (8)
	14.19	15.55	17.29	20.05	15 18.35 (6)	21.41	28 18.59 (8)
2	10.17	09.00	07.24	06.32	18.18 (6)	04.42	18.29 (8)
	14.21	15.58	17.32	20.08	18 18.36 (6)	21.44	30 18.59 (8)
3	10.16	08.57	07.20	06.28	18.12 (7)	04.39	18.28 (8)
	14.23	16.02	17.35	20.11	25 18.37 (6)	21.47	32 19.00 (8)
4	10.14	08.53	07.17	06.24	18.09 (7)	04.35	18.28 (8)
	14.25	16.05	17.38	20.14	28 18.37 (6)	21.51	33 19.01 (8)
5	10.13	08.50	07.13	06.21	18.07 (7)	04.32	18.27 (8)
	14.28	16.09	17.42	20.17	31 18.38 (6)	21.54	34 19.01 (8)
6	10.11	08.47	07.10	06.17	18.05 (7)	04.28	18.26 (8)
	14.30	16.12	17.45	20.20	33 18.38 (6)	21.58	36 19.02 (8)
7	10.09	08.44	07.06	06.13	18.04 (7)	04.25	18.26 (8)
	14.33	16.16	17.48	20.23	34 18.38 (6)	22.01	36 19.02 (8)
8	10.07	08.40	07.02	06.10	18.03 (7)	04.21	18.26 (8)
	14.36	16.19	17.51	20.27	34 18.37 (6)	22.05	36 19.02 (8)
9	10.06	08.37	06.59	06.06	18.02 (7)	04.17	18.26 (8)
	14.39	16.23	17.54	20.30	35 18.37 (6)	22.08	36 19.02 (8)
10	10.03	08.34	06.55	06.02	18.01 (7)	04.14	18.25 (8)
	14.42	16.26	17.57	20.33	35 18.36 (6)	22.11	38 19.03 (8)
11	10.01	08.30	06.52	05.59	18.00 (7)	04.10	18.25 (8)
	14.44	16.29	18.00	20.36	34 18.34 (6)	22.15	37 19.02 (8)
12	09.59	08.27	06.48	05.55	18.00 (7)	04.07	18.25 (8)
	14.47	16.33	18.03	20.39	33 18.33 (6)	22.18	37 19.02 (8)
13	09.57	08.23	06.44	05.51	18.01 (7)	04.03	18.26 (8)
	14.51	16.36	18.07	20.42	31 18.32 (6)	22.22	37 19.03 (8)
14	09.55	08.20	06.41	05.48	18.00 (7)	04.00	18.26 (8)
	14.54	16.40	18.10	20.45	30 18.30 (7)	22.25	37 19.03 (8)
15	09.52	08.17	06.37	05.44	18.01 (7)	03.56	18.26 (8)
	14.57	16.43	18.13	20.49	28 18.29 (7)	22.29	36 19.02 (8)
16	09.50	08.13	06.34	05.40	18.01 (7)	03.53	18.26 (8)
	15.00	16.46	18.16	20.52	27 18.28 (7)	22.32	36 19.02 (8)
17	09.47	08.10	06.30	05.37	18.01 (7)	03.50	18.27 (8)
	15.03	16.50	18.19	20.55	27 18.28 (7)	22.36	35 19.02 (8)
18	09.44	08.06	06.26	05.33	18.02 (7)	03.46	18.27 (8)
	15.07	16.53	18.22	20.58	24 18.26 (7)	22.39	34 19.01 (8)
19	09.42	08.03	06.23	05.29	18.03 (7)	03.43	18.27 (8)
	15.10	16.56	18.25	21.01	22 18.25 (7)	22.43	34 19.01 (8)
20	09.39	07.59	06.19	05.26	18.05 (7)	03.39	18.29 (8)
	15.13	17.00	18.28	21.05	19 18.24 (7)	22.46	32 19.01 (8)
21	09.36	07.56	06.15	05.22	18.06 (7)	03.36	18.29 (8)
	15.17	17.03	18.31	21.08	15 18.21 (7)	22.50	31 19.00 (8)
22	09.33	07.52	06.12	05.19	18.10 (7)	03.33	18.30 (8)
	15.20	17.06	18.34	21.11	7 18.17 (7)	22.53	30 19.00 (8)
23	09.31	07.49	06.08	05.15		03.29	18.31 (8)
	15.24	17.09	18.37	21.14		22.57	29 19.00 (8)
24	09.28	07.45	06.04	05.11		03.26	18.31 (8)
	15.27	17.13	18.40	21.18		23.00	27 18.58 (8)
25	09.25	07.42	06.01	05.08		03.23	18.33 (8)
	15.30	17.16	18.43	21.21		23.03	25 18.58 (8)
26	09.22	07.38	05.57	05.04		03.20	18.34 (8)
	15.34	17.19	18.46	21.24		23.07	24 18.58 (8)
27	09.19	07.35	05.54	05.00	18.38 (8)	03.16	18.35 (8)
	15.37	17.22	18.49	21.27	13 18.51 (8)	23.10	22 18.57 (8)
28	09.16	07.31	05.50	04.57	18.35 (8)	03.13	18.37 (8)
	15.41	17.26	18.53	21.31	19 18.54 (8)	23.14	19 18.56 (8)
29	09.13		06.46	04.53	18.33 (8)	03.10	18.38 (8)
	15.44		19.56	21.34	23 18.56 (8)	23.17	17 18.55 (8)
30	09.09		06.43	04.50	18.32 (8)	03.07	18.40 (8)
	15.48		19.59	21.37	26 18.58 (8)	23.20	14 18.54 (8)
31	09.06		06.39	18.23 (6)		03.04	18.42 (8)
	15.51		20.02	18.33 (6)		23.24	10 18.52 (8)
Potential sun hours	163	235	363	454		578	641
Total, worst case			10	666		942	4
Sun reduction			0,50	0,50		0,50	0,50
Oper. time red.			0,80	0,80		0,80	0,80
Wind dir. red.			0,69	0,69		0,71	0,71
Total reduction			0,28	0,28		0,29	0,29
Total, real			3	184		269	1

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

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

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6
Shadow receptor: C - Hundhammer
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35	04.12	18.36 (8)	05.52	18.00 (7)	07.21
	00.01	22.28	37 19.13 (8)	20.36	34 18.34 (6)	18.47
2	02.37	04.15	18.36 (8)	05.55	17.59 (7)	07.24
	23.59	22.25	37 19.13 (8)	20.33	35 18.34 (6)	18.43
3	02.39	04.19	18.35 (8)	05.58	17.59 (7)	07.27
	23.57	22.21	37 19.12 (8)	20.29	35 18.34 (6)	18.39
4	02.42	04.22	18.36 (8)	06.01	18.00 (7)	07.30
	23.55	22.17	36 19.12 (8)	20.25	34 18.34 (6)	18.36
5	02.44	04.25	18.36 (8)	06.04	18.00 (7)	07.34
	23.52	22.14	36 19.12 (8)	20.22	34 18.34 (6)	18.32
6	02.47	04.29	18.36 (8)	06.07	18.01 (7)	07.37
	23.50	22.10	36 19.12 (8)	20.18	33 18.34 (6)	18.29
7	02.50	04.32	18.37 (8)	06.10	18.02 (7)	07.40
	23.47	22.07	35 19.12 (8)	20.14	31 18.33 (6)	18.25
8	02.53	04.36	18.36 (8)	06.13	18.04 (7)	07.43
	23.45	22.03	34 19.10 (8)	20.11	29 18.33 (6)	18.21
9	02.55	04.39	18.37 (8)	06.16	18.05 (7)	07.46
	23.42	22.00	33 19.10 (8)	20.07	26 18.31 (6)	18.18
10	02.58	04.42	18.37 (8)	06.19	18.11 (6)	07.49
	23.39	21.56	32 19.09 (8)	20.03	19 18.30 (6)	18.14
11	03.02	04.45	18.38 (8)	06.22	18.12 (6)	07.52
	23.37	21.53	30 19.08 (8)	20.00	16 18.28 (6)	18.11
12	03.05	18.51 (8) 04.49	18.39 (8)	06.25	18.14 (6)	07.55
	23.34	8 18.59 (8) 21.49	28 19.07 (8)	19.56	11 18.25 (6)	18.07
13	03.08	18.49 (8) 04.52	18.41 (8)	06.28	18.03	07.58
	23.31	12 19.01 (8) 21.45	25 19.06 (8)	19.52	18.03	15.18
14	03.11	18.47 (8) 04.55	18.41 (8)	06.31	18.01	08.43
	23.28	15 19.02 (8) 21.42	22 19.03 (8)	19.49	18.00	15.15
15	03.14	18.45 (8) 04.59	18.43 (8)	06.34	18.04	08.46
	23.25	19 19.04 (8) 21.38	18 19.01 (8)	19.45	17.56	15.12
16	03.18	18.45 (8) 05.02	18.46 (8)	06.37	18.07	08.50
	23.22	21 19.06 (8) 21.35	12 18.58 (8)	19.41	17.53	15.09
17	03.21	18.44 (8) 05.05	18.44 (8)	06.40	18.10	08.53
	23.18	22 19.06 (8) 21.31	19.38	17.49	15.06	14.05
18	03.24	18.42 (8) 05.08	18.42 (8)	06.43	18.13	08.56
	23.15	25 19.07 (8) 21.27	19.34	17.46	15.03	14.05
19	03.28	18.42 (8) 05.11	18.42 (8)	06.46	18.17	09.00
	23.12	26 19.08 (8) 21.24	19.30	17.42	15.00	14.05
20	03.31	18.41 (8) 05.15	18.41 (8)	06.49	18.20	09.03
	23.09	28 19.09 (8) 21.20	19.27	17.39	14.57	14.05
21	03.34	18.41 (8) 05.18	18.14 (7)	06.52	18.23	09.07
	23.06	29 19.10 (8) 21.16	9 18.23 (7)	19.23	17.35	14.54
22	03.38	18.39 (8) 05.21	18.10 (7)	06.55	18.26	09.10
	23.02	31 19.10 (8) 21.13	16 18.26 (7)	19.19	17.32	14.51
23	03.41	18.39 (8) 05.24	18.08 (7)	06.58	18.29	09.13
	22.59	32 19.11 (8) 21.09	19 18.27 (7)	19.16	17.28	14.48
24	03.45	18.38 (8) 05.27	18.07 (7)	07.01	18.33	09.17
	22.56	33 19.11 (8) 21.05	22 18.29 (7)	19.12	17.25	14.45
25	03.48	18.38 (8) 05.30	18.05 (7)	07.04	18.36	09.20
	22.52	34 19.12 (8) 21.02	25 18.30 (7)	19.08	16.21	14.43
26	03.51	18.38 (8) 05.34	18.04 (7)	07.07	18.39	09.23
	22.49	34 19.12 (8) 20.58	26 18.30 (7)	19.05	16.18	14.40
27	03.55	18.37 (8) 05.37	18.02 (7)	07.10	18.42	09.26
	22.45	35 19.12 (8) 20.55	28 18.30 (7)	19.01	16.14	14.38
28	03.58	18.37 (8) 05.40	18.01 (7)	07.13	18.45	09.30
	22.42	36 19.13 (8) 20.51	29 18.30 (7)	18.58	16.11	14.35
29	04.02	18.37 (8) 05.43	18.01 (7)	07.16	18.48	09.33
	22.38	36 19.13 (8) 20.47	29 18.30 (6)	18.54	16.07	14.33
30	04.05	18.36 (8) 05.46	18.01 (7)	07.19	18.51	09.36
	22.35	37 19.13 (8) 20.44	31 18.32 (6)	18.50	16.04	14.30
31	04.09	18.36 (8) 05.49	18.00 (7)	07.22	18.54	09.39
	22.32	37 19.13 (8) 20.40	33 18.33 (6)	18.53	16.01	14.27
Potential sun hours	620	513	394	302	192	125
Total, worst case	550	755	337			
Sun reduction	0,50	0,50	0,50			
Oper. time red.	0,80	0,80	0,80			
Wind dir. red.	0,71	0,71	0,69			
Total reduction	0,29	0,28	0,28			
Total, real	157	213	93			

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

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

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5
Assumptions for shadow calculations 12 x V136 + 2 x E70 timer/år layout v6
Shadow receptor: D - Klungset
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
336	290	258	618	1 095	913	457	524	726	653	632	498	7 000

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.18	09.03	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	09.39
	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	14.28
2	10.17	09.00	07.24	06.32	04.43	02.58	02.37	04.16	05.55	07.25	08.02	09.42
	14.21	15.59	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	14.26
3	10.16	08.57	07.21	06.28	04.39	02.56	02.40	04.19	05.58	07.28	08.06	09.45
	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.40	15.51	14.24
4	10.14	08.54	07.17	06.24	04.35	02.53	02.42	04.22	06.01	07.31	08.09	09.48
	14.26	16.06	17.39	20.14	21.51	23.36	23.54	22.18	20.25	18.36	15.47	14.22
5	10.13	08.50	07.13	06.21	04.32	02.50	02.45	04.26	06.04	07.34	08.12	09.51
	14.28	16.09	17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44	14.20
6	10.11	08.47	07.10	06.17	04.28	02.48	02.47	04.29	06.07	07.37	08.16	09.53
	14.31	16.12	17.45	20.20	21.58	23.42	23.50	22.10	20.18	18.29	15.41	14.18
7	10.09	08.44	07.06	06.13	04.25	02.45	02.50	04.32	06.10	07.40	08.19	09.56
	14.33	16.16	17.48	20.24	22.01	23.45	23.47	22.07	20.14	18.25	15.37	14.16
8	10.08	08.40	07.03	06.10	04.21	02.43	02.53	04.36	06.13	07.43	08.23	09.58
	14.36	16.19	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.22	15.34	14.15
9	10.06	08.37	06.59	06.06	04.18	02.40	02.56	04.39	06.16	07.46	08.26	10.01
	14.39	16.23	17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13
10	10.04	08.34	06.55	06.03	04.14	02.38	02.59	04.42	06.19	07.49	08.29	10.03
	14.42	16.26	17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.28	14.12
11	10.01	08.30	06.52	05.59	04.11	02.36	03.02	04.46	06.22	07.52	08.33	10.05
	14.45	16.30	18.01	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10
12	09.59	08.27	06.48	05.55	04.07	02.34	05.04 (9)	03.05	04.49	06.25	07.55	08.36
	14.48	16.33	18.04	20.39	22.18	23.57	1 05.05 (9)	03.34	21.49	19.56	18.07	15.21
13	09.57	08.24	06.45	05.52	04.04	02.32	05.02 (9)	03.08	04.52	06.28	07.58	08.40
	14.51	16.36	18.07	20.42	22.22	23.59	4 05.06 (9)	03.31	21.45	19.52	18.04	15.18
14	09.55	08.20	06.41	05.48	04.00	02.31	05.02 (9)	03.11	04.56	06.31	08.01	08.43
	14.54	16.40	18.10	20.45	22.25	00.01	6 05.08 (9)	03.28	21.42	19.49	18.00	15.15
15	09.52	08.17	06.37	05.44	03.57	02.29	05.01 (9)	03.15	04.59	06.34	08.04	08.46
	14.57	16.43	18.13	20.49	22.29	00.03	7 05.08 (9)	03.25	21.38	19.45	17.57	15.12
16	09.50	08.13	06.34	05.41	03.53	02.28	05.01 (9)	03.18	05.02	06.37	08.07	08.50
	15.00	16.47	18.16	20.52	22.32	00.05	8 05.09 (9)	03.22	21.35	19.41	17.53	15.09
17	09.47	08.10	06.30	05.37	03.50	02.27	05.00 (9)	03.21	05.05	06.40	08.10	08.53
	15.04	16.50	18.19	20.55	22.36	00.06	9 05.09 (9)	03.18	21.31	19.38	17.49	15.06
18	09.44	08.06	06.26	05.33	03.46	02.26	05.00 (9)	03.25	05.08	06.43	08.14	08.57
	15.07	16.53	18.22	20.58	22.39	00.07	10 05.10 (9)	03.15	21.27	19.34	17.46	15.03
19	09.42	08.03	06.23	05.30	03.43	02.25	05.01 (9)	03.28	05.12	06.46	08.17	09.00
	15.10	16.57	18.25	21.01	22.43	00.08	9 05.10 (9)	03.12	21.24	19.31	17.42	15.00
20	09.39	07.59	06.19	05.26	03.40	02.25	05.01 (9)	03.31	05.15	06.49	08.20	09.03
	15.14	17.00	18.28	21.05	22.46	00.08	9 05.10 (9)	03.09	21.20	19.27	17.39	14.57
21	09.36	07.56	06.16	05.22	03.36	02.25	05.01 (9)	03.35	05.18	06.52	08.23	09.07
	15.17	17.03	18.31	21.08	22.50	00.09	10 05.11 (9)	03.06	21.17	19.23	17.35	14.54
22	09.33	07.52	06.12	05.19	03.33	02.25	05.02 (9)	03.38	05.21	06.55	08.26	09.10
	15.20	17.06	18.34	21.11	22.53	00.09	10 05.12 (9)	03.02	21.13	19.20	17.32	14.51
23	09.31	07.49	06.08	05.15	03.30	02.25	05.02 (9)	03.41	05.24	06.58	08.30	09.13
	15.24	17.10	18.37	21.14	22.57	00.09	9 05.11 (9)	03.29	21.09	19.16	17.28	14.48
24	09.28	07.45	06.05	05.11	03.26	02.26	05.01 (9)	03.45	05.28	07.01	08.33	09.17
	15.27	17.13	18.40	21.18	23.00	00.09	10 05.11 (9)	03.26	21.06	19.12	17.25	14.46
25	09.25	07.42	06.01	05.08	03.23	02.26	05.02 (9)	03.48	05.31	07.04	07.36	09.20
	15.31	17.16	18.44	21.21	23.04	00.08	9 05.11 (9)	03.25	21.02	19.09	16.21	14.43
26	09.22	07.38	05.57	05.04	03.20	02.27	05.03 (9)	03.52	05.34	07.07	07.39	09.23
	15.34	17.19	18.47	21.24	23.07	00.07	9 05.12 (9)	03.49	20.58	19.05	16.18	14.40
27	09.19	07.35	05.54	05.01	03.17	02.28	05.03 (9)	03.55	05.37	07.10	07.42	09.26
	15.38	17.23	18.50	21.28	23.10	00.06	8 05.11 (9)	03.45	20.55	19.01	16.14	14.38
28	09.16	07.31	05.50	04.57	03.14	02.30	05.04 (9)	03.59	05.40	07.13	07.46	09.30
	15.41	17.26	18.53	21.31	23.14	00.05	7 05.11 (9)	03.42	20.51	18.58	16.11	14.35
29	09.13		06.46	04.53	03.10	02.32	05.05 (9)	04.02	05.43	07.16	07.49	09.33
	15.45		19.56	21.34	23.17	00.04	5 05.10 (9)	03.39	20.47	18.54	16.08	14.33
30	09.10		06.43	04.50	03.07	02.33	05.06 (9)	04.05	05.46	07.19	07.52	09.36
	15.48		19.59	21.37	23.20	00.02	3 05.09 (9)	03.35	20.44	18.50	16.04	14.31
31	09.06		06.39		03.04			04.09	05.49		07.56	10.19
	15.52		20.02		23.24			22.32	20.40		16.01	14.17
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125
Total, worst case						143						
Sun reduction						0,50						
Oper. time red.						0,80						
Wind dir. red.						0,60						
Total reduction						0,24						
Total, real						34						

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

Day in month	Sun rise (hh:mm)	Minutes with flicker	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen
Nedre Skøyen vei 2
NO-0213 Oslo
+47 21 58 60 15
Helge Dalbu / helge.dalbu@multiconsult.no
Calculated:
20.12.2018 10.43/3.2.737

SHADOW - Calendar

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **Shadow receptor:** E - Løvmo
Assumptions for shadow calculations Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	July	August	September	October	November	December			
1	10.18	09.03	07.28	06.35	04.46	03.01	05.06 (5)	02.35	05.05 (5)	04.12	05.52	07.22	07.59	09.39	
	14.19	15.55	17.29	20.05	21.41	23.27	31 05.48 (6)	00.01	21 05.26 (5)	22.28	20.36	18.47	15.57	14.28	
2	10.17	09.00	07.24	06.32	04.43	02.59	05.05 (5)	02.38	05.06 (5)	04.16	05.55	07.25	08.02	09.42	
	14.21	15.59	17.32	20.08	21.44	23.30	32 05.48 (6)	23.59	20 05.26 (5)	22.25	20.33	18.43	15.54	14.26	
3	10.16	08.57	07.21	06.28	04.39	02.56	05.04 (5)	02.40	05.06 (5)	04.19	05.58	07.28	08.06	09.45	
	14.23	16.02	17.35	20.11	21.48	23.33	31 05.46 (6)	23.57	20 05.26 (5)	22.21	20.29	18.40	15.51	14.24	
4	10.14	08.54	07.17	06.25	04.36	02.53	05.02 (5)	02.42	05.07 (5)	04.22	06.01	07.31	08.09	09.48	
	14.26	16.06	17.39	20.14	21.51	23.36	29 05.45 (6)	23.55	19 05.26 (5)	22.18	20.25	18.36	15.47	14.22	
5	10.13	08.50	07.13	06.21	04.32	02.50	05.02 (5)	02.45	05.07 (5)	04.26	06.04	07.34	08.12	09.51	
	14.28	16.09	17.42	20.17	21.54	23.39	23 05.31 (2)	23.52	20 05.34 (2)	22.14	20.22	18.32	15.44	14.20	
6	10.11	08.47	07.10	06.17	04.28	02.48	05.01 (5)	02.47	05.08 (5)	04.29	06.07	07.37	08.16	09.53	
	14.31	16.13	17.45	20.20	21.58	23.42	24 05.30 (2)	23.50	22 05.36 (2)	22.11	20.18	18.29	15.41	14.18	
7	10.09	08.44	07.06	06.14	04.25	02.45	05.01 (5)	02.50	05.09 (5)	04.33	06.10	07.40	08.19	09.56	
	14.33	16.16	17.48	20.24	22.01	23.45	21 05.29 (2)	23.47	22 05.37 (2)	22.07	20.14	18.25	15.37	14.16	
8	10.08	08.40	07.03	06.10	04.21	02.43	05.01 (5)	02.53	05.09 (5)	04.36	06.13	07.43	08.23	09.58	
	14.36	16.19	17.51	20.27	22.05	23.48	19 05.20 (5)	23.45	27 05.51 (6)	22.03	20.11	18.22	15.34	14.15	
9	10.06	08.37	06.59	06.06	04.18	02.40	05.01 (5)	02.56	05.10 (5)	04.39	06.16	07.46	08.26	10.01	
	14.39	16.23	17.54	20.30	22.08	23.50	20 05.21 (5)	23.42	31 05.53 (6)	22.00	20.07	18.18	15.31	14.13	
10	10.04	08.34	06.56	06.03	04.14	02.38	05.01 (5)	02.59	05.11 (5)	04.43	06.19	07.49	08.29	10.03	
	14.42	16.26	17.57	20.33	22.12	23.53	20 05.21 (5)	23.39	32 05.54 (6)	21.56	20.04	18.14	15.28	14.12	
11	10.01	08.30	06.52	05.59	04.11	02.36	05.01 (5)	03.02	05.13 (5)	04.46	06.22	07.52	08.33	10.05	
	14.45	16.30	18.01	20.36	22.15	23.55	21 05.22 (5)	23.37	30 05.55 (6)	21.53	20.00	18.11	15.25	14.10	
12	09.59	08.27	06.48	05.55	04.07	02.34	05.01 (5)	03.05	05.15 (5)	04.49	06.25	07.55	08.36	10.08	
	14.48	16.33	18.04	20.39	22.19	6 05.44 (6)	23.57	21 05.22 (5)	23.34	29 05.56 (6)	21.49	19.56	18.07	15.21	14.09
13	09.57	08.24	06.45	05.52	04.04	02.32	05.01 (5)	03.08	05.29 (2)	04.52	06.28	07.58	08.40	10.10	
	14.51	16.37	18.07	20.42	22.22	10 05.46 (6)	23.59	21 05.22 (5)	23.31	26 05.57 (6)	21.46	19.53	18.04	15.18	14.08
14	09.55	08.20	06.41	05.48	04.00	02.31	05.01 (5)	03.11	05.30 (2)	04.56	06.31	08.01	08.43	10.11	
	14.54	16.40	18.10	20.46	22.25	13 05.47 (6)	00.01	22 05.23 (5)	23.28	26 05.58 (6)	21.42	19.49	18.00	15.15	14.07
15	09.52	08.17	06.37	05.44	03.57	02.29	05.01 (5)	03.15	05.29 (2)	04.59	06.34	08.04	08.46	10.13	
	14.57	16.43	18.13	20.49	22.29	15 05.48 (6)	00.03	22 05.23 (5)	23.25	29 05.59 (6)	21.38	19.45	17.57	15.12	14.07
16	09.50	08.13	06.34	05.41	03.53	02.28	05.01 (5)	03.18	05.29 (2)	05.02	06.37	08.07	08.50	10.15	
	15.00	16.47	18.16	20.52	22.32	16 05.49 (6)	00.05	23 05.24 (5)	23.22	29 05.59 (6)	21.35	19.42	17.53	15.09	14.06
17	09.47	08.10	06.30	05.37	03.50	02.27	05.01 (5)	03.21	05.29 (2)	05.05	06.40	08.11	08.53	10.16	
	15.04	16.50	18.19	20.55	22.36	17 05.49 (6)	00.06	22 05.23 (5)	23.18	30 05.59 (6)	21.31	19.38	17.50	15.06	14.06
18	09.45	08.06	06.27	05.33	03.46	02.26	05.01 (5)	03.25	05.30 (2)	05.09	06.43	08.14	08.57	10.17	
	15.07	16.53	18.22	20.58	22.39	18 05.49 (6)	00.07	23 05.24 (5)	23.15	29 06.00 (6)	21.27	19.34	17.46	15.03	14.05
19	09.42	08.03	06.23	05.30	03.43	02.25	05.01 (5)	03.28	05.30 (2)	05.12	06.46	08.17	09.00	10.19	
	15.10	16.57	18.25	21.01	22.43	19 05.50 (6)	00.08	23 05.24 (5)	23.12	29 06.00 (6)	21.24	19.31	17.42	15.00	14.05
20	09.39	07.59	06.19	05.26	03.40	02.25	05.01 (5)	03.31	05.31 (2)	05.15	06.49	08.20	09.03	10.19	
	15.14	17.00	18.28	21.05	22.46	19 05.50 (6)	00.08	22 05.24 (5)	23.09	29 06.01 (6)	21.20	19.27	17.39	14.57	14.05
21	09.36	07.56	06.16	05.22	03.36	02.25	05.02 (5)	03.35	05.31 (2)	05.18	06.52	08.23	09.07	10.20	
	15.17	17.03	18.31	21.08	22.50	24 05.51 (6)	00.09	22 05.24 (5)	23.06	28 06.00 (6)	21.17	19.23	17.35	14.54	14.05
22	09.34	07.52	06.12	05.19	03.33	02.25	05.03 (5)	03.38	05.33 (2)	05.21	06.55	08.26	09.10	10.21	
	15.21	17.06	18.34	21.11	22.53	26 05.50 (6)	00.09	22 05.25 (5)	23.02	25 06.01 (6)	21.13	19.20	17.32	14.51	14.06
23	09.31	07.49	06.08	05.15	03.30	02.25	05.02 (5)	03.42	05.41 (6)	05.24	06.58	08.30	09.13	10.21	
	15.24	17.10	18.37	21.14	22.57	29 05.51 (6)	00.09	23 05.25 (5)	22.59	19 06.00 (6)	21.09	19.16	17.28	14.49	14.06
24	09.28	07.45	06.05	05.12	03.26	02.26	05.02 (5)	03.45	05.42 (6)	05.28	07.01	08.33	09.17	10.22	
	15.27	17.13	18.41	21.18	23.00	29 05.51 (6)	00.09	23 05.25 (5)	22.56	19 06.01 (6)	21.06	19.12	17.25	14.46	14.07
25	09.25	07.42	06.01	05.08	03.23	02.26	05.03 (5)	03.48	05.41 (6)	05.31	07.04	07.36	09.20	10.22	
	15.31	17.16	18.44	21.21	23.04	30 05.50 (6)	00.08	23 05.26 (5)	22.52	19 06.00 (6)	21.02	19.09	16.21	14.43	14.08
26	09.22	07.38	05.57	05.04	03.20	02.27	05.04 (5)	03.52	05.42 (6)	05.34	07.07	07.39	09.23	10.22	
	15.34	17.19	18.47	21.24	23.07	29 05.50 (6)	00.07	22 05.26 (5)	22.49	18 06.00 (6)	20.58	19.05	16.18	14.41	14.09
27	09.19	07.35	05.54	05.01	03.17	02.29	05.04 (5)	03.55	05.43 (6)	05.37	07.10	07.43	09.27	10.22	
	15.38	17.23	18.50	21.28	23.10	30 05.50 (6)	00.06	22 05.26 (5)	22.45	17 06.00 (6)	20.55	19.01	16.15	14.38	14.10
28	09.16	07.31	05.50	04.57	03.14	02.30	05.04 (5)	03.59	05.43 (6)	05.40	07.13	07.46	09.30	10.21	
	15.41	17.26	18.53	21.31	23.14	29 05.50 (6)	00.05	22 05.26 (5)	22.42	16 05.59 (6)	20.51	18.58	16.11	14.35	14.12
29	09.13	07.28	05.46	04.53	03.10	02.32	05.04 (5)	04.02	05.44 (6)	05.43	07.16	07.49	09.33	10.21	
	15.45	19.56	21.34	23.17	27 05.49 (6)	00.04	22 05.26 (5)	22.39	14 05.58 (6)	20.47	18.54	16.08	14.33	14.13	
30	09.10	07.23	05.43	04.50	03.07	02.33	05.04 (5)	04.05	05.45 (6)	05.46	07.19	07.52	09.36	10.20	
	15.48	19.59	21.38	23.20	26 05.49 (6)	00.02	22 05.26 (5)	22.35	12 05.57 (6)	20.44	18.51	16.04	14.31	14.15	
31	09.06	07.19	05.39	04.47	03.04	02.34	05.09 (5)	04.09	05.46 (6)	05.49	07.56	07.56	09.36	10.19	
	15.52	19.60	21.39	23.24	25 05.48 (6)	00.00	22.32	9 05.55 (6)	20.40	16.01	14.17	14.17	14.17	14.17	
Potential sun hours	163	235	363	454	578	641	693	716	513	394	302	192	126	126	
Total, worst case					437		693	716							
Sun reduction					0,50		0,50	0,50							
Oper. time red.					0,80		0,80	0,80							
Wind dir. red.					0,64		0,61	0,63							
Total reduction					0,26		0,25	0,25							
Total, real					112		170	181							

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

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

SHADOW - Calendar

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **Shadow receptor:** F - Storeienen
Assumptions for shadow calculations Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June
1	10.18	09.03	07.28	09.02 (2)	06.35	04.46
	14.19	15.55	17.29	11.53 (3)	20.05	21.41
2	10.17	09.00	07.24	09.00 (2)	06.32	04.43
	14.21	15.58	17.32	11.51 (3)	20.08	21.44
3	10.16	08.57	07.21	08.59 (2)	06.28	07.30 (14)
	14.23	16.02	17.35	11.49 (3)	20.11	21.48
4	10.14	08.54	07.17	08.40 (6)	06.24	07.28 (14)
	14.26	16.05	17.39	11.47 (3)	20.14	21.51
5	10.13	08.50	12.15 (1)	08.37 (6)	06.21	07.27 (14)
	14.28	16.09	17.42	11.42 (3)	20.17	21.55
6	10.11	08.47	12.14 (1)	08.35 (6)	06.17	07.25 (14)
	14.31	16.12	17.45	10.40 (4)	20.21	21.58
7	10.10	08.44	12.13 (1)	08.14 (7)	06.13	07.25 (14)
	14.33	16.16	17.48	10.38 (4)	20.24	22.01
8	10.08	08.41	12.12 (1)	08.12 (7)	06.10	07.24 (14)
	14.36	16.19	17.51	10.37 (4)	20.27	22.05
9	10.06	08.37	12.12 (1)	08.11 (7)	06.06	07.24 (14)
	14.39	16.23	17.54	10.34 (4)	20.30	22.08
10	10.04	08.34	11.37 (3)	08.10 (7)	06.03	07.23 (14)
	14.42	16.26	17.57	10.30 (4)	20.33	22.12
11	10.02	08.30	11.32 (3)	08.09 (7)	05.59	07.24 (14)
	14.45	16.30	18.01	08.54 (6)	20.36	22.15
12	09.59	08.27	11.31 (3)	08.09 (7)	05.55	07.24 (14)
	14.48	16.33	18.04	08.54 (6)	20.39	22.19
13	09.57	08.24	11.29 (3)	08.08 (7)	05.52	07.25 (14)
	14.51	16.36	18.07	08.53 (6)	20.42	22.22
14	09.55	08.20	11.27 (3)	08.08 (7)	05.48	07.26 (14)
	14.54	16.40	18.10	08.51 (6)	20.46	22.26
15	09.52	08.17	10.20 (4)	08.08 (7)	05.44	07.28 (14)
	14.57	16.43	18.13	08.50 (6)	20.49	22.29
16	09.50	08.13	10.17 (4)	08.10 (7)	05.41	07.38 (14)
	15.00	16.47	18.16	08.48 (6)	20.52	22.33
17	09.47	08.10	10.15 (4)	07.40 (8)	05.37	07.40 (14)
	15.04	16.50	18.19	08.45 (6)	20.55	22.36
18	09.45	08.06	10.13 (4)	07.38 (8)	05.33	07.42 (14)
	15.07	16.53	18.22	08.18 (7)	20.58	22.40
19	09.42	08.03	10.12 (4)	07.37 (8)	05.30	07.43 (14)
	15.10	16.57	18.25	07.53 (8)	21.02	22.43
20	09.39	08.00	09.41 (5)	07.36 (8)	05.26	07.44 (14)
	15.14	17.00	18.28	07.53 (8)	21.05	22.46
21	09.36	07.56	09.37 (5)	07.35 (8)	05.22	07.45 (14)
	15.17	17.03	18.31	07.53 (8)	21.08	22.50
22	09.34	07.53	09.35 (5)	07.35 (8)	05.19	07.46 (14)
	15.20	17.06	18.34	07.53 (8)	21.11	22.53
23	09.31	07.49	09.33 (5)	07.35 (8)	05.15	07.47 (14)
	15.24	17.10	18.37	07.52 (8)	21.14	22.57
24	09.28	07.45	09.31 (5)	07.34 (8)	05.11	07.48 (14)
	15.27	17.13	18.41	07.51 (8)	21.18	23.00
25	09.25	07.42	09.30 (5)	07.36 (8)	05.08	07.49 (14)
	15.31	17.16	18.44	07.51 (8)	21.21	23.04
26	09.22	07.38	09.29 (5)	07.36 (8)	05.04	07.50 (14)
	15.34	17.19	18.47	07.49 (8)	21.24	23.07
27	09.19	07.35	09.29 (5)	07.38 (8)	05.01	07.51 (14)
	15.38	17.23	18.50	07.46 (8)	21.28	23.11
28	09.16	07.31	09.06 (2)	05.50	04.57	07.52 (14)
	15.41	17.26	18.53	05.50	21.31	23.14
29	09.13		06.46	04.53	04.53	07.53 (14)
	15.45		19.56	21.34	23.17	07.54 (14)
30	09.10		06.43	04.50	04.50	07.55 (14)
	15.48		19.59	21.38	23.21	07.56 (14)
31	09.07		06.39		03.04	07.57 (14)
	15.52		20.02		23.24	07.58 (14)
Potential sun hours	163	235	363	454	578	641
Total, worst case		1365	1327	238		
Sun reduction		0,50	0,50	0,50		
Oper. time red.		0,80	0,80	0,80		
Wind dir. red.		0,62	0,68	0,71		
Total reduction		0,25	0,27	0,29		
Total, real		336	359	68		

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

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

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **Shadow receptor:** F - Storeienen
Assumptions for shadow calculations Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December					
1	02.35	04.12	05.52	07.23 (14)	07.22	08.47 (7)	07.59	11.42 (1)	09.39		
	00.01	22.28	20.36	07.43 (14)	18.47	41	09.32 (6)	15.57	17	11.59 (1)	14.28
2	02.37	04.15	05.55	07.22 (14)	07.25		08.47 (7)	08.02		11.42 (1)	09.42
	23.59	22.25	20.33	07.43 (14)	18.43	41	09.32 (6)	15.54	17	11.59 (1)	14.26
3	02.39	04.19	05.58	07.22 (14)	07.28		08.48 (7)	08.06		11.43 (1)	09.45
	23.57	22.21	20.29	07.44 (14)	18.40	58	11.07 (4)	15.51	15	11.58 (1)	14.24
4	02.42	04.22	06.01	07.21 (14)	07.31		08.48 (7)	08.09		11.43 (1)	09.48
	23.55	22.18	20.25	07.42 (14)	18.36	72	11.10 (4)	15.47	14	11.57 (1)	14.22
5	02.44	04.26	06.04	07.21 (14)	07.34		08.49 (7)	08.13		11.44 (1)	09.51
	23.53	22.14	20.22	07.42 (14)	18.32	81	11.13 (4)	15.44	12	11.56 (1)	14.20
6	02.47	04.29	06.07	07.21 (14)	07.37		08.50 (7)	08.16		11.46 (1)	09.54
	23.50	22.11	20.18	07.41 (14)	18.29	90	11.14 (4)	15.41	8	11.54 (1)	14.18
7	02.50	04.32	06.10	07.22 (14)	07.40		08.52 (7)	08.19			09.56
	23.48	22.07	20.15	07.40 (14)	18.25	92	11.15 (4)	15.37			14.16
8	02.53	04.36	06.13	07.23 (14)	07.43		09.11 (6)	08.23			09.59
	23.45	22.04	20.11	07.39 (14)	18.22	87	11.16 (4)	15.34			14.14
9	02.56	04.39	06.16	07.24 (14)	07.46		09.14 (6)	08.26			10.01
	23.42	22.00	20.07	07.37 (14)	18.18	100	12.20 (3)	15.31			14.13
10	02.59	04.42	06.19	07.26 (14)	07.49		09.17 (6)	08.29			10.03
	23.40	21.56	20.04	07.33 (14)	18.14	101	12.22 (3)	15.28			14.11
11	03.02	04.46	06.22		07.52		09.34 (2)	08.33			10.06
	23.37	21.53	20.00		18.11	102	12.24 (3)	15.24			14.10
12	03.05	04.49	06.25		07.55		09.34 (2)	08.36			10.08
	23.34	21.49	19.56		18.07	105	12.25 (3)	15.21			14.09
13	03.08	04.52	06.28		07.58		09.37 (2)	08.40			10.10
	23.31	21.46	19.53		18.04	104	12.27 (3)	15.18			14.08
14	03.11	04.56	06.31		08.01		10.01 (5)	08.43			10.12
	23.28	21.42	19.49		18.00	98	12.27 (3)	15.15			14.07
15	03.14	04.59	06.34		08.04		10.01 (5)	08.47			10.13
	23.25	21.38	19.45		17.57	98	12.27 (3)	15.12			14.06
16	03.18	05.02	06.37	08.28 (8)	08.07		10.02 (5)	08.50			10.15
	23.22	21.35	19.42	6	08.34 (8)	17.53	12.28 (3)	15.09			14.06
17	03.21	05.05	06.40	08.25 (8)	08.11		10.02 (5)	08.53			10.16
	23.19	21.31	19.38	12	08.37 (8)	17.49	12.28 (3)	15.06			14.05
18	03.24	05.08	06.43	08.24 (8)	08.14		10.04 (5)	08.57			10.18
	23.16	21.28	19.34	14	08.38 (8)	17.46	12.29 (3)	15.03			14.05
19	03.28	05.12	06.46	08.21 (8)	08.17		10.04 (5)	09.00			10.19
	23.12	21.24	19.31	17	08.38 (8)	17.42	12.28 (3)	15.00			14.05
20	03.31	05.15	06.49	08.21 (8)	08.20		10.06 (5)	09.04			10.20
	23.09	21.20	19.27	17	08.38 (8)	17.39	12.28 (3)	14.57			14.05
21	03.34	05.18	06.52	08.20 (8)	08.23		10.08 (5)	09.07			10.21
	23.06	21.17	19.23	18	08.38 (8)	17.35	12.28 (3)	14.54			14.05
22	03.38	05.21	06.55	08.20 (8)	08.26		10.42 (4)	09.10			10.21
	23.02	21.13	19.20	18	08.38 (8)	17.32	12.28 (3)	14.51			14.06
23	03.41	05.24	06.58	08.20 (8)	08.30		10.43 (4)	09.14			10.22
	22.59	21.09	19.16	17	08.37 (8)	17.28	12.28 (3)	14.48			14.06
24	03.45	05.27	07.01	08.20 (8)	08.33		10.44 (4)	09.17			10.22
	22.56	21.06	19.12	16	08.36 (8)	17.25	12.26 (3)	14.46			14.07
25	03.48	05.31	07.04	08.21 (8)	07.36		09.46 (4)	09.20			10.22
	22.52	21.02	19.09	14	08.35 (8)	16.21	11.26 (3)	14.43			14.08
26	03.52	05.34	07.07	08.22 (8)	07.39		09.48 (4)	09.23			10.22
	22.49	20.58	19.05	22	09.24 (6)	16.18	11.55 (1)	14.40			14.09
27	03.55	05.37	07.10	08.24 (8)	07.43		09.50 (4)	09.27			10.22
	22.46	20.55	19.01	31	09.29 (6)	16.14	11.56 (1)	14.38			14.10
28	03.58	05.40	07.13	08.50 (7)	07.46		10.57 (3)	09.30			10.21
	22.42	20.51	11	07.39 (14)	18.58	31	11.57 (1)	14.35			14.11
29	04.02	05.43	07.16	08.49 (7)	07.49		10.58 (3)	09.33			10.21
	22.39	20.47	15	07.41 (14)	18.54	36	11.58 (1)	14.33			14.13
30	04.05	05.46	07.19	08.48 (7)	07.52		11.00 (3)	09.36			10.20
	22.35	20.44	17	07.42 (14)	18.51	39	11.58 (1)	14.30			14.15
31	04.09	05.49	07.24 (14)		07.56		11.03 (3)				10.19
	22.32	20.40	19	07.43 (14)		31	16.01	11.59 (1)			14.16
Potential sun hours	621	513	394		302		192				125
Total, worst case			487		2322		83				
Sun reduction		0,50	0,50		0,50		0,50				
Oper. time red.		0,80	0,80		0,80		0,80				
Wind dir. red.		0,71	0,71		0,64		0,58				
Total reduction		0,29	0,28		0,26		0,23				
Total, real		18	138		594		19				

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

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

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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Calculated:

20.12.2018 10.43/3.2.737

SHADOW - Calendar

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **Shadow receptor:** G - Hamland
Assumptions for shadow calculations Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June
1	10.18	09.03	12.28 (8) 07.28	09.01 (13) 06.35	04.46	03.01
	14.19	15.55 12	12.40 (8) 17.29 47	10.06 (12) 20.05	21.41	23.27
2	10.17	09.00	12.27 (8) 07.24	09.01 (13) 06.32	04.42	02.58
	14.21	15.58 15	12.42 (8) 17.32 46	10.05 (12) 20.08	21.44	23.30
3	10.16	08.57	12.26 (8) 07.21	09.00 (13) 06.28	04.39	02.55
	14.23	16.02 17	12.43 (8) 17.35 45	10.04 (12) 20.11	21.48	23.34
4	10.15	08.54	11.58 (9) 07.17	09.01 (13) 06.24	04.35	02.52
	14.25	16.05 31	13.12 (14) 17.38 43	10.03 (12) 20.14	21.51	23.37
5	10.13	08.50	11.18 (10) 07.13	09.01 (13) 06.21	04.32	02.50
	14.28	16.09 52	13.15 (14) 17.42 39	10.01 (12) 20.17	21.54	23.40
6	10.11	08.47	11.15 (10) 07.10	09.01 (13) 06.17	04.28	02.47
	14.30	16.12 65	13.17 (14) 17.45 34	09.59 (12) 20.20	21.58	23.43
7	10.10	08.44	11.14 (10) 07.06	09.01 (13) 06.13	04.24	02.44
	14.33	16.16 74	13.19 (14) 17.48 19	09.20 (13) 20.24	22.01	23.45
8	10.08	08.40	11.13 (10) 07.03	09.03 (13) 06.10	04.21	02.42
	14.36	16.19 79	13.20 (14) 17.51 16	09.19 (13) 20.27	22.05	23.48
9	10.06	08.37	11.12 (10) 06.59	09.04 (13) 06.06	04.17	02.40
	14.38	16.23 84	13.21 (14) 17.54 13	09.17 (13) 20.30	22.08	23.51
10	10.04	08.34	11.11 (10) 06.55	09.08 (13) 06.02	04.14	02.37
	14.41	16.26 88	13.22 (14) 17.57 4	09.12 (13) 20.33	22.12	23.53
11	10.02	08.30	10.32 (11) 06.52	05.59	04.10	02.35
	14.44	16.29 96	13.22 (14) 18.00	20.36	22.15	23.56
12	09.59	08.27	10.31 (11) 06.48	05.55	04.07	02.33
	14.47	16.33 100	13.23 (14) 18.03	20.39	22.19	23.58
13	09.57	08.24	10.29 (11) 06.45	05.51	04.03	02.31
	14.50	16.36 101	13.24 (14) 18.07	20.42	22.22	00.00
14	09.55	08.20	10.28 (11) 06.41	05.48	04.00	02.30
	14.54	16.40 98	13.24 (14) 18.10	20.45	22.26	00.02
15	09.52	08.17	10.27 (11) 06.37	05.44	03.56	02.28
	14.57	16.43 91	13.23 (14) 18.13	20.49	22.29	00.04
16	09.50	08.13	10.26 (11) 06.34	05.40	03.53	02.27
	15.00	16.46 89	13.23 (14) 18.16	20.52	22.33	00.05
17	09.47	08.10	10.25 (11) 06.30	05.37	03.49	02.26
	15.03	16.50 87	13.23 (14) 18.19	20.55	22.36	00.06
18	09.45	08.06	10.25 (11) 06.26	05.33	03.46	02.25
	15.07	16.53 81	13.22 (14) 18.22	20.58	22.40	00.08
19	09.42	08.03	09.50 (12) 06.23	05.29	03.43	02.24
	15.10	16.56 80	13.21 (14) 18.25	21.01	22.43	00.08
20	09.39	07.59	09.47 (12) 06.19	05.26	03.39	02.24
	15.13	17.00 73	13.20 (14) 18.28	21.05	22.46	00.09
21	09.36	07.56	09.46 (12) 06.15	05.22	03.36	02.24
	15.17	17.03 65	13.19 (14) 18.31	21.08	22.50	00.10
22	09.34	07.52	09.45 (12) 06.12	05.19	03.32	02.24
	15.20	17.06 58	13.17 (14) 18.34	21.11	22.53	00.10
23	09.31	07.49	09.43 (12) 06.08	05.15	03.29	02.24
	15.23	17.09 51	13.13 (14) 18.37	21.14	22.57	00.10
24	09.28	07.45	09.09 (13) 06.05	05.11	03.26	02.25
	15.27	17.13 52	10.45 (11) 18.40	21.18	23.00	00.09
25	09.25	07.42	09.06 (13) 06.01	05.08	03.23	02.25
	15.30	17.16 53	10.43 (11) 18.43	21.21	23.04	00.09
26	09.22	07.38	09.04 (13) 05.57	05.04	03.19	02.26
	15.34	17.19 52	10.40 (11) 18.47	21.24	23.07	00.08
27	09.19	07.35	09.03 (13) 05.54	05.00	03.16	02.28
	15.37	17.22 45	10.07 (12) 18.50	21.28	23.11	00.07
28	09.16	07.31	09.02 (13) 05.50	04.57	03.13	02.29
	15.41	17.26 47	10.07 (12) 18.53	21.31	23.14	00.06
29	09.13		06.46	04.53	03.10	02.31
	15.44		19.56	21.34	23.17	00.04
30	09.10		06.43	04.50	03.07	02.33
	15.48		19.59	21.38	23.21	00.03
31	09.06	12.30 (8)	06.39		03.04	
	15.51	8 12.38 (8)	20.02		23.24	
Potential sun hours	162	235	363	454	578	641
Total, worst case	8	1836	306			
Sun reduction	0,50	0,50	0,50			
Oper. time red.	0,80	0,80	0,80			
Wind dir. red.	0,58	0,60	0,68			
Total reduction	0,23	0,24	0,27			
Total, real	2	442	83			

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

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

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **Shadow receptor:** G - Hamland
Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35	04.12	05.52	07.22	07.59	10.42 (10) 09.39
	00.01	22.28	20.36	18.47	15.57	86 12.52 (14) 14.28
2	02.37	04.15	05.55	07.25	08.02	10.42 (10) 09.42
	23.59	22.25	20.33	18.43	15.54	84 12.51 (14) 14.26
3	02.39	04.19	05.58	07.28	08.06	10.43 (10) 09.45
	23.57	22.21	20.29	18.39	15.50	79 12.50 (14) 14.23
4	02.41	04.22	06.01	07.31	09.43 (13)	08.09 10.44 (10) 09.48
	23.55	22.18	20.25	18.36	10 09.53 (13)	15.47 73 12.49 (14) 14.21
5	02.44	04.25	06.04	07.34	09.40 (13)	08.12 10.46 (10) 09.51
	23.53	22.14	20.22	18.32	15 09.55 (13)	15.44 63 12.47 (14) 14.19
6	02.47	04.29	06.07	07.37	09.38 (13)	08.16 10.48 (10) 09.54
	23.50	22.11	20.18	18.29	18 09.56 (13)	15.40 51 12.45 (14) 14.18
7	02.49	04.32	06.10	07.40	09.37 (13)	08.19 11.30 (9) 09.56
	23.48	22.07	20.14	18.25	29 10.33 (12)	15.37 28 12.42 (14) 14.16
8	02.52	04.35	06.13	07.43	09.36 (13)	08.23 11.56 (8) 09.59
	23.45	22.03	20.11	18.21	36 10.35 (12)	15.34 16 12.12 (8) 14.14
9	02.55	04.39	06.16	07.46	09.35 (13)	08.26 11.58 (8) 10.01
	23.43	22.00	20.07	18.18	41 10.37 (12)	15.31 14 12.12 (8) 14.13
10	02.58	04.42	06.19	07.49	09.35 (13)	08.29 11.59 (8) 10.03
	23.40	21.56	20.03	18.14	44 10.38 (12)	15.27 12 12.11 (8) 14.11
11	03.01	04.45	06.22	07.52	09.34 (13)	08.33 12.01 (8) 10.06
	23.37	21.53	20.00	18.11	46 10.39 (12)	15.24 7 12.08 (8) 14.10
12	03.04	04.49	06.25	07.55	09.34 (13)	08.36 11.56 (8) 10.08
	23.34	21.49	19.56	18.07	47 10.39 (12)	15.21 14.09
13	03.08	04.52	06.28	07.58	09.35 (13)	08.40 10.10
	23.31	21.46	19.52	18.04	47 10.40 (12)	15.18 14.08
14	03.11	04.55	06.31	08.01	09.35 (13)	08.43 10.12
	23.28	21.42	19.49	18.00	46 10.39 (12)	15.15 14.07
15	03.14	04.59	06.34	08.04	09.35 (13)	08.46 10.13
	23.25	21.38	19.45	17.56	45 10.39 (12)	15.12 14.06
16	03.17	05.02	06.37	08.07	09.37 (13)	08.50 10.15
	23.22	21.35	19.41	17.53	53 11.14 (11)	15.09 14.05
17	03.21	05.05	06.40	08.10	09.38 (13)	08.53 10.16
	23.19	21.31	19.38	17.49	53 11.15 (11)	15.06 14.05
18	03.24	05.08	06.43	08.14	09.42 (13)	08.57 10.18
	23.16	21.27	19.34	17.46	48 11.17 (11)	15.03 14.05
19	03.27	05.11	06.46	08.17	10.14 (12)	09.00 10.19
	23.12	21.24	19.30	17.42	55 13.45 (14)	15.00 14.05
20	03.31	05.15	06.49	08.20	10.16 (12)	09.03 10.20
	23.09	21.20	19.27	17.39	58 13.48 (14)	14.57 14.05
21	03.34	05.18	06.52	08.23	10.16 (12)	09.07 10.21
	23.06	21.17	19.23	17.35	70 13.49 (14)	14.54 14.05
22	03.38	05.21	06.55	08.26	10.19 (12)	09.10 10.21
	23.02	21.13	19.19	17.32	74 13.51 (14)	14.51 14.05
23	03.41	05.24	06.58	08.30	10.21 (12)	09.14 10.22
	22.59	21.09	19.16	17.28	81 13.51 (14)	14.48 14.06
24	03.44	05.27	07.01	08.33	10.55 (11)	09.17 10.22
	22.56	21.06	19.12	17.25	83 13.52 (14)	14.45 14.06
25	03.48	05.30	07.04	08.36	09.55 (11)	09.20 10.22
	22.52	21.02	19.09	16.21	87 12.53 (14)	14.43 14.07
26	03.51	05.34	07.07	08.39	09.55 (11)	09.23 10.22
	22.49	20.58	19.05	16.18	89 12.52 (14)	14.40 14.08
27	03.55	05.37	07.10	08.42	09.56 (11)	09.27 10.22
	22.46	20.55	19.01	16.14	91 12.52 (14)	14.37 14.10
28	03.58	05.40	07.13	08.45	09.57 (11)	09.30 10.22
	22.42	20.51	18.58	16.11	100 12.53 (14)	14.35 14.11
29	04.02	05.43	07.16	08.49	09.58 (11)	09.33 10.21
	22.39	20.47	18.54	16.07	103 12.53 (14)	14.32 14.13
30	04.05	05.46	07.19	08.52	10.00 (11)	09.36 10.20
	22.35	20.44	18.50	16.04	100 12.53 (14)	14.30 14.14
31	04.08	05.49	07.22	08.55	10.03 (11)	09.39 10.20
	22.32	20.40	16.01	94 12.52 (14)	14.16	
Potential sun hours	621	513	394	302	192	125
Total, worst case				1663		513
Sun reduction				0,50		0,50
Oper. time red.				0,80		0,80
Wind dir. red.				0,62		0,58
Total reduction				0,25		0,23
Total, real				415		118

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

Day in month	Sun rise (hh:mm)	Minutes with flicker	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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Helge Dalbu / helge.dalbu@multiconsult.no
Calculated:
20.12.2018 10.43/3.2.737

SHADOW - Calendar

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **Shadow receptor:** H - Myhrvang
Assumptions for shadow calculations Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	July	August	September	October	November	December		
1	10.18	09.03	12.10 (10)	07.28	06.35	04.46	03.01	02.34	04.12	05.52	07.22	07.59	10.21 (12)	09.39
	14.18	15.55	28 12.55 (9)	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	105 13.41 (14)	14.28
2	10.17	09.00	11.31 (11)	07.24	06.32	04.42	02.58	02.37	04.15	05.55	07.25	08.02	10.22 (12)	09.42
	14.21	15.58	42 12.57 (9)	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	104 13.40 (14)	14.26
3	10.16	08.57	11.29 (11)	07.21	06.28	04.39	02.55	02.39	04.19	05.58	07.28	08.06	10.25 (12)	09.45
	14.23	16.02	60 14.04 (14)	17.35	20.11	21.48	23.34	23.57	22.21	20.29	18.39	15.50	98 13.40 (14)	14.23
4	10.15	08.54	11.27 (11)	07.17	06.24	04.35	02.52	02.41	04.22	06.01	07.31	08.09	10.29 (12)	09.48
	14.25	16.05	69 14.05 (14)	17.38	20.14	21.51	23.37	23.55	22.18	20.25	18.36	15.47	88 13.39 (14)	14.21
5	10.13	08.50	11.26 (11)	07.13	06.21	04.32	02.49	02.44	04.25	06.04	07.34	08.12	10.36 (11)	09.51
	14.28	16.09	77 14.07 (14)	17.42	20.17	21.54	23.40	23.53	22.14	20.22	18.32	15.44	80 13.38 (14)	14.19
6	10.11	08.47	11.25 (11)	07.10	06.17	04.28	02.47	02.47	04.29	06.07	07.37	08.16	10.37 (11)	09.54
	14.30	16.12	81 14.08 (14)	17.45	20.20	21.58	23.43	23.50	22.11	20.18	18.29	15.40	73 13.37 (14)	14.17
7	10.10	08.44	10.57 (12)	07.06	06.13	04.24	02.44	02.49	04.32	06.10	07.40	08.19	10.38 (11)	09.56
	14.33	16.16	91 14.09 (14)	17.48	20.23	22.01	23.45	23.48	22.07	20.14	18.25	15.37	68 13.35 (14)	14.16
8	10.08	08.40	10.54 (12)	07.03	06.10	04.21	02.42	02.52	04.35	06.13	07.43	08.23	10.39 (11)	09.59
	14.36	16.19	99 14.10 (14)	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.21	15.34	58 13.33 (14)	14.14
9	10.06	08.37	10.52 (12)	06.59	06.06	04.17	02.39	02.55	04.39	06.16	07.46	08.26	11.02 (11)	10.01
	14.38	16.23	104 14.10 (14)	17.54	20.30	22.08	23.51	23.43	22.00	20.07	18.18	15.31	40 12.27 (9)	14.12
10	10.04	08.34	10.50 (12)	06.55	06.02	04.14	02.37	02.58	04.42	06.19	07.49	08.29	11.40 (10)	10.03
	14.41	16.26	106 14.10 (14)	17.57	20.33	22.12	23.53	23.40	21.56	20.03	18.14	15.27	28 12.26 (9)	14.11
11	10.02	08.30	10.49 (12)	06.52	05.59	04.10	02.35	03.01	04.45	06.22	07.52	08.33	11.41 (10)	10.06
	14.44	16.29	106 14.10 (14)	18.00	20.36	22.15	23.56	23.37	21.53	20.00	18.11	15.24	21 12.23 (9)	14.10
12	09.59	08.27	10.07 (13)	06.48	05.55	04.07	02.33	03.04	04.49	06.25	07.55	08.36	11.44 (10)	10.08
	14.47	16.33	110 14.10 (14)	18.03	20.39	22.19	23.58	23.34	21.49	19.56	18.07	15.21	11 11.55 (10)	14.09
13	09.57	08.24	10.05 (13)	06.45	05.51	04.03	02.31	03.08	04.52	06.28	07.58	08.40	11.46 (10)	10.10
	14.50	16.36	111 14.11 (14)	18.07	20.42	22.22	00.00	23.31	21.46	19.52	18.03	15.18	5 11.51 (10)	14.08
14	09.55	08.20	10.03 (13)	06.41	05.48	04.00	02.30	03.11	04.55	06.31	08.01	08.43	10.36 (13)	10.12
	14.54	16.40	104 14.11 (14)	18.10	20.45	22.26	00.02	23.28	21.42	19.49	18.00	13 10.49 (13)	15.15	14.07
15	09.52	08.17	10.02 (13)	06.37	05.44	03.56	02.28	03.14	04.59	06.34	08.04	08.46	10.34 (13)	10.13
	14.57	16.43	85 14.10 (14)	18.13	20.49	22.29	00.04	23.25	21.38	19.45	17.56	16 10.50 (13)	15.12	14.06
16	09.50	08.13	10.00 (13)	06.34	05.40	03.53	02.27	03.17	05.02	06.37	08.07	08.46	10.33 (13)	10.15
	15.00	16.46	84 14.09 (14)	18.16	20.52	22.33	00.05	23.22	21.35	19.41	17.53	19 10.52 (13)	15.09	14.05
17	09.47	08.10	10.00 (13)	06.30	05.37	03.49	02.26	03.21	05.05	06.40	08.10	08.46	10.31 (13)	10.16
	15.03	16.50	81 14.08 (14)	18.19	20.55	22.36	00.07	23.19	21.31	19.38	17.49	32 11.36 (12)	15.05	14.05
18	09.45	08.06	09.59 (13)	06.26	05.33	03.46	02.25	03.24	05.08	06.43	08.14	08.46	10.31 (13)	10.18
	15.07	16.53	71 14.06 (14)	18.22	20.58	22.40	00.08	23.16	21.27	19.34	17.46	39 11.40 (12)	15.02	14.05
19	09.42	08.03	09.58 (13)	06.23	05.29	03.43	02.24	03.27	05.11	06.46	08.17	08.46	10.30 (13)	10.19
	15.10	16.56	57 14.03 (14)	18.25	21.01	22.43	00.09	23.12	21.24	19.30	17.42	43 11.41 (12)	15.00	14.04
20	09.39	07.59	09.58 (13)	06.19	05.26	03.39	02.24	03.31	05.15	06.49	08.20	08.46	10.29 (13)	10.20
	15.13	17.00	49 11.12 (12)	18.28	21.05	22.46	00.09	23.09	21.20	19.27	17.39	46 11.42 (12)	14.57	14.05
21	09.36	07.56	09.58 (13)	06.15	05.22	03.36	02.24	03.34	05.18	06.52	08.23	08.46	10.29 (13)	10.21
	15.17	17.03	48 11.11 (12)	18.31	21.08	22.50	00.10	23.06	21.17	19.23	17.35	49 11.43 (12)	14.54	14.05
22	09.34	07.52	09.59 (13)	06.12	05.18	03.32	02.24	03.38	05.21	06.55	08.26	08.46	10.29 (13)	10.21
	15.20	17.06	45 11.11 (12)	18.34	21.11	22.53	00.10	23.02	21.13	19.19	17.32	50 11.44 (12)	14.51	14.05
23	09.31	07.49	09.59 (13)	06.08	05.15	03.29	02.24	03.41	05.24	06.58	08.29	08.46	10.28 (13)	10.22
	15.23	17.09	42 11.09 (12)	18.37	21.14	22.57	00.10	22.59	21.09	19.16	17.28	61 14.34 (14)	14.48	14.06
24	09.28	07.45	09.59 (13)	06.04	05.11	03.26	02.25	03.44	05.27	07.01	08.33	08.46	10.29 (13)	10.22
	15.27	17.13	37 11.07 (12)	18.40	21.18	23.00	00.09	22.56	21.06	19.12	17.25	75 14.36 (14)	14.45	14.06
25	09.25	07.42	10.00 (13)	06.01	05.08	03.23	02.25	03.48	05.30	07.04	08.36	08.46	10.30 (13)	10.22
	15.30	17.16	28 11.03 (12)	18.43	21.21	23.04	00.09	22.52	21.02	19.09	16.21	81 13.38 (14)	14.43	14.07
26	09.22	07.38	10.01 (13)	05.57	05.04	03.19	02.26	03.51	05.34	07.07	08.39	08.46	10.30 (13)	10.22
	15.34	17.19	18 10.19 (13)	18.46	21.24	23.07	00.08	22.49	20.58	19.05	16.18	83 13.38 (14)	14.40	14.08
27	09.19	07.35	10.03 (13)	05.54	05.00	03.16	02.28	03.55	05.37	07.10	08.42	08.46	10.31 (13)	10.22
	15.37	17.22	15 10.18 (13)	18.50	21.28	23.11	00.07	22.46	20.55	19.01	16.14	88 13.39 (14)	14.37	14.10
28	09.16	07.31	10.05 (13)	05.50	04.57	03.13	02.29	03.58	05.40	07.13	08.46	08.46	10.32 (13)	10.20
	15.41	17.26	10 10.15 (13)	18.53	21.31	23.14	00.06	22.42	20.51	18.58	16.11	108 13.40 (14)	14.35	14.11
29	09.13	07.27	10.04 (13)	05.46	04.53	03.10	02.31	04.02	05.43	07.16	08.49	08.46	10.33 (13)	10.21
	15.44	6 12.14 (10)	18.58	19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.07	111 13.40 (14)	14.32	14.12
30	09.10	07.23	10.03 (13)	05.43	04.49	03.07	02.32	04.05	05.46	07.19	08.52	08.46	10.33 (13)	10.20
	15.48	11 12.23 (10)	18.59	19.59	21.38	23.21	00.03	22.35	20.44	18.50	16.04	107 13.41 (14)	14.30	14.14
31	09.06	07.20	10.02 (13)	05.39	04.46	03.04	02.33	04.08	05.49	07.22	08.56	08.46	10.20 (12)	10.20
	15.51	21 12.52 (9)	18.59	19.59	21.38	23.24	00.04	22.32	20.40	18.50	16.01	106 13.41 (14)	14.30	14.16
Potential sun hours	162	235	363	454	578	641	621	513	394	302	1127	779	125	
Total, worst case	38	1858									1127	779		
Sun reduction	0,50	0,50									0,50	0,50		
Oper. time red.	0,80	0,80									0,80	0,80		
Wind dir. red.	0,58	0,60									0,61	0,57		
Total reduction	0,23	0,24									0,24	0,23		
Total, real	9	443									275	179		

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

Day in month	Sun rise (hh:mm)	Minutes with flicker	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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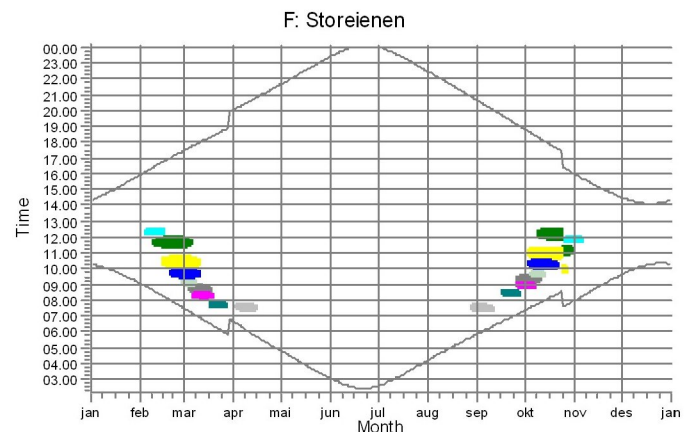
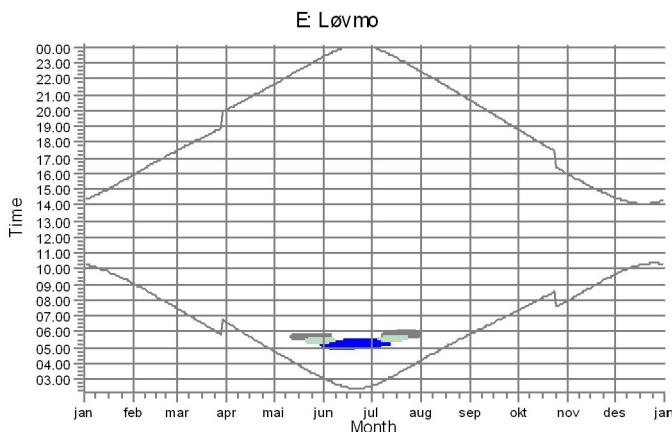
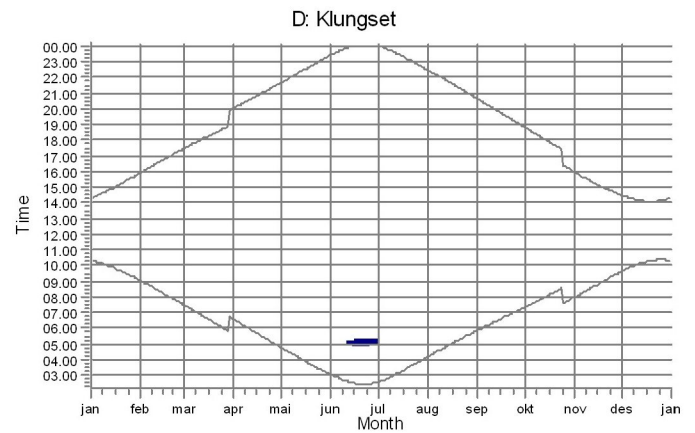
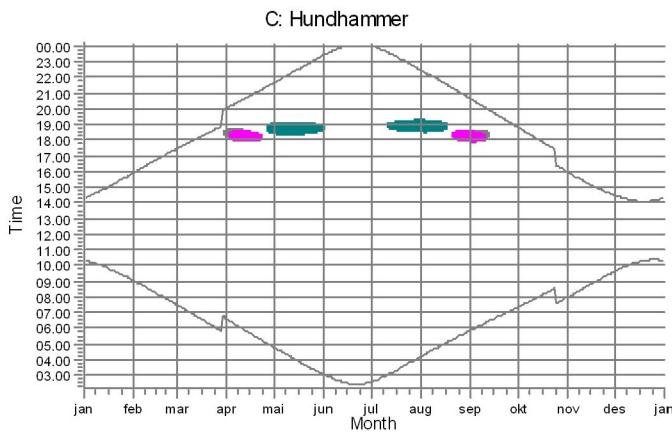
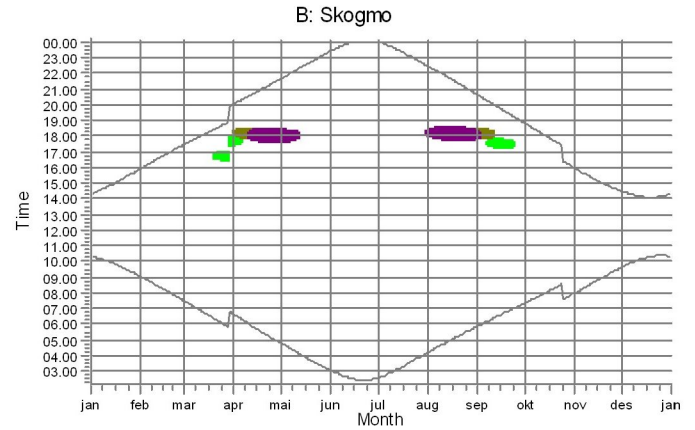
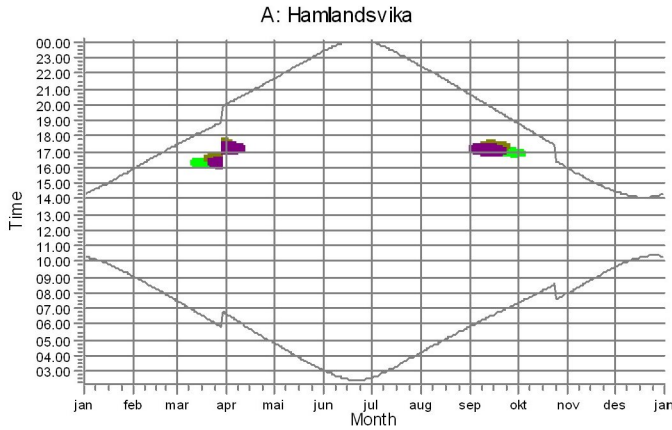
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

20.12.2018 10.43/3.2.737

SHADOW - Calendar, graphical

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6



WTGs

- 3: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (627)
- 4: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (628)
- 5: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)
- 6: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (630)
- 7: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (631)
- 8: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)
- 9: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)

- 11: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)
- 12: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)
- 13: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)
- 14: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)
- 1: M1-E-70 E4 2000 71.0
- 2: M5- E-70 E4 2,3 MW 2300

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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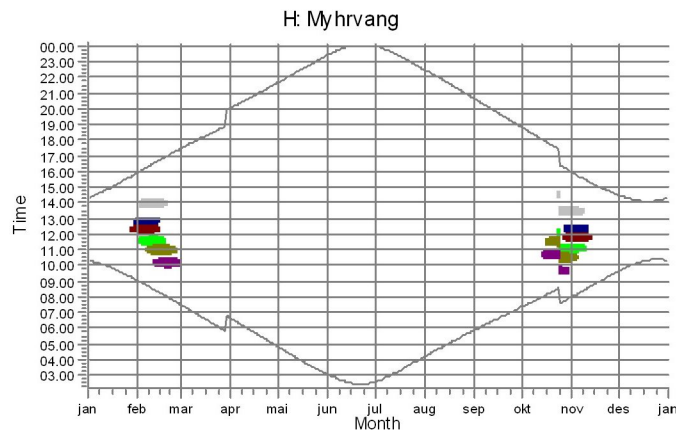
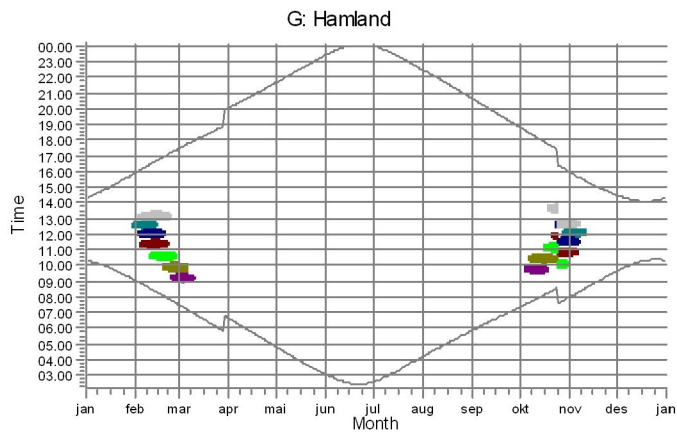
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:





20.12.2018 10.43/3.2.737




SHADOW - Calendar, graphical

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6



WTGs

	8: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)
	9: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)
	10: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (634)
	11: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)

	12: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)
	13: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)
	14: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)

Project:

Hundhammerfjellet Reetablering

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Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnsannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6WTG: 3 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (627)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	July	August	September	October	November	December		
1	10.18	09.03	07.28	11.24-11.53/29	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	09.39	
	14.19	15.55	17.29		20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	14.28	
2	10.17	09.00	07.24	11.25-11.51/26	06.32	04.43	02.58	02.37	04.16	05.55	07.25	08.02	09.42	
	14.21	15.59	17.32		20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	14.26	
3	10.16	08.57	07.21	11.27-11.49/22	06.28	04.39	02.56	02.40	04.19	05.58	07.28	08.06	09.45	
	14.23	16.02	17.35		20.11	21.48	23.33	23.57	22.21	20.29	18.40	15.51	14.24	
4	10.14	08.54	07.17	11.30-11.47/17	06.24	04.35	02.53	02.42	04.22	06.01	07.31	08.09	09.48	
	14.26	16.06	17.39		20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47	14.22	
5	10.13	08.50	07.13	11.34-11.42/8	06.21	04.32	02.50	02.45	04.26	06.04	07.34	08.12	09.51	
	14.28	16.09	17.42		20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44	14.20	
6	10.11	08.47	07.10		06.17	04.28	02.47	02.47	04.29	06.07	07.37	08.16	09.53	
	14.31	16.12	17.45		20.20	21.58	23.42	23.50	22.11	20.18	18.29	15.41	14.18	
7	10.09	08.44	07.06		06.13	04.25	02.45	02.50	04.32	06.10	07.40	08.19	09.56	
	14.33	16.16	17.48		20.24	22.01	23.45	23.47	22.07	20.14	18.25	15.37	14.16	
8	10.08	08.40	07.03		06.10	04.21	02.42	02.53	04.36	06.13	07.43	08.23	09.59	
	14.36	16.19	17.51		20.27	22.05	23.48	23.45	22.03	20.11	18.22	15.34	14.14	
9	10.06	08.37	06.59		06.06	04.18	02.40	02.56	04.39	06.16	07.46	12.07-12.20/13	08.26	10.01
	14.39	16.23	17.54		20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13	
10	10.04	08.34	11.37-11.43/6	06.55	06.03	04.14	02.38	02.59	04.42	06.19	07.49	12.03-12.22/19	08.29	10.03
	14.42	16.26	17.57		20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.28	14.12	
11	10.02	08.30	11.32-11.47/15	06.52	05.59	04.11	02.36	03.02	04.46	06.22	07.52	12.00-12.24/24	08.33	10.06
	14.45	16.30	18.01		20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10	
12	09.59	08.27	11.31-11.50/19	06.48	05.55	04.07	02.34	03.05	04.49	06.25	07.55	11.58-12.25/27	08.36	10.08
	14.48	16.33	18.04		20.39	22.19	23.58	23.34	21.49	19.56	18.07	15.21	14.09	
13	09.57	08.24	11.29-11.52/23	06.45	05.52	04.04	02.32	03.08	04.52	06.28	07.58	11.57-12.27/30	08.40	10.10
	14.51	16.36	18.07		20.42	22.22	00.00	23.31	21.46	19.52	18.04	15.18	14.08	
14	09.55	08.20	11.27-11.54/27	06.41	05.48	04.00	02.30	03.11	04.56	06.31	08.01	11.56-12.27/31	08.43	10.11
	14.54	16.40	18.10		20.46	22.25	00.01	23.28	21.42	19.49	18.00	15.15	14.07	
15	09.52	08.17	11.26-11.55/29	06.37	05.44	03.57	02.29	03.15	04.59	06.34	08.04	11.55-12.27/32	08.46	10.13
	14.57	16.43	18.13		20.49	22.29	00.03	23.25	21.38	19.45	17.57	15.12	14.06	
16	09.50	08.13	11.25-11.55/30	06.34	05.41	03.53	02.28	03.18	05.02	06.37	08.07	11.54-12.28/34	08.50	10.15
	15.00	16.47	18.16		20.52	22.32	00.05	23.22	21.35	19.42	17.53	15.09	14.06	
17	09.47	08.10	11.24-11.56/32	06.30	05.37	03.50	02.27	03.21	05.05	06.40	08.11	11.53-12.28/35	08.53	10.16
	15.04	16.50	18.19		20.55	22.36	00.06	23.19	21.31	19.38	17.49	15.06	14.05	
18	09.45	08.06	11.23-11.57/34	06.27	05.33	03.46	02.26	03.24	05.08	06.43	08.14	11.54-12.29/35	08.57	10.17
	15.07	16.53	18.22		20.58	22.39	00.07	23.15	21.27	19.34	17.46	15.03	14.05	
19	09.42	08.03	11.23-11.57/34	06.23	05.30	03.43	02.25	03.28	05.12	06.46	08.17	11.53-12.28/35	09.00	10.19
	15.10	16.57	18.25		21.01	22.43	00.08	23.12	21.24	19.31	17.42	15.00	14.05	
20	09.39	07.59	11.22-11.57/35	06.19	05.26	03.40	02.25	03.31	05.15	06.49	08.20	11.53-12.28/35	09.03	10.20
	15.14	17.00	18.28		21.05	22.46	00.09	23.09	21.20	19.27	17.39	14.57	14.05	
21	09.36	07.56	11.23-11.58/35	06.16	05.22	03.36	02.24	03.35	05.18	06.52	08.23	11.52-12.28/36	09.07	10.20
	15.17	17.03	18.31		21.08	22.50	00.09	23.06	21.17	19.23	17.35	14.54	14.05	
22	09.34	07.52	11.22-11.58/36	06.12	05.19	03.33	02.25	03.38	05.21	06.55	08.26	11.53-12.28/35	09.10	10.21
	15.20	17.06	18.34		21.11	22.53	00.09	23.02	21.13	19.20	17.32	14.51	14.06	
23	09.31	07.49	11.22-11.57/35	06.08	05.15	03.30	02.25	03.41	05.24	06.58	08.30	11.54-12.28/34	09.13	10.21
	15.24	17.10	18.37		21.14	22.57	00.09	22.59	21.09	19.16	17.28	14.48	14.06	
24	09.28	07.45	11.22-11.57/35	06.05	05.11	03.26	02.25	03.45	05.28	07.01	08.33	11.53-12.26/33	09.17	10.22
	15.27	17.13	18.41		21.18	23.00	00.09	22.56	21.06	19.12	17.25	14.46	14.07	
25	09.25	07.42	11.22-11.56/34	06.01	05.08	03.23	02.26	03.48	05.31	07.04	07.36	10.54-11.26/32	09.20	10.22
	15.31	17.16	18.44		21.21	23.04	00.08	22.52	21.02	19.09	16.21	14.43	14.08	
26	09.22	07.38	11.22-11.56/34	05.57	05.04	03.20	02.27	03.52	05.34	07.07	07.39	10.55-11.25/30	09.23	10.22
	15.34	17.19	18.47		21.24	23.07	00.08	22.49	20.58	19.05	16.18	14.40	14.09	
27	09.19	07.35	11.23-11.56/33	05.54	05.01	03.17	02.28	03.55	05.37	07.10	07.43	10.55-11.23/28	09.27	10.22
	15.38	17.23	18.50		21.28	23.10	00.07	22.45	20.55	19.01	16.14	14.38	14.10	
28	09.16	07.31	11.24-11.54/30	05.50	04.57	03.13	02.30	03.58	05.40	07.13	07.46	10.57-11.22/25	09.30	10.21
	15.41	17.26	18.53		21.31	23.14	00.05	22.42	20.51	18.58	16.11	14.35	14.11	
29	09.13		06.46	04.53	03.10	02.31	04.02	05.43	07.16	07.49	10.58-11.21/23	09.33	10.21	
	15.45		19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.08		14.33	14.13	
30	09.10		06.43	04.50	03.07	02.33	04.05	05.46	07.19	07.52	11.00-11.19/19	09.36	10.20	
	15.48		19.59	21.38	23.20	00.02	22.35	20.44	18.50		16.04	14.30	14.15	
31	09.06		06.39		03.04		04.09	05.49		07.56	11.03-11.17/14		10.19	
	15.52		20.02		23.24		22.32	20.40		16.01			14.16	
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125	0	
Sum of minutes with flicker	0	556	102	0	0	0	0	0	0	659	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen
Nedre Skøyen vei 2
NO-0213 Oslo
+47 21 58 60 15
Helge Dalbu / helge.dalbu@multiconsult.no
Calculated:
20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnsannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 4 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (628)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.18	09.03	07.28 10.07-10.45/38	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	09.39
	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	14.28
2	10.17	09.00	07.24 10.07-10.44/37	06.32	04.43	02.58	02.37	04.16	05.55	07.25	08.02	09.42
	14.21	15.59	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54	14.26
3	10.16	08.57	07.21 10.07-10.43/36	06.28	04.39	02.55	02.40	04.19	05.58	07.28 10.57-11.07/10	08.06	09.45
	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.40	15.51	14.24
4	10.14	08.54	07.17 10.08-10.43/35	06.24	04.35	02.53	02.42	04.22	06.01	07.31 10.52-11.10/18	08.09	09.48
	14.26	16.05	17.39	20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47	14.22
5	10.13	08.50	07.13 10.08-10.42/34	06.21	04.32	02.50	02.45	04.26	06.04	07.34 10.49-11.13/24	08.12	09.51
	14.28	16.09	17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44	14.20
6	10.11	08.47	07.10 10.09-10.40/31	06.17	04.28	02.47	02.47	04.29	06.07	07.37 10.47-11.14/27	08.16	09.53
	14.31	16.12	17.45	20.20	21.58	23.42	23.50	22.11	20.18	18.29	15.41	14.18
7	10.09	08.44	07.06 10.10-10.38/28	06.13	04.25	02.45	02.50	04.32	06.10	07.40 10.45-11.15/30	08.19	09.56
	14.33	16.16	17.48	20.24	22.01	23.45	23.48	22.07	20.14	18.25	15.37	14.16
8	10.08	08.40	07.03 10.12-10.37/25	06.10	04.21	02.42	02.53	04.36	06.13	07.43 10.44-11.16/32	08.23	09.59
	14.36	16.19	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.22	15.34	14.14
9	10.06	08.37	06.59 10.13-10.34/21	06.06	04.18	02.40	02.56	04.39	06.16	07.46 10.43-11.17/34	08.26	10.01
	14.39	16.23	17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13
10	10.04	08.34	06.55 10.16-10.30/14	06.02	04.14	02.38	02.59	04.42	06.19	07.49 10.42-11.18/36	08.29	10.03
	14.42	16.26	17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.28	14.11
11	10.02	08.30	06.52	05.59	04.11	02.36	03.02	04.46	06.22	07.52 10.41-11.18/37	08.33	10.06
	14.45	16.30	18.01	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10
12	09.59	08.27	06.48	05.55	04.07	02.34	03.05	04.49	06.25	07.55 10.40-11.17/37	08.36	10.08
	14.48	16.33	18.04	20.39	22.19	23.58	23.34	21.49	19.56	18.07	15.21	14.09
13	09.57	08.24	06.45	05.52	04.04	02.32	03.08	04.52	06.28	07.58 10.40-11.18/38	08.40	10.10
	14.51	16.36	18.07	20.42	22.22	00.00	23.31	21.46	19.52	18.04	15.18	14.08
14	09.55	08.20	06.41	05.48	04.00	02.30	03.11	04.56	06.31	08.01 10.40-11.18/38	08.43	10.11
	14.54	16.40	18.10	20.46	22.25	00.02	23.28	21.42	19.49	18.00	15.15	14.07
15	09.52	08.17 10.20-10.35/15	06.37	05.44	03.57	02.29	03.14	04.59	06.34	08.04 10.39-11.17/38	08.46	10.13
	14.57	16.43	18.13	20.49	22.29	00.03	23.25	21.38	19.45	17.57	15.12	14.06
16	09.50	08.13 10.17-10.37/20	06.34	05.41	03.53	02.28	03.18	05.02	06.37	08.07 10.39-11.17/38	08.50	10.15
	15.00	16.47	18.16	20.52	22.32	00.05	23.22	21.35	19.42	17.53	15.09	14.06
17	09.47	08.10 10.15-10.39/24	06.30	05.37	03.50	02.27	03.21	05.05	06.40	08.11 10.39-11.17/38	08.53	10.16
	15.04	16.50	18.19	20.55	22.36	00.06	23.19	21.31	19.38	17.49	15.06	14.05
18	09.45	08.06 10.13-10.41/28	06.26	05.33	03.46	02.26	03.24	05.08	06.43	08.14 10.40-11.17/37	08.57	10.17
	15.07	16.53	18.22	20.58	22.39	00.07	23.15	21.27	19.34	17.46	15.03	14.05
19	09.42	08.03 10.12-10.42/30	06.23	05.30	03.43	02.25	03.28	05.12	06.46	08.17 10.39-11.15/36	09.00	10.19
	15.10	16.56	18.25	21.01	22.43	00.08	23.12	21.24	19.31	17.42	15.00	14.05
20	09.39	07.59 10.11-10.43/32	06.19	05.26	03.40	02.25	03.31	05.15	06.49	08.20 10.40-11.15/35	09.03	10.20
	15.14	17.00	18.28	21.05	22.46	00.09	23.09	21.20	19.27	17.39	14.57	14.05
21	09.36	07.56 10.10-10.44/34	06.16	05.22	03.36	02.24	03.35	05.18	06.52	08.23 10.40-11.14/34	09.07	10.20
	15.17	17.03	18.31	21.08	22.50	00.09	23.06	21.17	19.23	17.35	14.54	14.05
22	09.34	07.52 10.09-10.45/36	06.12	05.19	03.33	02.24	03.38	05.21	06.55	08.26 10.42-11.13/31	09.10	10.21
	15.20	17.06	18.34	21.11	22.53	00.09	23.02	21.13	19.20	17.32	14.51	14.06
23	09.31	07.49 10.09-10.45/36	06.08	05.15	03.30	02.25	03.41	05.24	06.58	08.30 10.43-11.12/29	09.13	10.21
	15.24	17.10	18.37	21.14	22.57	00.09	22.59	21.09	19.16	17.28	14.48	14.06
24	09.28	07.45 10.08-10.45/37	06.05	05.11	03.26	02.25	03.45	05.27	07.01	08.33 10.44-11.10/26	09.17	10.22
	15.27	17.13	18.40	21.18	23.00	00.09	22.56	21.06	19.12	17.25	14.46	14.07
25	09.25	07.42 10.07-10.45/38	06.01	05.08	03.23	02.26	03.48	05.31	07.04	07.36 09.46-10.09/23	09.20	10.22
	15.31	17.16	18.44	21.21	23.04	00.08	22.52	21.02	19.09	16.21	14.43	14.08
26	09.22	07.38 10.07-10.45/38	05.57	05.04	03.20	02.27	03.52	05.34	07.07	07.39 09.48-10.07/19	09.23	10.22
	15.34	17.19	18.47	21.24	23.07	00.08	22.49	20.58	19.05	16.18	14.40	14.09
27	09.19	07.35 10.07-10.46/39	05.54	05.01	03.17	02.28	03.55	05.37	07.10	07.43 09.50-10.03/13	09.27	10.22
	15.38	17.23	18.50	21.28	23.10	00.07	22.45	20.55	19.01	16.14	14.38	14.10
28	09.16	07.31 10.07-10.45/38	05.50	04.57	03.13	02.30	03.58	05.40	07.13	07.46	09.30	10.21
	15.41	17.26	18.53	21.31	23.14	00.05	22.42	20.51	18.58	16.11	14.35	14.11
29	09.13		06.46	04.53	03.10	02.31	04.02	05.43	07.16	07.49	09.33	10.21
	15.45		19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.08	14.33	14.13
30	09.10		06.43	04.50	03.07	02.33	04.05	05.46	07.19	07.52	09.36	10.20
	15.48		19.59	21.38	23.20	00.02	22.35	20.44	18.50	16.04	14.30	14.15
31	09.06		06.39		03.04		04.09	05.49		07.56		10.19
	15.52		20.02		23.24		22.32	20.40		16.01		14.16
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125
Sum of minutes with flicker	0	445	299	0	0	0	0	0	0	758	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



SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 5 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (629)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	
1	10.18 14.19	09.03 15.55	07.28 17.29	09.28-09.58/30	06.35 20.05	04.46 21.41	03.01 23.27
2	10.17 14.21	09.00 15.58	07.24 17.32	09.28-09.57/29	06.32 20.08	04.43 21.44	02.58 23.30
3	10.16 14.23	08.57 16.02	07.21 17.35	09.28-09.57/29	06.28 20.11	04.39 21.48	02.55 23.33
4	10.14 14.26	08.54 16.05	07.17 17.39	09.28-09.57/29	06.24 20.14	04.35 21.51	02.53 23.36
5	10.13 14.28	08.50 16.09	07.13 17.42	09.29-09.56/27	06.21 20.17	04.32 21.54	02.50 23.39
6	10.11 14.31	08.47 16.12	07.10 17.45	09.29-09.55/26	06.17 20.20	04.28 21.58	02.47 23.42
7	10.09 14.33	08.44 16.16	07.06 17.48	09.29-09.53/24	06.13 20.24	04.25 22.01	02.45 23.45
8	10.08 14.36	08.40 16.19	07.03 17.51	09.31-09.52/21	06.10 20.27	04.21 22.05	02.42 23.48
9	10.06 14.39	08.37 16.23	06.59 17.54	09.32-09.50/18	06.06 20.30	04.18 22.08	02.40 23.50
10	10.04 14.42	08.34 16.26	06.55 17.57	09.35-09.46/11	06.02 20.33	04.14 22.12	02.38 23.53
11	10.01 14.45	08.30 16.30	06.52 18.00		05.59 20.36	04.11 22.15	02.36 23.55
12	09.59 14.48	08.27 16.33	06.48 18.04		05.55 20.39	04.07 22.19	02.34 23.57
13	09.57 14.51	08.24 16.36	06.45 18.07		05.52 20.42	04.04 22.22	02.32 00.00
14	09.55 14.54	08.20 16.40	06.41 18.10		05.48 20.45	04.00 22.25	02.30 00.01
15	09.52 14.57	08.17 16.43	06.37 18.13		05.44 20.49	03.57 22.29	02.29 00.03
16	09.50 15.00	08.13 16.46	06.34 18.16		05.41 20.52	03.53 22.32	02.28 00.05
17	09.47 15.04	08.10 16.50	06.30 18.19		05.37 20.55	03.50 22.36	02.27 00.06
18	09.45 15.07	08.06 16.53	06.26 18.22		05.33 20.58	03.46 22.39	02.26 00.07
19	09.42 15.10	08.03 16.56	06.23 18.25		05.30 21.01	03.43 22.43	02.25 00.08
20	09.39 15.14	07.59 17.00	06.19 18.28	09.41-09.47/6	05.26 21.05	03.40 22.46	02.25 00.09
21	09.36 15.17	07.56 17.03	06.16 18.31	09.37-09.52/15	05.22 21.08	03.36 22.50	02.24 00.09
22	09.34 15.20	07.52 17.06	06.12 18.34	09.35-09.53/18	05.19 21.11	03.33 22.53	02.24 00.09
23	09.31 15.24	07.49 17.10	06.08 18.37	09.33-09.55/22	05.15 21.14	03.29 22.57	02.25 00.09
24	09.28 15.27	07.45 17.13	06.05 18.40	09.31-09.56/25	05.11 21.18	03.26 23.00	02.25 00.09
25	09.25 15.31	07.42 17.16	06.01 18.44	09.30-09.56/26	05.08 21.21	03.23 23.04	02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 18.47	09.29-09.57/28	05.04 21.24	03.20 23.07	02.27 00.07
27	09.19 15.38	07.35 17.23	05.54 18.50	09.29-09.58/29	05.01 21.28	03.17 23.10	02.28 00.07
28	09.16 15.41	07.31 17.26	05.50 18.53	09.29-09.58/29	04.57 21.31	03.13 23.14	02.30 00.05
29	09.13 15.45		06.46 19.56		04.53 21.34	03.10 23.17	02.31 00.04
30	09.10 15.48		06.43 19.59		04.50 21.38	03.07 23.20	02.33 00.02
31	09.06 15.52		06.39 20.02			03.04 23.24	
Potential sun hours	163	235	363	454	578	641	600
Sum of minutes with flicker	0	198	244	0	1	600	

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 5 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (629)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35 05.05-05.26/21 00.01	04.12 22.28	05.52 20.36	07.22 18.47	07.59 15.57	09.39 14.28
2	02.37 05.06-05.26/20 23.59	04.15 22.25	05.55 20.33	07.25 18.43	08.02 15.54	09.42 14.26
3	02.40 05.06-05.26/20 23.57	04.19 22.21	05.58 20.29	07.28 18.40	10.15-10.22/7 08.06	09.45 14.24
4	02.42 05.07-05.26/19 23.55	04.22 22.18	06.01 20.25	07.31 18.36	10.11-10.26/15 08.09	09.48 14.22
5	02.45 05.07-05.25/18 23.52	04.26 22.14	06.04 20.22	07.34 18.32	10.09-10.28/19 08.12	09.51 14.20
6	02.47 05.08-05.25/17 23.50	04.29 22.11	06.07 20.18	07.37 18.29	10.07-10.29/22 08.16	09.53 14.18
7	02.50 05.09-05.25/16 23.47	04.32 22.07	06.10 20.14	07.40 18.25	10.05-10.30/25 08.19	09.56 14.16
8	02.53 05.09-05.24/15 23.45	04.36 22.03	06.13 20.11	07.43 18.22	10.04-10.30/26 08.23	09.59 14.14
9	02.56 05.10-05.24/14 23.42	04.39 22.00	06.16 20.07	07.46 18.18	10.04-10.31/27 08.26	10.01 14.13
10	02.59 05.11-05.23/12 23.39	04.42 21.56	06.19 20.03	07.49 18.14	10.03-10.31/28 08.29	10.03 14.11
11	03.02 05.13-05.22/9 23.37	04.46 21.53	06.22 20.00	07.52 18.11	10.02-10.31/29 08.33	10.06 14.10
12	03.05 05.15-05.20/5 23.34	04.49 21.49	06.25 19.56	07.55 18.07	10.01-10.31/30 08.36	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 19.52	07.58 18.04	10.02-10.31/29 08.40	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 19.49	08.01 18.00	10.01-10.30/29 08.43	10.11 14.07
15	03.14 23.25	04.59 21.38	06.34 19.45	08.04 17.57	10.01-10.29/28 08.46	10.13 14.06
16	03.18 23.22	05.02 21.35	06.37 19.41	08.07 17.53	10.02-10.29/27 08.50	10.15 14.06
17	03.21 23.19	05.05 21.31	06.40 19.38	08.10 17.49	10.02-10.28/26 08.53	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 19.34	08.14 17.46	10.04-10.27/23 08.57	10.17 14.05
19	03.28 23.12	05.12 21.24	06.46 19.31	08.17 17.42	10.04-10.25/21 09.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 19.27	08.20 17.39	10.06-10.24/18 09.03	10.20 14.05
21	03.35 23.06	05.18 21.17	06.52 19.23	08.23 17.35	10.08-10.20/12 09.07	10.20 14.05
22	03.38 23.02	05.21 21.13	06.55 19.20	08.26 17.32	09.10 14.51	10.21 14.06
23	03.41 22.59	05.24 21.09	06.58 19.16	08.30 17.28	09.13 14.48	10.21 14.06
24	03.45 22.56	05.27 21.06	07.01 19.12	08.33 17.25	09.17 14.46	10.22 14.07
25	03.48 22.49	05.31 21.02	07.04 19.09	07.36 16.21	09.20 14.43	10.22 14.08
26	03.52 22.45	05.34 20.55	07.07 19.01	07.39 16.14	09.23 14.38	10.22 14.10
27	03.55 22.42	05.37 20.51	07.10 18.58	07.42 16.11	09.27 14.35	10.22 14.11
28	03.58 22.39	05.40 20.47	07.13 18.54	07.46 16.08	09.30 14.33	10.21 14.13
29	04.02 22.35	05.43 20.44	07.16 18.50	07.49 16.04	09.33 14.30	10.21 14.15
30	04.05 22.32	05.46 20.40	07.19 18.50	07.52 16.01	09.36 14.30	10.20 14.15
31	04.09 22.32	05.49 20.40	07.22 18.50	07.55 16.01	09.39 14.30	10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	186	0	0	441	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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 6 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (630)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
336	290	258	618	1 095	913	457	524	726	653	632	498	7 000

	January	February	March	April	May	June
1	10.18 14.19	09.03 15.55	07.28 17.29	06.35 18.20-18.35/15 20.05	04.46 21.41	03.01 05.35-05.48/13 23.27
2	10.17 14.21	09.00 15.58	07.24 17.32	06.32 18.18-18.36/18 20.08	04.43 21.44	02.58 05.37-05.48/11 23.30
3	10.16 14.23	08.57 16.02	07.21 17.35	06.28 18.17-18.37/20 20.11	04.39 21.48	02.55 05.38-05.46/8 23.33
4	10.14 14.26	08.54 16.05	07.17 08.40-08.50/10 17.39	06.24 18.15-18.37/22 20.14	04.35 21.51	02.53 05.39-05.45/6 23.36
5	10.13 14.28	08.50 16.09	07.13 08.37-08.52/15 17.42	06.21 18.15-18.38/23 20.17	04.32 21.54	02.50 23.39
6	10.11 14.31	08.47 16.12	07.10 08.35-08.53/18 17.45	06.17 18.14-18.38/24 20.20	04.28 21.58	02.47 23.42
7	10.09 14.33	08.44 16.16	07.06 08.34-08.53/19 17.48	06.13 18.14-18.38/24 20.23	04.25 22.01	02.45 23.45
8	10.08 14.36	08.40 16.19	07.03 08.34-08.54/20 17.51	06.10 18.14-18.37/23 20.27	04.21 22.05	02.42 23.48
9	10.06 14.39	08.37 16.23	06.59 08.33-08.54/21 17.54	06.06 18.14-18.37/23 20.30	04.18 22.08	02.40 23.50
10	10.04 14.42	08.34 16.26	06.55 08.32-08.54/22 17.57	06.02 18.14-18.36/22 20.33	04.14 22.12	02.38 23.53
11	10.01 14.45	08.30 16.30	06.52 08.31-08.54/23 18.00	05.59 18.14-18.34/20 20.36	04.11 22.15	02.36 23.55
12	09.59 14.48	08.27 16.33	06.48 08.32-08.54/22 18.04	05.55 18.16-18.33/17 20.39	04.07 05.38-05.44/6 22.18	02.34 23.57
13	09.57 14.51	08.24 16.36	06.45 08.32-08.53/21 18.07	05.51 18.17-18.32/15 20.42	04.04 05.36-05.46/10 22.22	02.32 00.00
14	09.55 14.54	08.20 16.40	06.41 08.32-08.51/19 18.10	05.48 18.19-18.29/10 20.45	04.00 05.34-05.47/13 22.25	02.30 00.01
15	09.52 14.57	08.17 16.43	06.37 08.33-08.50/17 18.13	05.44 20.49	03.57 05.33-05.48/15 22.29	02.29 00.03
16	09.50 15.00	08.13 16.46	06.34 08.35-08.48/13 18.16	05.41 20.52	03.53 05.33-05.49/16 22.32	02.28 00.05
17	09.47 15.04	08.10 16.50	06.30 08.37-08.45/8 18.19	05.37 20.55	03.50 05.32-05.49/17 22.36	02.27 00.06
18	09.44 15.07	08.06 16.53	06.26 18.22	05.33 20.58	03.46 05.31-05.49/18 22.39	02.26 00.07
19	09.42 15.10	08.03 16.56	06.23 18.25	05.30 21.01	03.43 05.31-05.50/19 22.43	02.25 00.08
20	09.39 15.14	07.59 17.00	06.19 18.28	05.26 21.05	03.39 05.31-05.50/19 22.46	02.25 00.09
21	09.36 15.17	07.56 17.03	06.16 18.31	05.22 21.08	03.36 05.31-05.51/20 22.50	02.24 00.09
22	09.33 15.20	07.52 17.06	06.12 18.34	05.19 21.11	03.33 05.31-05.50/19 22.53	02.24 00.09
23	09.31 15.24	07.49 17.10	06.08 18.37	05.15 21.14	03.29 05.31-05.51/20 22.57	02.25 00.09
24	09.28 15.27	07.45 17.13	06.05 18.40	05.11 21.18	03.26 05.32-05.51/19 23.00	02.25 00.09
25	09.25 15.31	07.42 17.16	06.01 18.43	05.08 21.21	03.23 05.31-05.50/19 23.04	02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 18.47	05.04 21.24	03.20 05.32-05.50/18 23.07	02.27 00.07
27	09.19 15.38	07.35 17.23	05.54 18.50	05.01 21.27	03.16 05.32-05.50/18 23.10	02.28 00.06
28	09.16 15.41	07.31 17.26	05.50 18.53	04.57 21.31	03.13 05.33-05.50/17 23.14	02.30 00.05
29	09.13 15.45		06.46 19.56	04.53 21.34	03.10 05.34-05.49/15 23.17	02.31 00.04
30	09.10 15.48		06.43 19.59	04.50 21.37	03.07 05.34-05.49/15 23.20	02.33 00.02
31	09.06 15.51		06.39 18.23-18.33/10 20.02		03.04 05.35-05.48/13 23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	0	258	276	326	38

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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen
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 NO-0213 Oslo
 +47 21 58 60 15
 Helge Dalbu / helge.dalbu@multiconsult.no
 Calculated:
 20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 6 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (630)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 18.14-18.34/20 20.36	07.22 09.11-09.32/21 18.47	07.59 15.57	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 18.12-18.34/22 20.33	07.25 09.10-09.32/22 18.43	08.02 15.54	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 18.11-18.34/23 20.29	07.28 09.10-09.33/23 18.40	08.06 15.51	09.45 14.24
4	02.42 23.55	04.22 22.18	06.01 18.11-18.34/23 20.25	07.31 09.10-09.32/22 18.36	08.09 15.47	09.48 14.22
5	02.44 23.52	04.26 22.14	06.04 18.10-18.34/24 20.22	07.34 09.10-09.31/21 18.32	08.12 15.44	09.51 14.20
6	02.47 23.50	04.29 22.10	06.07 18.10-18.34/24 20.18	07.37 09.10-09.30/20 18.29	08.16 15.41	09.53 14.18
7	02.50 23.47	04.32 22.07	06.10 18.10-18.33/23 20.14	07.40 09.11-09.29/18 18.25	08.19 15.37	09.56 14.16
8	02.53 05.46-05.51/5 23.45	04.36 22.03	06.13 18.11-18.33/22 20.11	07.43 09.11-09.27/16 18.22	08.23 15.34	09.58 14.14
9	02.56 05.45-05.53/8 23.42	04.39 22.00	06.16 18.10-18.31/21 20.07	07.46 09.14-09.26/12 18.18	08.26 15.31	10.01 14.13
10	02.59 05.44-05.54/10 23.39	04.42 21.56	06.19 18.11-18.30/19 20.03	07.49 09.17-09.22/5 18.14	08.29 15.28	10.03 14.11
11	03.02 05.44-05.55/11 23.37	04.46 21.53	06.22 18.12-18.28/16 20.00	07.52 18.11	08.33 15.24	10.05 14.10
12	03.05 05.43-05.56/13 23.34	04.49 21.49	06.25 18.14-18.25/11 19.56	07.55 18.07	08.36 15.21	10.08 14.09
13	03.08 05.42-05.57/15 23.31	04.52 21.45	06.28 19.52	07.58 18.04	08.40 15.18	10.10 14.08
14	03.11 05.43-05.58/15 23.28	04.55 21.42	06.31 19.49	08.01 18.00	08.43 15.15	10.11 14.07
15	03.14 05.42-05.59/17 23.25	04.59 21.38	06.34 19.45	08.04 17.56	08.46 15.12	10.13 14.06
16	03.18 05.42-05.59/17 23.22	05.02 21.35	06.37 19.41	08.07 17.53	08.50 15.09	10.15 14.06
17	03.21 05.41-05.59/18 23.18	05.05 21.31	06.40 19.38	08.10 17.49	08.53 15.06	10.16 14.05
18	03.24 05.42-06.00/18 23.15	05.08 21.27	06.43 19.34	08.14 17.46	08.57 15.03	10.17 14.05
19	03.28 05.41-06.00/19 23.12	05.12 21.24	06.46 19.30	08.17 17.42	09.00 15.00	10.19 14.05
20	03.31 05.42-06.01/19 23.09	05.15 21.20	06.49 19.27	08.20 17.39	09.03 14.57	10.19 14.05
21	03.34 05.41-06.00/19 23.06	05.18 21.16	06.52 19.23	08.23 17.35	09.07 14.54	10.20 14.05
22	03.38 05.42-06.01/19 23.02	05.21 21.13	06.55 19.20	08.26 17.32	09.10 14.51	10.21 14.06
23	03.41 05.41-06.00/19 22.59	05.24 21.09	06.58 19.16	08.29 17.28	09.13 14.48	10.21 14.06
24	03.45 05.42-06.01/19 22.56	05.27 21.06	07.01 19.12	08.33 17.25	09.17 14.46	10.22 14.07
25	03.48 05.41-06.00/19 22.52	05.31 21.02	07.04 19.09	07.36 16.21	09.20 14.43	10.22 14.08
26	03.52 05.42-06.00/18 22.49	05.34 20.58	07.07 09.22-09.24/2 19.05	07.39 16.18	09.23 14.40	10.22 14.09
27	03.55 05.43-06.00/17 22.45	05.37 20.55	07.10 09.17-09.29/12 19.01	07.42 16.14	09.27 14.38	10.22 14.10
28	03.58 05.43-05.59/16 22.42	05.40 20.51	07.13 09.15-09.30/15 18.58	07.46 16.11	09.30 14.35	10.21 14.11
29	04.02 05.44-05.58/14 22.39	05.43 18.20-18.30/10 20.47	07.16 09.13-09.31/18 18.54	07.49 16.08	09.33 14.33	10.21 14.13
30	04.05 05.45-05.57/12 22.35	05.46 18.17-18.32/15 20.44	07.19 09.12-09.32/20 18.50	07.52 16.04	09.36 14.30	10.20 14.15
31	04.09 05.46-05.55/9 22.32	05.49 18.15-18.33/18 20.40		07.56 16.01		10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	366	43	315	180	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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 Helge Dalbu / helge.dalbu@multiconsult.no
 Calculated:
 20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 7 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (631)
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	July	August	September	October	November	December				
1	10.18	09.03	07.28	06.35	04.46	03.01	02.35	04.12	05.52	18.00-18.30/30	07.22	08.47-09.07/20	07.59	09.39		
2	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	18.47	15.57	14.28	14.28		
3	10.17	09.00	07.24	06.32	04.42	02.58	02.37	04.15	05.55	17.59-18.29/30	07.25	08.47-09.06/19	08.02	09.42		
4	14.21	15.58	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	18.43	15.54	14.26	14.26		
5	10.16	08.57	07.21	06.28	18.12-18.24/12	04.39	02.55	02.39	04.19	05.58	17.59-18.28/29	07.28	08.48-09.06/18	08.06	09.45	
6	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.40	18.40	15.51	14.24	14.24		
7	10.14	08.54	07.17	06.24	18.09-18.26/17	04.35	02.53	02.42	04.22	06.01	18.00-18.27/27	07.31	08.48-09.05/17	08.09	09.48	
8	14.26	16.05	17.38	20.14	21.51	23.36	23.55	22.18	20.25	18.36	18.36	15.47	14.22	14.22		
9	10.13	08.50	07.13	06.21	18.07-18.28/21	04.32	02.50	02.44	04.26	06.04	18.00-18.26/26	07.34	08.49-09.04/15	08.12	09.51	
10	14.28	16.09	17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	18.32	15.44	14.20	14.20		
11	10.11	08.47	07.10	06.17	18.05-18.29/24	04.28	02.47	02.47	04.29	06.07	18.01-18.25/24	07.37	08.50-09.02/12	08.16	09.53	
12	14.31	16.12	17.45	20.20	21.58	23.42	23.50	22.10	20.18	18.29	18.29	15.41	14.18	14.18		
13	10.09	08.44	07.06	08.14-08.24/10	06.13	18.04-18.30/26	04.25	02.45	02.50	04.32	06.10	18.02-18.23/21	07.40	08.52-08.59/7	08.19	09.56
14	14.33	16.16	17.48	20.23	22.01	23.45	23.47	22.07	20.14	18.25	18.25	15.37	14.16	14.16		
15	10.08	08.40	07.03	08.12-08.27/15	06.10	18.03-18.30/27	04.21	02.42	02.53	04.36	06.13	18.04-18.21/17	07.43	08.22	09.58	
16	14.36	16.19	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.21	18.21	15.34	14.14	14.14		
17	10.06	08.37	06.59	08.11-08.27/16	06.06	18.02-18.31/29	04.18	02.40	02.56	04.39	06.16	18.05-18.17/12	07.46	08.26	10.01	
18	14.39	16.23	17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	18.18	15.31	14.13	14.13		
19	10.04	08.34	06.55	08.10-08.28/18	06.02	18.01-18.31/30	04.14	02.38	02.59	04.42	06.19	07.49	08.29	10.03		
20	14.42	16.26	17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	18.14	15.28	14.11	14.11		
21	10.01	08.30	06.52	08.09-08.27/18	05.59	18.00-18.30/30	04.10	02.36	03.02	04.46	06.22	07.52	08.33	10.05		
22	14.45	16.30	18.00	20.36	22.15	23.55	23.37	21.53	20.00	18.11	18.11	15.24	14.10	14.10		
23	09.59	08.27	06.48	08.09-08.28/19	05.55	18.00-18.30/30	04.07	02.34	03.05	04.49	06.25	07.55	08.36	10.08		
24	14.48	16.33	18.04	20.39	22.18	23.57	23.34	21.49	20.19	18.07	18.07	15.21	14.09	14.09		
25	09.57	08.24	06.45	08.08-08.27/19	05.51	18.01-18.31/30	04.03	02.32	03.08	04.52	06.28	07.58	08.40	10.10		
26	14.51	16.36	18.07	20.42	22.22	24.00	23.31	21.45	20.18	18.04	18.04	15.18	14.08	14.08		
27	09.55	08.20	06.41	08.08-08.27/19	05.48	18.00-18.30/30	04.00	02.30	03.11	04.55	06.31	08.01	08.43	10.11		
28	14.54	16.40	18.10	20.45	22.25	24.01	23.28	21.42	20.19	18.00	18.00	15.15	14.07	14.07		
29	09.52	08.17	06.37	08.08-08.25/17	05.44	18.01-18.29/28	03.57	02.29	03.14	04.59	06.34	08.04	08.46	10.13		
30	14.57	16.43	18.13	20.49	22.29	24.03	23.25	21.38	20.15	18.05	18.05	15.12	14.06	14.06		
31	09.50	08.13	06.34	08.10-08.25/15	05.40	18.01-18.28/27	03.53	02.28	03.18	05.02	06.37	08.07	08.50	10.15		
1	15.00	16.46	18.16	20.52	22.32	24.05	23.22	21.35	20.11	18.07	18.07	15.09	14.06	14.06		
2	09.47	08.10	06.30	08.11-08.22/11	05.37	18.01-18.28/27	03.50	02.26	03.21	05.05	06.40	08.10	08.53	10.16		
3	15.03	16.50	18.19	20.55	22.36	24.06	23.18	21.31	20.13	18.08	18.08	15.06	14.05	14.05		
4	09.44	08.06	06.26	08.14-08.18/4	05.33	18.02-18.26/24	03.46	02.26	03.24	05.08	06.43	08.14	08.57	10.17		
5	15.07	16.53	18.22	20.58	22.39	24.07	23.15	21.27	20.14	18.09	18.09	15.03	14.05	14.05		
6	09.42	08.03	06.23	05.30	18.03-18.25/22	03.43	02.25	03.28	05.12	06.46	08.17	08.17	09.00	10.19		
7	15.10	16.56	18.25	21.01	22.43	24.08	23.12	21.24	20.13	18.10	18.10	15.00	14.05	14.05		
8	09.39	07.59	06.19	05.26	18.05-18.24/19	03.39	02.25	03.31	05.15	06.49	08.20	09.03	10.19	10.19		
9	15.13	17.00	18.28	21.05	22.46	24.09	23.09	21.20	20.12	18.11	18.11	14.57	14.05	14.05		
10	09.36	07.56	06.15	05.22	18.06-18.21/15	03.36	02.24	03.34	05.18	18.14-18.23/9	06.52	08.23	09.07	10.20		
11	15.17	17.03	18.31	21.08	22.50	24.09	23.06	21.16	20.13	18.12	18.12	14.54	14.05	14.05		
12	09.33	07.52	06.12	05.19	18.10-18.17/7	03.33	02.24	03.38	05.21	18.10-18.26/16	06.55	08.26	09.10	10.21		
13	15.20	17.06	18.34	21.11	22.53	24.09	23.02	21.13	20.14	18.13	18.13	14.51	14.06	14.06		
14	09.31	07.49	06.08	05.15	03.29	02.25	03.41	05.24	18.08-18.27/19	06.58	08.29	09.13	10.21	10.21		
15	15.24	17.10	18.37	21.14	22.57	24.09	22.59	21.09	20.15	18.14	18.14	14.48	14.06	14.06		
16	09.28	07.45	06.05	05.11	03.26	02.25	03.45	05.27	18.07-18.29/22	07.01	08.33	09.17	10.22	10.22		
17	15.27	17.13	18.40	21.18	23.00	24.09	22.56	21.06	20.16	18.15	18.15	14.46	14.07	14.07		
18	09.25	07.42	06.01	05.08	03.23	02.26	03.48	05.31	18.05-18.30/25	07.04	08.36	09.20	10.22	10.22		
19	15.31	17.16	18.43	21.21	23.04	24.08	22.52	21.02	20.17	18.16	18.16	14.43	14.08	14.08		
20	09.22	07.38	05.57	05.04	03.20	02.27	03.52	05.34	18.04-18.30/26	07.07	08.54-09.03/9	07.39	09.23	10.22		
21	15.34	17.19	18.47	21.24	23.07	24.07	22.49	20.58	20.18	18.17	18.17	14.40	14.09	14.09		
22	09.19	07.35	05.54	05.01	03.16	02.28	03.55	05.37	18.02-18.30/28	07.10	08.52-09.05/13	07.42	09.26	10.22		
23	15.38	17.23	18.50	21.27	23.10	24.06	22.45	20.55	20.19	18.18	18.18	14.38	14.10	14.10		
24	09.16	07.31	05.50	04.57	03.13	02.30	03.58	05.40	18.01-18.30/29	07.13	08.50-09.06/16	07.46	09.30	10.21		
25	15.41	17.26	18.53	21.31	23.14	24.05	22.42	20.51	20.19	18.18	18.18	14.35	14.11	14.11		
26	09.13	07.28	05.47	04.53	03.10	02.31	04.02	05.43	18.01-18.30/29	07.16	08.49-09.07/18	07.49	09.33	10.21		
27	15.44	17.29	18.56	21.34	23.17	24.04	22.39	20.47	20.20	18.19	18.19	14.33	14.13	14.13		
28	09.09	07.24	05.43	04.50	03.07	02.33	04.05	05.46	18.01-18.30/29	07.19	08.48-09.07/19	07.52	09.36	10.20		
29	15.48	17.33	18.59	21.37	23.20	24.02	22.35	20.44	20.21	18.20	18.20	14.30	14.15	14.15		
30	09.06	07.21	05.40	04.47	03.04	02.30	04.09	05.49	18.00-18.30/30	07.22	08.51-09.08/14	07.56	09.40	10.19		
31	15.51	17.36	19.02	21.40	23.24	24.05	22.32	20.40	20.22	18.21	18.21	14.31	14.16	14.16		
Potential sun hours	163	235	363	454	578	641	620	513	394	291	302	192	125	125		
Sum of minutes with flicker	0	0	181	475	0	0	0	262								

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen
 Nedre Skøyen vei 2
 NO-0213 Oslo
 +47 21 58 60 15
 Helge Dalbu / helge.dalbu@multiconsult.no
 Calculated:
 20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 8 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (632)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June
1	10.18 14.19	09.03 12.28-12.40/12 15.55	07.28 17.29	06.35 20.05	04.46 18.31-18.59/28 21.41	03.01 18.45-18.49/4 23.27
2	10.17 14.21	09.00 12.27-12.42/15 15.58	07.24 17.32	06.32 20.08	04.42 18.29-18.59/30 21.44	02.58 23.30
3	10.16 14.23	08.57 12.26-12.43/17 16.02	07.20 17.35	06.28 20.11	04.39 18.28-19.00/32 21.48	02.55 23.33
4	10.14 14.25	08.54 12.25-12.43/18 16.05	07.17 17.38	06.24 20.14	04.35 18.28-19.01/33 21.51	02.53 23.36
5	10.13 14.28	08.50 12.25-12.43/18 16.09	07.13 17.42	06.21 20.17	04.32 18.27-19.01/34 21.54	02.50 23.39
6	10.11 14.30	08.47 12.24-12.44/20 16.12	07.10 17.45	06.17 20.20	04.28 18.26-19.02/36 21.58	02.47 23.42
7	10.09 14.33	08.44 12.24-12.44/20 16.16	07.06 17.48	06.13 20.23	04.25 18.26-19.02/36 22.01	02.45 23.45
8	10.08 14.36	08.40 12.25-12.44/19 16.19	07.03 17.51	06.10 20.27	04.21 18.26-19.02/36 22.05	02.42 23.48
9	10.06 14.39	08.37 12.25-12.44/19 16.23	06.59 17.54	06.06 20.30	04.18 18.26-19.02/36 22.08	02.40 23.50
10	10.04 14.42	08.34 12.25-12.44/19 16.26	06.55 17.57	06.02 20.33	04.14 18.25-19.03/38 22.12	02.38 23.53
11	10.01 14.45	08.30 12.26-12.43/17 16.29	06.52 18.00	05.59 20.36	04.10 18.25-19.02/37 22.15	02.36 23.55
12	09.59 14.48	08.27 12.28-12.43/15 16.33	06.48 18.04	05.55 20.39	04.07 18.25-19.02/37 22.18	02.34 23.57
13	09.57 14.51	08.24 12.30-12.41/11 16.36	06.45 18.07	05.51 20.42	04.03 18.26-19.03/37 22.22	02.32 00.00
14	09.55 14.54	08.20 12.32-12.38/6 16.40	06.41 18.10	05.48 20.45	04.00 18.26-19.03/37 22.25	02.30 00.01
15	09.52 14.57	08.17 16.43	06.37 18.13	05.44 20.49	03.56 18.26-19.02/36 22.29	02.29 00.03
16	09.50 15.00	08.13 16.46	06.34 18.16	05.40 20.52	03.53 18.26-19.02/36 22.32	02.27 00.05
17	09.47 15.03	08.10 16.50	06.30 07.40-07.50/10 18.19	05.37 20.55	03.50 18.27-19.02/35 22.36	02.26 00.06
18	09.44 15.07	08.06 16.53	06.26 07.38-07.51/13 18.22	05.33 20.58	03.46 18.27-19.01/34 22.39	02.26 00.07
19	09.42 15.10	08.03 16.56	06.23 07.37-07.53/16 18.25	05.30 21.01	03.43 18.27-19.01/34 22.43	02.25 00.08
20	09.39 15.13	07.59 17.00	06.19 07.36-07.53/17 18.28	05.26 21.05	03.39 18.29-19.01/32 22.46	02.24 00.09
21	09.36 15.17	07.56 17.03	06.15 07.35-07.53/18 18.31	05.22 21.08	03.36 18.29-19.00/31 22.50	02.24 00.09
22	09.33 15.20	07.52 17.06	06.12 07.35-07.53/18 18.34	05.19 21.11	03.33 18.30-19.00/30 22.53	02.24 00.09
23	09.31 15.24	07.49 17.10	06.08 07.35-07.52/17 18.37	05.15 21.14	03.29 18.31-19.00/29 22.57	02.25 00.09
24	09.28 15.27	07.45 17.13	06.05 07.34-07.51/17 18.40	05.11 21.18	03.26 18.31-18.58/27 23.00	02.25 00.09
25	09.25 15.31	07.42 17.16	06.01 07.36-07.51/15 18.43	05.08 21.21	03.23 18.33-18.58/25 23.04	02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 07.36-07.49/13 18.47	05.04 21.24	03.20 18.34-18.58/24 23.07	02.27 00.07
27	09.19 15.37	07.35 17.23	05.54 07.38-07.46/8 18.50	05.00 18.38-18.51/13 21.27	03.16 18.35-18.57/22 23.10	02.28 00.07
28	09.16 15.41	07.31 17.26	05.50 18.53	04.57 18.35-18.54/19 21.31	03.13 18.37-18.56/19 23.14	02.30 00.05
29	09.13 15.44		06.46 19.56	04.53 18.33-18.56/23 21.34	03.10 18.38-18.55/17 23.17	02.31 00.04
30	09.09 15.48		06.43 19.59	04.50 18.32-18.58/26 21.37	03.07 18.40-18.54/14 23.20	02.33 00.02
31	09.06 15.51	12.30-12.38/8	06.39 20.02		03.04 18.42-18.52/10 23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	8	226	162	81	942	4

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 8 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (632)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35	04.12 18.36-19.13/37	05.52	07.22	07.59 11.56-12.14/18	09.39
	00.01	22.28	20.36	18.47	15.57	14.28
2	02.37	04.15 18.36-19.13/37	05.55	07.25	08.02 11.55-12.14/19	09.42
	23.59	22.25	20.33	18.43	15.54	14.26
3	02.39	04.19 18.35-19.12/37	05.58	07.28	08.06 11.55-12.15/20	09.45
	23.57	22.21	20.29	18.40	15.51	14.24
4	02.42	04.22 18.36-19.12/36	06.01	07.31	08.09 11.55-12.15/20	09.48
	23.55	22.18	20.25	18.36	15.47	14.22
5	02.44	04.26 18.36-19.12/36	06.04	07.34	08.12 11.55-12.14/19	09.51
	23.52	22.14	20.22	18.32	15.44	14.20
6	02.47	04.29 18.36-19.12/36	06.07	07.37	08.16 11.55-12.14/19	09.53
	23.50	22.10	20.18	18.29	15.41	14.18
7	02.50	04.32 18.37-19.12/35	06.10	07.40	08.19 11.55-12.13/18	09.56
	23.47	22.07	20.14	18.25	15.37	14.16
8	02.53	04.36 18.36-19.10/34	06.13	07.43	08.22 11.56-12.12/16	09.58
	23.45	22.03	20.11	18.21	15.34	14.14
9	02.56	04.39 18.37-19.10/33	06.16	07.46	08.26 11.58-12.12/14	10.01
	23.42	22.00	20.07	18.18	15.31	14.13
10	02.59	04.42 18.37-19.09/32	06.19	07.49	08.29 11.59-12.11/12	10.03
	23.39	21.56	20.03	18.14	15.28	14.11
11	03.02	04.46 18.38-19.08/30	06.22	07.52	08.33 12.01-12.08/7	10.05
	23.37	21.53	20.00	18.11	15.24	14.10
12	03.05 18.51-18.59/8	04.49 18.39-19.07/28	06.25	07.55	08.36	10.08
	23.34	21.49	19.56	18.07	15.21	14.09
13	03.08 18.49-19.01/12	04.52 18.41-19.06/25	06.28	07.58	08.40	10.10
	23.31	21.45	19.52	18.04	15.18	14.08
14	03.11 18.47-19.02/15	04.55 18.41-19.03/22	06.31	08.01	08.43	10.11
	23.28	21.42	19.49	18.00	15.15	14.07
15	03.14 18.45-19.04/19	04.59 18.43-19.01/18	06.34	08.04	08.46	10.13
	23.25	21.38	19.45	17.56	15.12	14.06
16	03.18 18.45-19.06/21	05.02 18.46-18.58/12	06.37 08.28-08.34/6	08.07	08.50	10.15
	23.22	21.35	19.41	17.53	15.09	14.06
17	03.21 18.44-19.06/22	05.05	06.40 08.25-08.37/12	08.10	08.53	10.16
	23.18	21.31	19.38	17.49	15.06	14.05
18	03.24 18.42-19.07/25	05.08	06.43 08.24-08.38/14	08.14	08.57	10.17
	23.15	21.27	19.34	17.46	15.03	14.05
19	03.28 18.42-19.08/26	05.12	06.46 08.21-08.38/17	08.17	09.00	10.19
	23.12	21.24	19.30	17.42	15.00	14.05
20	03.31 18.41-19.09/28	05.15	06.49 08.21-08.38/17	08.20	09.03	10.19
	23.09	21.20	19.27	17.39	14.57	14.05
21	03.34 18.41-19.10/29	05.18	06.52 08.20-08.38/18	08.23	09.07	10.20
	23.06	21.16	19.23	17.35	14.54	14.05
22	03.38 18.39-19.10/31	05.21	06.55 08.20-08.38/18	08.26	09.10	10.21
	23.02	21.13	19.19	17.32	14.51	14.06
23	03.41 18.39-19.11/32	05.24	06.58 08.20-08.37/17	08.29	09.13	10.21
	22.59	21.09	19.16	17.28	14.48	14.06
24	03.45 18.38-19.11/33	05.27	07.01 08.20-08.36/16	08.33	09.17	10.22
	22.56	21.06	19.12	17.25	14.46	14.07
25	03.48 18.38-19.12/34	05.31	07.04 08.21-08.35/14	07.36	09.20	10.22
	22.52	21.02	19.09	16.21	14.43	14.08
26	03.51 18.38-19.12/34	05.34	07.07 08.22-08.33/11	07.39	09.23	10.22
	22.49	20.58	19.05	16.18	14.40	14.09
27	03.55 18.37-19.12/35	05.37	07.10 08.24-08.30/6	07.42	09.26	10.22
	22.45	20.55	19.01	16.14	14.38	14.10
28	03.58 18.37-19.13/36	05.40	07.13	07.46 12.00-12.08/8	09.30	10.21
	22.42	20.51	18.58	16.11	14.35	14.11
29	04.02 18.37-19.13/36	05.43	07.16	07.49 11.58-12.11/13	09.33	10.21
	22.39	20.47	18.54	16.07	14.33	14.13
30	04.05 18.36-19.13/37	05.46	07.19	07.52 11.57-12.12/15	09.36	10.20
	22.35	20.44	18.50	16.04	14.30	14.14
31	04.09 18.36-19.13/37	05.49		07.56 11.56-12.13/17		10.19
	22.32	20.40		16.01		14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	550	488	166	53	182	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:

Hundhammerfjellet Reetablering

NTE Energi AS

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Calculated:
20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6**WTG:** 9 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (633)
Assumptions for shadow calculations Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	July	August	September	October	November	December		
1 10.18	09.03	12.44-12.55/11	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	12.11-12.30/19	09.39	
1 14.19	15.55		17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57	11.21-11.42/21	14.28	
2 10.17	09.00	12.43-12.57/14	07.24	06.32	04.42	02.58	02.37	04.15	05.55	07.25	08.02	12.10-12.30/20	09.42	
2 14.21	15.58		17.32	20.08	21.44	23.30	02.39	22.25	20.33	18.43	15.54	11.22-11.42/20	14.26	
3 10.16	08.57	12.42-12.58/16	07.20	06.28	04.39	02.55	02.39	04.19	05.58	07.28	08.06	12.10-12.30/20	09.45	
3 14.23	16.02		17.35	20.11	21.48	23.33	02.37	22.21	20.29	18.39	15.50	11.23-11.41/18	14.24	
4 10.14	08.54	12.41-12.58/17	07.17	06.24	04.35	02.53	02.42	04.22	06.01	07.31	08.09	12.10-12.30/20	09.48	
4 14.25	16.05	11.58-12.03/5	17.38	20.14	21.51	23.36	02.42	22.18	20.25	18.36	15.47	11.23-11.40/17	14.22	
5 10.13	08.50	12.40-12.59/19	07.13	06.21	04.32	02.50	02.44	04.26	06.04	07.34	08.12	12.10-12.30/20	09.51	
5 14.28	16.09	11.55-12.07/12	17.42	20.17	21.54	23.39	02.42	22.14	20.22	18.32	15.44	11.25-11.39/14	14.20	
6 10.11	08.47	12.40-12.59/19	07.10	06.17	04.28	02.47	02.47	04.29	06.07	07.37	08.16	12.11-12.29/18	09.53	
6 14.30	16.12	11.54-12.09/15	17.45	20.20	21.58	23.42	02.50	22.10	20.18	18.29	15.41	11.26-11.37/11	14.18	
7 10.09	08.44	12.40-13.00/20	07.06	06.13	04.25	02.45	02.50	04.32	06.10	07.40	08.19	12.11-12.29/18	09.56	
7 14.33	16.16	11.53-12.10/17	17.48	20.23	22.01	23.45	02.47	22.07	20.14	18.25	15.37	11.30-11.33/3	14.16	
8 10.08	08.40	12.40-13.00/20	07.03	06.10	04.21	02.42	02.53	04.36	06.13	07.43	08.22	12.12-12.28/16	09.58	
8 14.36	16.19	11.52-12.11/19	17.51	20.27	22.05	23.48	02.45	22.03	20.11	18.21	15.34		14.14	
9 10.06	08.37	12.40-13.00/20	06.59	06.06	04.17	02.40	02.55	04.39	06.16	07.46	08.26	12.14-12.27/13	10.01	
9 14.39	16.23	11.51-12.12/21	17.54	20.30	22.08	23.50	02.42	22.00	20.07	18.18	15.31		14.13	
10 10.04	08.34	12.41-12.59/18	06.55	06.02	04.14	02.38	02.58	04.42	06.19	07.49	08.29	12.15-12.26/11	10.03	
10 14.42	16.26	11.51-12.12/21	17.57	20.33	22.12	23.53	02.39	21.56	20.03	18.14	15.27		14.11	
11 10.01	08.30	12.41-12.59/18	06.52	05.59	04.10	02.36	03.02	04.46	06.22	07.52	08.33	12.17-12.23/6	10.05	
11 14.44	16.29	11.51-12.12/21	18.00	20.36	22.15	23.55	02.37	21.53	20.00	18.11	15.24		14.10	
12 09.59	08.27	12.42-12.58/16	06.48	05.55	04.07	02.34	05.04-05.05/1	03.05	04.49	06.25	07.55	08.36	10.08	
12 14.48	16.33	11.52-12.13/21	18.03	20.39	22.18	23.58	02.34	21.49	19.56	18.07	15.21		14.09	
13 09.57	08.23	12.44-12.57/13	06.45	05.51	04.03	02.32	05.02-05.06/4	03.08	04.52	06.28	07.58	08.40	10.10	
13 14.51	16.36	11.52-12.13/21	18.07	20.42	22.22	00.00	02.31	21.45	19.52	18.04	15.18		14.08	
14 09.55	08.20	12.47-12.55/8	06.41	05.48	04.00	02.30	05.02-05.08/6	03.11	04.55	06.31	08.01	08.43	10.11	
14 14.54	16.40	11.52-12.13/21	18.10	20.45	22.25	00.01	02.38	21.42	19.49	18.00	15.15		14.07	
15 09.52	08.17	11.52-12.12/20	06.37	05.44	03.56	02.29	05.01-05.08/7	03.14	04.59	06.34	08.04	08.46	10.13	
15 14.57	16.43		18.13	20.49	22.29	00.03	02.35	21.38	19.45	17.56	15.12		14.06	
16 09.50	08.13	11.53-12.11/18	06.34	05.40	03.53	02.27	05.01-05.09/8	03.18	05.02	06.37	08.07	08.50	10.15	
16 15.00	16.46		18.16	20.52	22.32	00.05	02.32	21.35	19.41	17.53	15.09		14.06	
17 09.47	08.10	11.54-12.10/16	06.30	05.37	03.50	02.26	05.00-05.09/9	03.21	05.05	06.40	08.10	08.53	10.16	
17 15.03	16.50		18.19	20.55	22.36	00.06	02.38	21.31	19.38	17.49	15.06		14.05	
18 09.44	08.06	11.55-12.08/13	06.26	05.33	03.46	02.25	05.00-05.10/10	03.24	05.08	06.43	08.14	08.57	10.17	
18 15.07	16.53		18.22	20.58	22.39	00.07	02.35	21.27	19.34	17.46	15.03		14.05	
19 09.42	08.03	11.58-12.05/7	06.23	05.29	03.43	02.25	05.01-05.10/9	03.28	05.12	06.46	08.17	09.00	10.19	
19 15.10	16.56		18.25	21.01	22.43	00.08	02.32	21.24	19.30	17.42	15.00		14.05	
20 09.39	07.59		06.19	05.26	03.39	02.24	05.01-05.10/9	03.31	05.15	06.49	08.20	09.03	10.19	
20 15.13	17.00		18.28	21.05	22.46	00.09	02.30	21.20	19.27	17.39	14.57		14.05	
21 09.36	07.56		06.15	05.22	03.36	02.24	05.01-05.11/10	03.34	05.18	06.52	08.23	09.07	10.20	
21 15.17	17.03		18.31	21.08	22.50	00.09	02.36	21.16	19.23	17.35	14.54		14.05	
22 09.33	07.52		06.12	05.19	03.33	02.24	05.02-05.12/10	03.38	05.21	06.55	08.26	09.10	10.21	
22 15.20	17.06		18.34	21.11	22.53	00.09	02.32	21.13	19.19	17.32	14.51		14.05	
23 09.31	07.49		06.08	05.15	03.29	02.25	05.02-05.11/9	03.41	05.24	06.58	08.29	12.27-12.36/9	09.13	
23 15.24	17.10		18.37	21.14	22.57	00.09	02.39	21.09	19.16	17.28	14.48		14.06	
24 09.28	07.45		06.05	05.11	03.26	02.25	05.01-05.11/10	03.45	05.27	07.01	08.33	12.25-12.39/14	09.17	
24 15.27	17.13		18.40	21.18	23.00	00.09	02.36	21.06	19.12	17.25	14.46		14.07	
25 09.25	07.42		06.01	05.08	03.23	02.26	05.02-05.11/9	03.48	05.30	07.04	07.36	11.24-11.40/16	09.20	
25 15.31	17.16		18.43	21.21	23.04	00.08	02.32	21.02	19.09	16.21	14.43		14.08	
26 09.22	07.38		05.57	05.04	03.20	02.27	05.03-05.12/9	03.51	05.34	07.07	07.39	11.22-11.40/18	09.23	
26 15.34	17.19		18.46	21.24	23.07	00.08	02.49	20.58	19.05	16.18	14.40		14.09	
27 09.19	07.35		05.54	05.00	03.16	02.28	05.03-05.11/8	03.55	05.37	07.10	07.42	11.21-11.41/20	09.26	
27 15.37	17.22		18.50	21.27	23.10	00.07	02.45	20.55	19.01	16.14	14.38		14.10	
28 09.16	07.31		05.50	04.57	03.13	02.29	05.04-05.11/7	03.58	05.40	07.13	07.46	12.15-12.25/10	09.30	
28 15.41	17.26		18.53	21.31	23.14	00.05	02.42	20.51	18.58	16.11	11.21-11.42/21	14.35	14.11	
29 09.13			06.46	04.53	03.10	02.31	05.05-05.10/5	04.02	05.43	07.16	07.49	12.13-12.27/14	09.33	10.21
29 15.44			19.56	21.34	23.17	00.04	02.39	20.47	18.54	16.07	11.21-11.42/21	14.33	14.13	
30 09.09			06.43	04.50	03.07	02.33	05.06-05.09/3	04.05	05.46	07.19	07.52	12.12-12.28/16	09.36	10.20
30 15.48			19.59	21.37	23.20	00.02	02.35	20.44	18.50	16.04	11.21-11.42/21	14.30	14.14	
31 09.06	12.46-12.52/6		06.39		03.04		04.09	05.49		07.56	12.12-12.29/18		10.19	
31 15.51			20.02		23.24		02.32	20.40		16.01	11.21-11.42/21		14.16	
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125	0	
Sum of minutes with flicker	6	497	0	0	0	143	0	0	0	219	285	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

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Helge Dalbu / helge.dalbu@multiconsult.no
Calculated:
20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6WTG: 10 - VESTAS V136-4.2 4200 136.0 IOI hub: 90,0 m (TOT: 158,0 m) (634)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1095 913 457 524 726 653 632 498 7000

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.18	09.03 12.10-12.27/17	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59 11.38-11.59/21	09.39
	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57 10.42-11.03/21	14.28
2	10.17	09.00 12.09-12.28/19	07.24	06.32	04.42	02.58	02.37	04.15	05.55	07.25	08.02 11.38-12.00/22	09.42
	14.21	15.58	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54 10.42-11.03/21	14.26
3	10.16	08.57 12.09-12.29/20	07.20	06.28	04.39	02.55	02.39	04.19	05.58	07.28	08.06 11.38-12.00/22	09.45
	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.39	15.50 10.43-11.02/19	14.24
4	10.14	08.54 12.07-12.28/21	07.17	06.24	04.35	02.52	02.42	04.22	06.01	07.31	08.09 11.38-12.00/22	09.48
	14.25	16.05	17.38	20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47 10.44-11.00/16	14.22
5	10.13	08.50 12.07-12.29/22	07.13	06.21	04.32	02.50	02.44	04.25	06.04	07.34	08.12 11.38-12.00/22	09.51
	14.28	16.09 11.18-11.26/8	17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44 10.46-10.59/13	14.20
6	10.11	08.47 12.07-12.29/22	07.10	06.17	04.28	02.47	02.47	04.29	06.07	07.37	08.16 11.38-12.00/22	09.53
	14.30	16.12 11.15-11.28/13	17.45	20.20	21.58	23.42	23.50	22.10	20.18	18.29	15.40 10.48-10.56/8	14.18
7	10.09	08.44 12.07-12.29/22	07.06	06.13	04.25	02.45	02.50	04.32	06.10	07.40	08.19 11.38-11.59/21	09.58
	14.33	16.16 11.14-11.30/16	17.48	20.23	22.01	23.45	23.47	22.07	20.14	18.25	15.37	14.16
8	10.08	08.40 12.07-12.29/22	07.03	06.10	04.21	02.42	02.53	04.36	06.13	07.43	08.22 11.38-11.58/20	09.58
	14.36	16.19 11.13-11.31/18	17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.21	15.34	14.14
9	10.06	08.37 12.08-12.29/21	06.59	06.06	04.17	02.40	02.55	04.39	06.16	07.46	08.26 11.40-11.58/18	10.01
	14.39	16.23 11.12-11.32/20	17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31	14.13
10	10.04	08.34 12.08-12.29/21	06.55	06.02	04.14	02.38	02.58	04.42	06.19	07.49	08.29 11.40-11.57/17	10.02
	14.41	16.26 11.11-11.33/22	17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.27	14.11
11	10.01	08.30 12.09-12.28/19	06.52	05.59	04.10	02.35	03.02	04.46	06.22	07.52	08.33 11.41-11.56/15	10.05
	14.44	16.29 11.11-11.33/22	18.00	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24	14.10
12	09.59	08.27 12.10-12.27/17	06.48	05.55	04.07	02.34	03.05	04.49	06.25	07.55	08.36 11.44-11.55/11	10.08
	14.47	16.33 11.11-11.35/24	18.03	20.39	22.18	23.58	23.34	21.49	19.56	18.07	15.21	14.09
13	09.57	08.23 12.12-12.27/15	06.44	05.51	04.03	02.32	03.08	04.52	06.28	07.58	08.40 11.46-11.51/5	10.10
	14.51	16.36 11.11-11.35/24	18.07	20.42	22.22	00.00	23.31	21.45	19.52	18.04	15.18	14.08
14	09.55	08.20 12.14-12.24/10	06.41	05.48	04.00	02.30	03.11	04.55	06.31	08.01	08.43	10.11
	14.54	16.40 11.11-11.35/24	18.10	20.45	22.25	00.02	23.28	21.42	19.49	18.00	15.15	14.07
15	09.52	08.17 11.11-11.34/23	06.37	05.44	03.56	02.29	03.14	04.59	06.34	08.04	08.46	10.13
	14.57	16.43	18.13	20.49	22.29	00.03	23.25	21.38	19.45	17.56	15.12	14.06
16	09.50	08.13 11.12-11.34/22	06.34	05.40	03.53	02.27	03.18	05.02	06.37	08.07	08.50	10.15
	15.00	16.46	18.16	20.52	22.32	00.05	23.22	21.35	19.41	17.53	15.09	14.06
17	09.47	08.10 11.12-11.33/21	06.30	05.37	03.50	02.26	03.21	05.05	06.40	08.10	08.53	10.16
	15.03	16.50	18.19	20.55	22.36	00.06	23.19	21.31	19.38	17.49	15.06	14.05
18	09.44	08.06 11.13-11.32/19	06.26	05.33	03.46	02.25	03.24	05.08	06.43	08.14	08.57	10.17
	15.07	16.53	18.22	20.58	22.39	00.07	23.15	21.27	19.34	17.46	15.03	14.05
19	09.42	08.03 11.14-11.30/16	06.23	05.29	03.43	02.25	03.28	05.11	06.46	08.17	09.00	10.19
	15.10	16.56	18.25	21.01	22.43	00.08	23.12	21.24	19.30	17.42	15.00	14.05
20	09.39	07.59 11.15-11.28/13	06.19	05.26	03.39	02.24	03.31	05.15	06.49	08.20	09.03	10.20
	15.13	17.00	18.28	21.05	22.46	00.09	23.09	21.20	19.27	17.39	14.57	14.05
21	09.36	07.56 11.20-11.25/5	06.15	05.22	03.36	02.24	03.34	05.18	06.52	08.23 11.48-11.57/9	09.07	10.20
	15.17	17.03	18.31	21.08	22.50	00.09	23.06	21.16	19.23	17.35	14.54	14.05
22	09.33	07.52	06.12	05.19	03.33	02.24	03.38	05.21	06.55	08.26 11.46-12.00/14	09.10	10.21
	15.20	17.06	18.34	21.11	22.53	00.09	23.02	21.13	19.19	17.32	14.51	14.05
23	09.31	07.49	06.08	05.15	03.29	02.24	03.41	05.24	06.58	08.29 11.43-12.01/18	09.13	10.21
	15.24	17.09	18.37	21.14	22.57	00.09	22.59	21.09	19.16	17.28	14.48	14.06
24	09.28	07.45	06.04	05.11	03.26	02.25	03.45	05.27	07.01	08.33 11.42-12.02/20	09.17	10.22
	15.27	17.13	18.40	21.18	23.00	00.09	22.56	21.06	19.12	17.25	14.45	14.07
25	09.25	07.42	06.01	05.08	03.23	02.26	03.48	05.30	07.04	07.36 10.42-11.03/21	09.20	10.22
	15.30	17.16	18.43	21.21	23.04	00.08	22.52	21.02	19.09	16.21	14.43	14.08
26	09.22	07.38	05.57	05.04	03.20	02.27	03.51	05.34	07.07	07.39 10.41-11.03/22	09.23	10.22
	15.34	17.19	18.46	21.24	23.07	00.08	22.49	20.58	19.05	16.18	14.40	14.09
27	09.19	07.35	05.54	05.00	03.16	02.28	03.55	05.37	07.10	07.42 11.47-11.49/2	09.26	10.22
	15.37	17.22	18.50	21.27	23.10	00.07	22.45	20.55	19.01	16.14 10.40-11.03/23	14.38	14.10
28	09.16	07.31	05.50	04.57	03.13	02.29	03.58	05.40	07.13	07.46 11.43-11.54/11	09.30	10.21
	15.41	17.26	18.53	21.31	23.14	00.05	22.42	20.51	18.58	16.11 10.40-11.04/24	14.35	14.11
29	09.13 12.14-12.20/6	06.46	04.53	03.10	02.31	04.02	05.43	07.16	07.49	11.41-11.56/15	09.33	10.21
	15.44	19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.07	10.40-11.04/24	14.33	14.13
30	09.09 12.12-12.23/11	06.43	04.50	03.07	02.33	04.05	05.46	07.19	07.52	11.40-11.57/17	09.36	10.20
	15.48	19.59	21.37	23.20	00.02	22.35	20.44	18.50	16.04	10.41-11.04/23	14.30	14.14
31	09.06 12.10-12.25/15	06.39	03.04	03.04	00.00	04.09	05.49	07.56	07.56	11.39-11.58/19	09.36	10.19
	15.51	20.02	23.24	23.24	00.00	22.32	20.40	18.50	16.01	10.41-11.04/23	14.30	14.16
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	125
Sum of minutes with flicker	32	578	0	0	0	0	0	0	0	285	335	0

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 11 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (635)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June
1	10.18 14.19	09.03 15.55	07.28 17.29	06.35 17.30-17.53/23 20.05	04.46 21.41	03.01 23.27
2	10.17 14.21 14.23	09.00 11.31-11.40/9 15.58	07.24 17.32	06.32 17.31-17.51/20 20.08	04.42 21.44	02.58 23.30
3	10.16 14.23	08.57 11.29-11.43/14 16.02	07.20 17.35	06.28 17.33-17.50/17 20.11	04.39 21.48	02.55 23.33
4	10.14 14.25	08.53 11.27-11.44/17 16.05	07.17 17.38	06.24 17.34-17.47/13 20.14	04.35 21.51	02.52 23.36
5	10.13 14.28	08.50 11.26-11.45/19 16.09	07.13 17.42	06.21 17.39-17.43/4 20.17	04.32 21.54	02.50 23.39
6	10.11 14.30	08.47 11.25-11.46/21 16.12	07.10 17.45	06.17 20.20	04.28 21.58	02.47 23.42
7	10.09 14.33	08.44 11.25-11.47/22 16.16	07.06 17.48	06.13 20.23	04.24 22.01	02.45 23.45
8	10.08 14.36	08.40 11.25-11.47/22 16.19	07.03 17.51	06.10 20.27	04.21 22.05	02.42 23.48
9	10.06 14.39	08.37 11.24-11.47/23 16.23	06.59 17.54	06.06 20.30	04.17 22.08	02.40 23.50
10	10.04 14.41	08.34 11.24-11.48/24 16.26	06.55 16.13-16.23/10 17.57	06.02 20.33	04.14 22.12	02.38 23.53
11	10.01 14.44	08.30 11.24-11.48/24 16.29 10.32-10.41/9	06.52 16.10-16.25/15 18.00	05.59 20.36	04.10 22.15	02.35 23.55
12	09.59 14.47	08.27 11.24-11.47/23 16.33 10.31-10.44/13	06.48 16.08-16.26/18 18.03	05.55 20.39	04.07 22.18	02.33 23.58
13	09.57 14.51	08.23 11.26-11.48/22 16.36 10.29-10.46/17	06.44 16.07-16.27/20 18.07	05.51 20.42	04.03 22.22	02.32 00.00
14	09.55 14.54	08.20 11.26-11.47/21 16.40 10.28-10.47/19	06.41 16.06-16.28/22 18.10	05.48 20.45	04.00 22.25	02.30 00.02
15	09.52 14.57	08.17 11.27-11.46/19 16.43 10.27-10.48/21	06.37 16.05-16.27/22 18.13	05.44 20.49	03.56 22.29	02.29 00.03
16	09.50 15.00	08.13 11.28-11.45/17 16.46 10.26-10.48/22	06.34 16.04-16.27/23 18.16	05.40 20.52	03.53 22.32	02.27 00.05
17	09.47 15.03	08.10 11.29-11.43/14 16.50 10.25-10.48/23	06.30 16.04-16.28/24 18.19	05.37 20.55	03.49 22.36	02.26 00.06
18	09.44 15.07	08.06 11.32-11.40/8 16.53 10.25-10.48/23	06.26 16.04-16.27/23 18.22	05.33 20.58	03.46 22.39	02.25 00.07
19	09.42 15.10	08.03 10.25-10.48/23 16.56	06.23 16.04-16.26/22 18.25	05.29 21.01	03.43 22.43	02.25 00.08
20	09.39 15.13	07.59 10.25-10.48/23 17.00	06.19 16.39-16.51/12 18.28 16.05-16.25/20	05.26 21.05	03.39 22.46	02.24 00.09
21	09.36 15.17	07.56 10.26-10.48/22 17.03	06.15 16.36-16.53/17 18.31 16.06-16.24/18	05.22 21.08	03.36 22.50	02.24 00.09
22	09.33 15.20	07.52 10.26-10.48/22 17.06	06.12 16.34-16.54/20 18.34 16.07-16.21/14	05.19 21.11	03.33 22.53	02.24 00.09
23	09.31 15.24	07.49 10.27-10.47/20 17.09	06.08 16.33-16.56/23 18.37 16.10-16.19/9	05.15 21.14	03.29 22.57	02.24 00.09
24	09.28 15.27	07.45 10.27-10.45/18 17.13	06.04 16.32-16.56/24 18.40	05.11 21.18	03.26 23.00	02.25 00.09
25	09.25 15.30	07.42 10.29-10.43/14 17.16	06.01 16.30-16.56/26 18.43	05.08 21.21	03.23 23.04	02.26 00.08
26	09.22 15.34	07.38 10.31-10.40/9 17.19	05.57 16.30-16.57/27 18.46	05.04 21.24	03.19 23.07	02.27 00.08
27	09.19 15.37	07.35 17.22	05.54 16.29-16.56/27 18.50	05.00 21.27	03.16 23.10	02.28 00.07
28	09.16 15.41	07.31 17.26	05.50 16.29-16.56/27 18.53	04.57 21.31	03.13 23.14	02.29 00.05
29	09.13 15.44		06.46 17.29-17.56/27 19.56	04.53 21.34	03.10 23.17	02.31 00.04
30	09.09 15.48		06.43 17.29-17.55/26 19.59	04.50 21.37	03.07 23.20	02.33 00.02
31	09.06 15.51		06.39 17.30-17.55/25 20.02		03.04 23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	617	541	77	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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 11 - VESTAS V136-4.2 4200 136.0 IOI hub: 90,0 m (TOT: 158,0 m) (635)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 20.36	07.22 16.47-17.06/19 18.47	07.59 10.55-11.18/23 15.57	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 20.33	07.25 16.47-17.04/17 18.43	08.02 10.55-11.18/23 15.54	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 20.29	07.28 16.49-17.02/13 18.39	08.06 10.55-11.17/22 15.50	09.45 14.24
4	02.42 23.55	04.22 22.18	06.01 20.25	07.31 16.52-16.58/6 18.36	08.09 10.55-11.17/22 15.47	09.48 14.21
5	02.44 23.52	04.25 22.14	06.04 20.22	07.34 18.32	08.12 10.56-11.16/20 15.44	09.51 14.19
6	02.47 23.50	04.29 22.10	06.07 20.18	07.37 18.29	08.16 10.57-11.15/18 15.40	09.53 14.18
7	02.50 23.47	04.32 22.07	06.10 17.35-17.37/2 20.14	07.40 18.25	08.19 10.58-11.14/16 15.37	09.56 14.16
8	02.52 23.45	04.36 22.03	06.13 17.29-17.41/12 20.11	07.43 18.21	08.22 10.59-11.12/13 15.34	09.58 14.14
9	02.55 23.42	04.39 22.00	06.16 17.26-17.43/17 20.07	07.46 18.18	08.26 11.02-11.11/9 15.31	10.01 14.13
10	02.58 23.39	04.42 21.56	06.19 17.24-17.45/21 20.03	07.49 18.14	08.29 15.27	10.03 14.11
11	03.01 23.37	04.45 21.53	06.22 17.23-17.45/22 20.00	07.52 18.11	08.33 15.24	10.05 14.10
12	03.05 23.34	04.49 21.49	06.25 17.22-17.46/24 19.56	07.55 18.07	08.36 15.21	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 17.21-17.46/25 19.52	07.58 18.03	08.39 15.18	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 17.20-17.46/26 19.49	08.01 18.00	08.43 15.15	10.11 14.07
15	03.14 23.25	04.59 21.38	06.34 17.19-17.46/27 19.45	08.04 17.56	08.46 15.12	10.13 14.06
16	03.18 23.22	05.02 21.35	06.37 17.18-17.45/27 19.41	08.07 11.02-11.14/12 17.53	08.50 15.09	10.15 14.06
17	03.21 23.19	05.05 21.31	06.40 17.18-17.45/27 19.38	08.10 11.00-11.15/15 17.49	08.53 15.06	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 17.18-17.44/26 19.34	08.14 10.59-11.17/18 17.46	08.57 15.03	10.17 14.05
19	03.28 23.12	05.11 21.24	06.46 17.18-17.43/25 19.30	08.17 10.57-11.18/21 17.42	09.00 15.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 17.19-17.42/23 19.27	08.20 10.57-11.19/22 17.39	09.03 14.57	10.20 14.05
21	03.34 23.06	05.18 21.16	06.52 17.20-17.41/21 19.23	08.23 10.55-11.18/23 17.35	09.07 14.54	10.20 14.05
22	03.38 23.02	05.21 21.13	06.55 17.21-17.39/18 19.19	08.26 10.55-11.19/24 17.32	09.10 14.51	10.21 14.05
23	03.41 22.59	05.24 21.09	06.58 17.22-17.36/14 19.16	08.29 10.55-11.18/23 17.28	09.13 14.48	10.21 14.06
24	03.45 22.56	05.27 21.06	07.01 17.26-17.32/6 19.12	08.33 12.01-12.11/10 17.25	09.17 14.45	10.22 14.07
25	03.48 22.52	05.30 21.02	07.04 16.47-17.10/23 19.08	07.36 10.59-11.14/15 16.21	09.20 14.43	10.22 14.08
26	03.51 22.49	05.34 20.58	07.07 16.47-17.10/23 19.05	07.39 10.57-11.14/17 16.18	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 20.55	07.10 16.46-17.09/23 19.01	07.42 10.56-11.16/20 16.14	09.26 14.38	10.22 14.10
28	03.58 22.42	05.40 20.51	07.13 16.46-17.09/23 18.58	07.46 10.55-11.17/22 16.11	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 20.47	07.16 16.46-17.08/22 18.54	07.49 10.55-11.17/22 16.07	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 20.44	07.19 16.46-17.07/21 18.50	07.52 10.55-11.18/23 16.04	09.36 14.30	10.20 14.14
31	04.08 22.32	05.49 20.40		07.56 10.54-11.18/24 16.01		10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	0	0	576	511	166	0

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 12 - VESTAS V136-4.2 4200 136.0 IOI hub: 90,0 m (TOT: 158,0 m) (636)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June		
1	10.18 14.19	09.03 15.55	07.28 17.29	09.41-10.06/25 17.29	06.35 20.05	18.14-18.16/2 17.23-17.45/22	04.46 21.41	03.01 23.27
2	10.17 14.21	09.00 15.58	07.24 17.32	09.41-10.05/24 17.32	06.32 20.08	18.07-18.21/14 17.24-17.43/19	04.42 21.44	02.58 23.30
3	10.16 14.23	08.57 16.02	07.20 17.35	09.42-10.04/22 17.35	06.28 20.11	18.05-18.24/19 17.26-17.41/15	04.39 21.48	02.55 23.33
4	10.14 14.25	08.53 16.05	07.17 17.38	09.43-10.03/20 17.38	06.24 20.14	18.02-18.25/23 17.29-17.37/8	04.35 21.51	02.52 23.36
5	10.13 14.28	08.50 16.09	07.13 17.42	09.44-10.01/17 17.42	06.21 20.17	18.01-18.27/26 17.59-18.27/28	04.32 21.54	02.50 23.39
6	10.11 14.30	08.47 16.12	07.10 17.45	09.46-09.59/13 17.45	06.17 20.20	17.59-18.27/28 17.58-18.27/29	04.28 21.58	02.47 23.42
7	10.09 14.33	08.44 16.16	07.06 17.48	10.57-11.03/6 17.48	06.13 20.23	17.58-18.27/29 17.56-18.28/32	04.24 22.01	02.44 23.45
8	10.08 14.36	08.40 16.19	07.03 17.51	10.54-11.07/13 17.51	06.10 20.27	17.57-18.28/31 17.56-18.28/32	04.21 22.05	02.42 23.48
9	10.06 14.39	08.37 16.23	06.59 17.54	10.52-11.09/17 17.54	06.06 20.30	17.56-18.28/32 17.56-18.28/32	04.17 22.08	02.40 23.50
10	10.04 14.41	08.34 16.26	06.55 17.57	10.50-11.10/20 17.57	06.02 20.33	17.56-18.28/32 17.55-18.28/33	04.14 22.12	02.37 23.53
11	10.01 14.44	08.30 16.29	06.52 18.00	10.49-11.11/22 18.00	05.59 20.36	17.55-18.28/33 17.55-18.28/33	04.10 22.15	02.35 23.55
12	09.59 14.47	08.27 16.33	06.48 18.03	10.48-11.12/24 18.03	05.55 20.39	17.55-18.28/33 17.55-18.27/32	04.07 22.18	02.33 23.58
13	09.57 14.50	08.23 16.36	06.44 18.07	10.49-11.14/25 18.07	05.51 20.42	17.55-18.27/32 17.55-18.27/32	04.03 22.22	02.32 00.00
14	09.55 14.54	08.20 16.40	06.41 18.10	10.48-11.14/26 18.10	05.48 20.45	17.55-18.27/32 17.55-18.26/31	04.00 22.25	02.30 00.02
15	09.52 14.57	08.17 16.43	06.37 18.13	10.48-11.14/26 18.13	05.44 20.49	17.55-18.26/31 17.55-18.26/30	03.56 22.29	02.28 00.03
16	09.50 15.00	08.13 16.46	06.34 18.16	10.48-11.14/26 18.16	05.40 20.52	17.56-18.26/30 17.57-18.25/28	03.53 22.32	02.27 00.05
17	09.47 15.03	08.10 16.50	06.30 18.19	10.47-11.14/27 18.19	05.37 20.55	17.57-18.25/28 17.57-18.23/26	03.49 22.36	02.26 00.06
18	09.44 15.07	08.06 16.53	06.26 18.22	10.48-11.14/26 18.22	05.33 20.58	17.57-18.23/26 17.58-18.22/24	03.46 22.39	02.25 00.07
19	09.42 15.10	08.03 16.56	06.23 18.25	10.48-11.13/25 18.25	05.29 21.01	17.58-18.22/24 17.58-18.22/24	03.43 22.43	02.25 00.08
20	09.39 15.13	07.59 17.00	06.19 18.28	10.48-11.12/24 18.28	05.26 21.05	17.59-18.20/21 18.01-18.18/17	03.39 22.46	02.24 00.09
21	09.36 15.17	07.56 17.03	06.15 18.31	10.48-11.11/23 18.31	05.22 21.08	18.01-18.18/17 18.05-18.16/11	03.36 22.50	02.24 00.09
22	09.33 15.20	07.52 17.06	06.12 18.34	10.50-11.11/21 18.34	05.19 21.11	18.05-18.16/11 18.05-18.16/11	03.33 22.53	02.24 00.09
23	09.31 15.24	07.49 17.09	06.08 18.37	10.51-11.09/18 18.37	05.15 21.14	10.51-11.09/18 10.53-11.07/14	03.29 22.57	02.24 00.09
24	09.28 15.27	07.45 17.13	06.04 18.40	10.53-11.07/14 18.40	05.11 21.18	10.53-11.07/14 09.42-10.07/25	03.26 23.00	02.25 00.09
25	09.25 15.30	07.42 17.16	06.01 18.43	10.56-11.03/7 18.43	05.08 21.21	16.22-16.49/27 09.42-10.07/25	03.23 23.04	02.26 00.08
26	09.22 15.34	07.38 17.19	05.57 18.46	09.41-10.07/26 18.46	05.04 21.24	16.22-16.49/27 16.21-16.49/28	03.19 23.07	02.27 00.08
27	09.19 15.37	07.35 17.22	05.54 18.50	09.42-10.07/25 18.50	05.00 21.27	16.21-16.49/28 16.21-16.48/27	03.16 23.10	02.28 00.07
28	09.16 15.41	07.31 17.26	05.50 18.53	09.41-10.07/26 18.53	04.57 21.31	16.21-16.48/27 17.21-17.48/27	03.13 23.14	02.29 00.05
29	09.13 15.44		06.46 19.56	17.21-17.48/27 19.56	04.53 21.34	17.21-17.48/27 17.21-17.47/26	03.10 23.17	02.31 00.04
30	09.09 15.48		06.43 19.59	17.21-17.47/26 19.59	04.50 21.37	17.21-17.47/26 17.22-17.46/24	03.07 23.20	02.33 00.03
31	09.06 15.51		06.39 20.02	17.22-17.46/24 20.02			03.04 23.24	
Potential sun hours	163	235	363	454	578	641		
Sum of minutes with flicker	0	605	430	618	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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6WTG: 12 - VESTAS V136-4.2 4200 136.0 IOI hub: 90,0 m (TOT: 158,0 m) (636)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 17.55-18.28/33 20.36	07.21 18.47	07.59 10.21-10.40/19 15.57	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 17.54-18.26/32 20.33	07.24 18.43	08.02 10.22-10.39/17 15.54	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 17.54-18.26/32 20.29	07.27 18.39	08.06 10.25-10.37/12 15.50	09.45 14.23
4	02.42 23.55	04.22 22.18	06.01 17.54-18.25/31 20.25	07.30 18.36	08.09 10.29-10.33/4 15.47	09.48 14.21
5	02.44 23.52	04.25 22.14	06.04 17.55-18.24/29 20.22	07.34 18.32	08.12 15.44	09.51 14.19
6	02.47 23.50	04.29 22.10	06.07 17.55-18.23/28 20.18	07.37 18.29	08.16 15.40	09.53 14.18
7	02.50 23.48	04.32 22.07	06.10 17.56-18.22/26 20.14	07.40 10.24-10.33/9 18.25	08.19 15.37	09.56 14.16
8	02.52 23.45	04.35 22.03	06.13 17.56-18.20/24 20.11	07.43 10.20-10.35/15 18.21	08.22 15.34	09.59 14.14
9	02.55 23.42	04.39 22.00	06.16 17.58-18.17/19 20.07	07.46 10.18-10.37/19 18.18	08.26 15.31	10.01 14.13
10	02.58 23.39	04.42 21.56	06.19 18.00-18.15/15 20.03	07.49 10.17-10.38/21 18.14	08.29 15.27	10.03 14.11
11	03.01 23.37	04.45 21.53	06.22 18.05-18.10/5 20.00	07.52 10.16-10.39/23 18.11	08.33 15.24	10.06 14.10
12	03.05 23.34	04.49 21.49	06.25 17.14-17.38/24 19.56	07.55 10.15-10.39/24 18.07	08.36 15.21	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 17.13-17.38/25 19.52	07.58 10.15-10.40/25 18.03	08.40 15.18	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 17.12-17.39/27 19.49	08.01 10.14-10.39/25 18.00	08.43 15.15	10.11 14.07
15	03.14 23.25	04.59 21.38	06.34 17.11-17.39/28 19.45	08.04 10.13-10.39/26 17.56	08.46 15.12	10.13 14.06
16	03.17 23.22	05.02 21.35	06.37 17.10-17.37/27 19.41	08.07 10.14-10.39/25 17.53	08.50 15.09	10.15 14.05
17	03.21 23.19	05.05 21.31	06.40 17.10-17.37/27 19.38	08.10 11.26-11.36/10 17.49	08.53 15.06	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 17.09-17.37/28 19.34	08.14 11.24-11.40/16 17.46	08.57 15.03	10.17 14.05
19	03.27 23.12	05.11 21.24	06.46 17.10-17.36/26 19.30	08.17 11.22-11.41/19 17.42	09.00 15.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 17.10-17.35/25 19.27	08.20 11.21-11.42/21 17.39	09.03 14.57	10.20 14.05
21	03.34 23.06	05.18 18.09-18.21/12 21.16	06.52 17.10-17.34/24 19.23	08.23 11.19-11.43/24 17.35	09.07 14.54	10.20 14.05
22	03.38 23.02	05.21 18.06-18.23/17 21.13	06.55 17.11-17.32/21 19.19	08.26 11.19-11.44/25 17.32	09.10 14.51	10.21 14.05
23	03.41 22.59	05.24 18.03-18.25/22 21.09	06.58 17.12-17.31/19 19.16	08.29 11.17-11.43/26 17.28	09.13 14.48	10.21 14.06
24	03.44 22.56	05.27 18.02-18.26/24 21.06	07.01 17.14-17.28/14 19.12	08.33 11.17-11.44/27 17.25	09.17 14.45	10.22 14.07
25	03.48 22.52	05.30 18.00-18.27/27 21.02	07.04 17.18-17.24/6 19.08	07.36 10.17-10.44/27 16.21	09.20 14.43	10.22 14.07
26	03.51 22.49	05.34 17.58-18.27/29 20.58	07.07 19.05	07.39 10.17-10.43/26 16.18	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 17.57-18.27/30 20.55	07.10 19.01	07.42 10.17-10.43/26 16.14	09.27 14.38	10.22 14.10
28	03.58 22.42	05.40 17.57-18.28/31 20.51	07.13 18.58	07.46 10.17-10.43/26 16.11	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 17.56-18.28/32 20.47	07.16 18.54	07.49 10.18-10.43/25 16.07	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 17.56-18.28/32 20.44	07.19 18.50	07.52 10.19-10.42/23 16.04	09.36 14.30	10.20 14.14
31	04.08 22.32	05.49 17.55-18.28/33 20.40		07.56 10.20-10.41/21 16.01		10.19 14.16
Potential sun hours	621	513	394	302	192	125
Sum of minutes with flicker	0	289	659	684	52	0

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG: 13** - VESTAS V136-4.2 4200 136.0 IOI hub: 90,0 m (TOT: 158,0 m) (637)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
336	290	258	618	1 095	913	457	524	726	653	632	498	7 000

	January	February	March	April	May	June
1	10.18 14.19	09.03 15.55	07.28 17.29	09.01-09.23/22 17.29	06.35 20.05	16.58-17.34/36 21.41
2	10.17 14.21	09.00 15.58	07.24 17.32	09.01-09.23/22 17.32	06.32 20.08	16.58-17.33/35 21.44
3	10.16 14.23	08.57 16.02	07.20 17.35	09.00-09.23/23 17.35	06.28 20.11	16.58-17.33/35 21.48
4	10.14 14.25	08.53 16.05	07.17 17.38	09.01-09.24/23 17.38	06.24 20.14	16.58-17.32/34 21.51
5	10.13 14.28	08.50 16.09	07.13 17.42	09.01-09.23/22 17.42	06.21 20.17	16.59-17.32/33 21.54
6	10.11 14.30	08.47 16.12	07.10 17.45	09.01-09.22/21 17.45	06.17 20.20	16.59-17.30/31 21.58
7	10.09 14.33	08.44 16.16	07.06 17.48	09.01-09.20/19 17.48	06.13 20.23	17.00-17.29/29 22.01
8	10.08 14.36	08.40 16.19	07.02 17.51	09.03-09.19/16 17.51	06.10 20.27	17.01-17.28/27 22.05
9	10.06 14.38	08.37 16.23	06.59 17.54	09.04-09.17/13 17.54	06.06 20.30	17.02-17.26/24 22.08
10	10.04 14.41	08.34 16.26	06.55 17.57	09.08-09.12/4 17.57	06.02 20.33	17.59-18.13/14 22.12
11	10.01 14.44	08.30 16.29	06.52 18.00		05.59 20.36	17.55-18.16/21 22.15
12	09.59 14.47	08.27 16.33	06.48 18.03	10.07-10.14/7 18.03	05.55 20.39	17.52-18.19/27 22.18
13	09.57 14.50	08.23 16.36	06.44 18.07	10.05-10.18/13 18.07	05.51 20.42	17.50-18.20/30 22.22
14	09.55 14.54	08.20 16.40	06.41 18.10	10.03-10.20/17 18.10	05.48 20.45	17.48-18.22/34 22.25
15	09.52 14.57	08.17 16.43	06.37 18.13	10.02-10.21/19 18.13	05.44 20.49	17.46-18.22/36 22.29
16	09.50 15.00	08.13 16.46	06.34 18.16	10.00-10.22/22 18.16	05.40 20.52	17.46-18.24/38 22.32
17	09.47 15.03	08.10 16.50	06.30 18.19	10.00-10.23/23 18.19	05.37 20.55	17.45-18.25/40 22.36
18	09.44 15.07	08.06 16.53	06.26 18.22	09.59-10.23/24 18.22	05.33 20.58	17.43-18.25/42 22.39
19	09.42 15.10	08.03 16.56	06.23 18.25	09.58-10.23/25 18.25	05.29 21.01	17.43-18.25/42 22.43
20	09.39 15.13	07.59 17.00	06.19 18.28	09.58-10.23/25 18.28	05.26 21.05	17.42-18.25/43 22.46
21	09.36 15.17	07.56 17.03	06.15 18.31	09.58-10.23/25 18.31	05.22 21.08	17.41-18.26/45 22.50
22	09.33 15.20	07.52 17.06	06.12 18.34	16.12-16.26/14 18.34	05.18 21.11	17.41-18.26/45 22.53
23	09.31 15.23	07.49 17.09	06.08 18.37	16.09-16.29/20 18.37	05.15 21.14	17.40-18.25/45 22.57
24	09.28 15.27	07.45 17.13	06.04 18.40	09.59-10.22/23 18.40	05.11 21.18	17.40-18.26/46 23.00
25	09.25 15.30	07.42 17.16	06.01 18.43	09.09-09.18/9 18.43	05.08 21.21	17.40-18.26/46 23.04
26	09.22 15.34	07.38 17.19	05.57 18.46	10.00-10.21/21 18.46	05.04 21.24	17.40-18.25/45 23.07
27	09.19 15.37	07.35 17.22	05.53 18.49	09.06-09.20/14 18.49	05.00 21.27	17.40-18.25/45 23.10
28	09.16 15.41	07.31 17.26	05.50 18.53	10.01-10.19/18 18.53	04.57 21.31	17.40-18.25/45 23.14
29	09.13 15.44		06.46 19.56	10.05-10.15/10 19.56	04.53 21.34	17.41-18.25/44 23.17
30	09.09 15.48		06.43 19.59	09.02-09.23/21 19.59	04.50 21.37	17.41-18.24/43 23.20
31	09.06 15.51		06.39 20.02	16.00-16.34/34 20.02		17.40-18.25/45 23.24
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	416	505	1131	366	0

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 13 - VESTAS V136-4.2 4200 136.0 IOI hub: 90,0 m (TOT: 158,0 m) (637)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35 00.01	04.12 18.06-18.21/15 22.28	05.52 17.55-18.16/21 20.36 17.07-17.20/13	07.21 18.47	07.59 15.57	09.39 14.28
2	02.37 23.59	04.15 18.03-18.22/19 22.25	05.55 17.57-18.11/14 20.33 17.03-17.22/19	07.24 18.43	08.02 15.54	09.42 14.26
3	02.39 23.57	04.19 18.01-18.25/24 22.21	05.58 17.00-17.24/24 20.29	07.27 18.39	08.06 15.50	09.45 14.23
4	02.42 23.55	04.22 17.59-18.26/27 22.18	06.01 16.59-17.25/26 20.25	07.30 09.43-09.53/10 18.36	08.09 15.47	09.48 14.21
5	02.44 23.52	04.25 17.58-18.28/30 22.14	06.04 16.57-17.26/29 20.22	07.33 09.40-09.55/15 18.32	08.12 15.44	09.51 14.19
6	02.47 23.50	04.29 17.56-18.29/33 22.10	06.07 16.56-17.27/31 20.18	07.37 09.38-09.56/18 18.29	08.16 15.40	09.53 14.18
7	02.50 23.48	04.32 17.54-18.29/35 22.07	06.10 16.54-17.27/33 20.14	07.40 09.37-09.57/20 18.25	08.19 15.37	09.56 14.16
8	02.52 23.45	04.35 17.53-18.30/37 22.03	06.13 16.53-17.26/33 20.11	07.43 09.36-09.57/21 18.21	08.22 15.34	09.58 14.14
9	02.55 23.42	04.39 17.52-18.31/39 22.00	06.16 16.52-17.27/35 20.07	07.46 09.35-09.57/22 18.18	08.26 15.31	10.01 14.13
10	02.58 23.39	04.42 17.51-18.31/40 21.56	06.19 16.51-17.27/36 20.03	07.49 09.35-09.58/23 18.14	08.29 15.27	10.03 14.11
11	03.01 23.37	04.45 17.51-18.32/41 21.53	06.22 16.51-17.27/36 20.00	07.52 09.34-09.57/23 18.11	08.33 15.24	10.05 14.10
12	03.04 23.34	04.49 17.50-18.32/42 21.49	06.25 16.50-17.26/36 19.56	07.55 09.34-09.57/23 18.07	08.36 15.21	10.08 14.09
13	03.08 23.31	04.52 17.48-18.32/44 21.45	06.28 16.50-17.26/36 19.52	07.58 09.35-09.57/22 18.03	08.39 15.18	10.10 14.08
14	03.11 23.28	04.55 17.48-18.32/44 21.42	06.31 16.50-17.25/35 19.49	08.01 10.36-10.49/13 18.00	08.43 15.15	10.11 14.07
15	03.14 23.25	04.59 17.48-18.32/44 21.38	06.34 16.50-17.25/35 19.45	08.04 10.34-10.50/16 17.56	08.46 15.12	10.13 14.06
16	03.17 23.22	05.02 17.47-18.32/45 21.35	06.37 16.50-17.23/33 19.41	08.07 10.33-10.52/19 17.53	08.50 15.09	10.15 14.05
17	03.21 23.19	05.05 17.47-18.32/45 21.31	06.40 16.50-17.22/32 19.38	08.10 10.31-10.53/22 17.49	08.53 15.06	10.16 14.05
18	03.24 23.15	05.08 17.47-18.32/45 21.27	06.43 16.51-17.21/30 19.34	08.13 10.31-10.54/23 17.46	08.57 15.03	10.17 14.05
19	03.27 23.12	05.11 17.47-18.32/45 21.24	06.46 16.51-17.19/28 19.30	08.17 10.30-10.54/24 17.42	09.00 15.00	10.19 14.05
20	03.31 23.09	05.15 17.46-18.31/45 21.20	06.49 16.53-17.17/24 19.27	08.20 10.29-10.54/25 17.39	09.03 14.57	10.20 14.05
21	03.34 23.06	05.18 17.46-18.31/45 21.16	06.52 16.54-17.15/21 19.23	08.23 10.29-10.54/25 17.35	09.07 14.54	10.20 14.05
22	03.38 23.02	05.21 17.46-18.30/44 21.13	06.55 16.56-17.12/16 19.19	08.26 10.29-10.54/25 17.32	09.10 14.51	10.21 14.05
23	03.41 22.59	05.24 17.46-18.30/44 21.09	06.58 17.01-17.07/6 19.16	08.29 10.28-10.53/25 17.28	09.13 14.48	10.21 14.06
24	03.44 22.56	05.27 17.47-18.29/42 21.05	07.01 19.12	08.33 10.29-10.53/24 17.25	09.17 14.45	10.22 14.07
25	03.48 22.52	05.30 17.47-18.28/41 21.02	07.04 19.08	07.36 09.30-09.52/22 16.21	09.20 14.43	10.22 14.07
26	03.51 22.49	05.33 17.47-18.26/39 20.58	07.07 19.05	07.39 09.30-09.51/21 16.18	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 17.47-18.25/38 20.55	07.10 19.01	07.42 09.31-09.50/19 16.14	09.26 14.37	10.22 14.10
28	03.58 22.42	05.40 17.48-18.24/36 20.51	07.13 18.58	07.46 09.32-09.49/17 16.11	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 17.49-18.22/33 20.47	07.16 18.54	07.49 09.35-09.47/12 16.07	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 17.51-18.21/30 20.44	07.18 18.50	07.52 09.39-09.43/4 16.04	09.36 14.30	10.20 14.14
31	04.08 22.32	18.12-18.15/3 20.40	05.49 17.52-18.19/27 20.40	07.56 16.01	10.19 14.16	10.19 14.16
	Potential sun hours	621	394	302	192	125
	Sum of minutes with flicker	3	1158	682	608	0

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6WTG: 14 - VESTAS V136-4.2 4200 136.0 IOI hub: 90,0 m (TOT: 158,0 m) (638)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June
1	10.18	09.03	07.28	06.35	04.46	03.01
	14.19	15.55	17.29	20.05	21.41	23.27
2	10.17	09.00	07.24	06.32	07.34-07.40/6	04.42
	14.21	15.58	17.32	20.08	21.44	23.30
3	10.16	08.57	13.54-14.04/10	07.21	06.28	07.30-07.43/13
	14.23	16.02	17.35	20.11	21.48	23.33
4	10.14	08.54	13.51-14.05/14	07.17	06.24	07.28-07.44/16
	14.25	16.05	13.04-13.12/8	17.38	20.14	21.51
5	10.13	08.50	13.50-14.07/17	07.13	06.21	07.27-07.45/18
	14.28	16.09	13.01-13.15/14	17.42	20.17	21.54
6	10.11	08.47	13.49-14.08/19	07.10	06.17	07.25-07.45/20
	14.30	16.12	13.00-13.17/17	17.45	20.20	21.58
7	10.09	08.44	13.48-14.09/21	07.06	06.13	07.25-07.46/21
	14.33	16.16	12.58-13.19/21	17.48	20.23	22.01
8	10.08	08.40	13.48-14.10/22	07.03	06.10	07.24-07.45/21
	14.36	16.19	12.57-13.20/23	17.51	20.27	22.05
9	10.06	08.37	13.47-14.10/23	06.59	06.06	07.24-07.45/21
	14.39	16.23	12.57-13.21/24	17.54	20.30	22.08
10	10.04	08.34	13.47-14.10/23	06.55	06.02	07.23-07.45/22
	14.42	16.26	12.56-13.22/26	17.57	20.33	22.12
11	10.02	08.30	13.47-14.10/23	06.52	05.59	07.24-07.44/20
	14.44	16.29	12.55-13.22/27	18.00	20.36	22.15
12	09.59	08.27	13.47-14.10/23	06.48	05.55	07.24-07.43/19
	14.48	16.33	12.56-13.23/27	18.04	20.39	22.19
13	09.57	08.24	13.48-14.11/23	06.45	05.51	07.25-07.42/17
	14.51	16.36	12.56-13.24/28	18.07	20.42	22.22
14	09.55	08.20	13.49-14.11/22	06.41	05.48	07.26-07.40/14
	14.54	16.40	12.56-13.24/28	18.10	20.45	22.25
15	09.52	08.17	13.49-14.10/21	06.37	05.44	07.28-07.38/10
	14.57	16.43	12.56-13.23/27	18.13	20.49	22.29
16	09.50	08.13	13.50-14.09/19	06.34	05.40	03.53
	15.00	16.46	12.56-13.23/27	18.16	20.52	22.32
17	09.47	08.10	13.51-14.08/17	06.30	05.37	03.50
	15.03	16.50	12.56-13.23/27	18.19	20.55	22.36
18	09.45	08.06	13.53-14.06/13	06.26	05.33	03.46
	15.07	16.53	12.56-13.22/26	18.22	20.58	22.39
19	09.42	08.03	13.56-14.03/7	06.23	05.30	03.43
	15.10	16.56	12.57-13.21/24	18.25	21.01	22.43
20	09.39	07.59	12.58-13.20/22	06.19	05.26	03.39
	15.13	17.00	18.28	21.05	22.46	00.09
21	09.36	07.56	13.00-13.19/19	06.15	05.22	03.36
	15.17	17.03	18.31	21.08	22.50	00.09
22	09.34	07.52	13.02-13.17/15	06.12	05.19	03.33
	15.20	17.06	18.34	21.11	22.53	00.09
23	09.31	07.49	13.05-13.13/8	06.08	05.15	03.29
	15.24	17.10	18.37	21.14	22.57	00.09
24	09.28	07.45	06.05	05.11	03.26	02.25
	15.27	17.13	18.40	21.18	23.00	00.09
25	09.25	07.42	06.01	05.08	03.23	02.26
	15.31	17.16	18.43	21.21	23.04	00.08
26	09.22	07.38	05.57	05.04	03.20	02.27
	15.34	17.19	18.47	21.24	23.07	00.08
27	09.19	07.35	05.54	05.00	03.16	02.28
	15.37	17.22	18.50	21.28	23.10	00.07
28	09.16	07.31	05.50	04.57	03.13	02.29
	15.41	17.26	18.53	21.31	23.14	00.05
29	09.13		06.46	04.53	03.10	02.31
	15.44		19.56	21.34	23.17	00.04
30	09.10		06.43	04.50	03.07	02.33
	15.48		19.59	21.38	23.20	00.03
31	09.06		06.39		03.04	
	15.51		20.02		23.24	
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	755	0	238	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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG:** 14 - VESTAS V136-4.2 4200 136.0 IO! hub: 90,0 m (TOT: 158,0 m) (638)

Assumptions for shadow calculations

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

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35 00.01	04.12 22.28	05.52 07.23-07.43/20 20.36	07.22 18.47	07.59 13.18-13.41/23 15.57 12.26-12.52/26	09.39 14.28
2	02.37 23.59	04.15 22.25	05.55 07.22-07.43/21 20.33	07.25 18.43	08.02 13.18-13.40/22 15.54 12.27-12.51/24	09.42 14.26
3	02.39 23.57	04.19 22.21	05.58 07.22-07.44/22 20.29	07.28 18.40	08.06 13.18-13.40/22 15.51 12.28-12.50/22	09.45 14.24
4	02.42 23.55	04.22 22.18	06.01 07.21-07.42/21 20.25	07.31 18.36	08.09 13.19-13.39/20 15.47 12.29-12.49/20	09.48 14.22
5	02.44 23.52	04.26 22.14	06.04 07.21-07.42/21 20.22	07.34 18.32	08.12 13.20-13.38/18 15.44 12.30-12.47/17	09.51 14.20
6	02.47 23.50	04.29 22.11	06.07 07.21-07.41/20 20.18	07.37 18.29	08.16 13.21-13.37/16 15.41 12.32-12.45/13	09.53 14.18
7	02.50 23.48	04.32 22.07	06.10 07.22-07.40/18 20.14	07.40 18.25	08.19 13.22-13.35/13 15.37 12.35-12.42/7	09.56 14.16
8	02.53 23.45	04.36 22.03	06.13 07.23-07.39/16 20.11	07.43 18.21	08.23 13.24-13.33/9 15.34	09.59 14.14
9	02.55 23.42	04.39 22.00	06.16 07.24-07.37/13 20.07	07.46 18.18	08.26 15.31	10.01 14.13
10	02.58 23.40	04.42 21.56	06.19 07.26-07.33/7 20.03	07.49 18.14	08.29 15.27	10.03 14.11
11	03.02 23.37	04.46 21.53	06.22 20.00	07.52 18.11	08.33 15.24	10.06 14.10
12	03.05 23.34	04.49 21.49	06.25 19.56	07.55 18.07	08.36 15.21	10.08 14.09
13	03.08 23.31	04.52 21.45	06.28 19.52	07.58 18.04	08.40 15.18	10.10 14.08
14	03.11 23.28	04.55 21.42	06.31 19.49	08.01 18.00	08.43 15.15	10.12 14.07
15	03.14 23.25	04.59 21.38	06.34 19.45	08.04 17.56	08.46 15.12	10.13 14.06
16	03.18 23.22	05.02 21.35	06.37 19.41	08.07 17.53	08.50 15.09	10.15 14.06
17	03.21 23.19	05.05 21.31	06.40 19.38	08.10 17.49	08.53 15.06	10.16 14.05
18	03.24 23.15	05.08 21.27	06.43 19.34	08.14 17.46	08.57 15.03	10.18 14.05
19	03.28 23.12	05.12 21.24	06.46 19.30	08.17 13.34-13.45/11 17.42	09.00 15.00	10.19 14.05
20	03.31 23.09	05.15 21.20	06.49 19.27	08.20 13.32-13.48/16 17.39	09.03 14.57	10.20 14.05
21	03.34 23.06	05.18 21.17	06.52 19.23	08.23 13.29-13.49/20 17.35	09.07 14.54	10.20 14.05
22	03.38 23.02	05.21 21.13	06.55 19.19	08.26 13.28-13.51/23 17.32	09.10 14.51	10.21 14.05
23	03.41 22.59	05.24 21.09	06.58 19.16	08.29 14.24-14.34/10 17.28 13.27-13.51/24	09.13 14.48	10.21 14.06
24	03.45 22.56	05.27 21.06	07.01 19.12	08.33 14.22-14.36/14 17.25 13.26-13.52/26	09.17 14.46	10.22 14.07
25	03.48 22.52	05.30 21.02	07.04 19.09	07.36 13.21-13.38/17 16.21 12.26-12.53/27	09.20 14.43	10.22 14.08
26	03.51 22.49	05.34 20.58	07.07 19.05	07.39 13.19-13.38/19 16.18 12.25-12.52/27	09.23 14.40	10.22 14.09
27	03.55 22.45	05.37 20.55	07.10 19.01	07.42 13.18-13.39/21 16.14 12.25-12.52/27	09.27 14.38	10.22 14.10
28	03.58 22.42	05.40 07.28-07.39/11 20.51	07.13 18.58	07.46 13.18-13.40/22 16.11 12.25-12.53/28	09.30 14.35	10.21 14.11
29	04.02 22.39	05.43 07.26-07.41/15 20.47	07.16 18.54	07.49 13.17-13.40/23 16.07 12.25-12.53/28	09.33 14.33	10.21 14.13
30	04.05 22.35	05.46 07.25-07.42/17 20.44	07.19 18.50	07.52 13.17-13.41/24 16.04 12.25-12.53/28	09.36 14.30	10.20 14.14
31	04.09 22.32	05.49 07.24-07.43/19 20.40	 	07.56 13.17-13.41/24 16.01 12.26-12.52/26	 	10.19 14.16
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	0	62	179	485	272	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:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen
 Nedre Skøyen vei 2
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 Helge Dalbu / helge.dalbu@multiconsult.no
 Calculated:
 20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6 **WTG: 1 - M1-E-70 E4 2000 71.0**
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June	July	August	September	October	November	December		
1	10.18	09.03	07.28	06.35	04.46	03.01	02.35	04.12	05.52	07.22	07.59	11.42-11.59/17	09.39	
	14.19	15.55	17.29	20.05	21.41	23.27	00.01	22.28	20.36	18.47	15.57		14.28	
2	10.17	09.00	07.24	06.32	04.43	02.58	02.37	04.16	05.55	07.25	08.02	11.42-11.59/17	09.42	
	14.21	15.59	17.32	20.08	21.44	23.30	23.59	22.25	20.33	18.43	15.54		14.26	
3	10.16	08.57	07.21	06.28	04.39	02.56	02.40	04.19	05.58	07.28	08.06	11.43-11.58/15	09.45	
	14.23	16.02	17.35	20.11	21.48	23.33	23.57	22.21	20.29	18.40	15.51		14.24	
4	10.14	08.54	07.17	06.24	04.35	02.53	02.42	04.22	06.01	07.31	08.09	11.43-11.57/14	09.48	
	14.26	16.06	17.39	20.14	21.51	23.36	23.55	22.18	20.25	18.36	15.47		14.22	
5	10.13	08.50	12.15-12.24/9	07.13	06.21	04.32	02.50	02.45	04.26	06.04	07.34	08.12	11.44-11.56/12	09.51
	14.28	16.09		17.42	20.17	21.54	23.39	23.52	22.14	20.22	18.32	15.44		14.20
6	10.11	08.47	12.14-12.26/12	07.10	06.17	04.28	02.47	02.47	04.29	06.07	07.37	08.16	11.46-11.54/8	09.53
	14.31	16.12		17.45	20.20	21.58	23.42	23.50	22.11	20.18	18.29	15.41		14.18
7	10.09	08.44	12.13-12.27/14	07.06	06.14	04.25	02.45	02.50	04.32	06.10	07.40	08.19		09.56
	14.33	16.16		17.48	20.24	22.01	23.45	23.47	22.07	20.14	18.25	15.37		14.16
8	10.08	08.40	12.12-12.28/16	07.03	06.10	04.21	02.42	02.53	04.36	06.13	07.43	08.23		09.59
	14.36	16.19		17.51	20.27	22.05	23.48	23.45	22.03	20.11	18.22	15.34		14.15
9	10.06	08.37	12.12-12.28/16	06.59	06.06	04.18	02.40	02.56	04.39	06.16	07.46	08.26		10.01
	14.39	16.23		17.54	20.30	22.08	23.50	23.42	22.00	20.07	18.18	15.31		14.13
10	10.04	08.34	12.12-12.28/16	06.55	06.03	04.14	02.38	02.59	04.42	06.19	07.49	08.29		10.03
	14.42	16.26		17.57	20.33	22.12	23.53	23.39	21.56	20.03	18.14	15.28		14.12
11	10.02	08.30	12.12-12.28/16	06.52	05.59	04.11	02.36	03.02	04.46	06.22	07.52	08.33		10.06
	14.45	16.30		18.01	20.36	22.15	23.55	23.37	21.53	20.00	18.11	15.24		14.10
12	09.59	08.27	12.13-12.29/16	06.48	05.55	04.07	02.34	03.05	04.49	06.25	07.55	08.36		10.08
	14.48	16.33		18.04	20.39	22.19	23.57	23.34	21.49	19.56	18.07	15.21		14.09
13	09.57	08.24	12.13-12.29/16	06.45	05.52	04.04	02.32	03.08	04.52	06.28	07.58	08.40		10.10
	14.51	16.36		18.07	20.42	22.22	00.00	23.31	21.46	19.53	18.04	15.18		14.08
14	09.55	08.20	12.14-12.28/14	06.41	05.48	04.00	02.30	03.11	04.56	06.31	08.01	08.43		10.11
	14.54	16.40		18.10	20.46	22.25	00.01	23.28	21.42	19.49	18.00	15.15		14.07
15	09.52	08.17	12.15-12.26/11	06.37	05.44	03.57	02.29	03.15	04.59	06.34	08.04	08.46		10.13
	14.57	16.43		18.13	20.49	22.29	00.03	23.25	21.38	19.45	17.57	15.12		14.06
16	09.50	08.13	12.17-12.24/7	06.34	05.41	03.53	02.28	03.18	05.02	06.37	08.07	08.50		10.15
	15.00	16.47		18.16	20.52	22.32	00.05	23.22	21.35	19.42	17.53	15.09		14.06
17	09.47	08.10		06.30	05.37	03.50	02.27	03.21	05.05	06.40	08.11	08.53		10.16
	15.04	16.50		18.19	20.55	22.36	00.06	23.19	21.31	19.38	17.49	15.06		14.05
18	09.45	08.06		06.27	05.33	03.46	02.26	03.24	05.09	06.43	08.14	08.57		10.17
	15.07	16.53		18.22	20.58	22.39	00.07	23.15	21.27	19.34	17.46	15.03		14.05
19	09.42	08.03		06.23	05.30	03.43	02.25	03.28	05.12	06.46	08.17	09.00		10.19
	15.10	16.57		18.25	21.01	22.43	00.08	23.12	21.24	19.31	17.42	15.00		14.05
20	09.39	07.59		06.19	05.26	03.40	02.25	03.31	05.15	06.49	08.20	09.03		10.20
	15.14	17.00		18.28	21.05	22.46	00.09	23.09	21.20	19.27	17.39	14.57		14.05
21	09.36	07.56		06.16	05.22	03.36	02.25	03.35	05.18	06.52	08.23	09.07		10.20
	15.17	17.03		18.31	21.08	22.50	00.09	23.06	21.17	19.23	17.35	14.54		14.05
22	09.34	07.52		06.12	05.19	03.33	02.25	03.38	05.21	06.55	08.26	09.10		10.21
	15.20	17.06		18.34	21.11	22.53	00.09	23.02	21.13	19.20	17.32	14.51		14.06
23	09.31	07.49		06.08	05.15	03.30	02.25	03.41	05.24	06.58	08.30	09.13		10.21
	15.24	17.10		18.37	21.14	22.57	00.09	22.59	21.09	19.16	17.28	14.48		14.06
24	09.28	07.45		06.05	05.12	03.26	02.25	03.45	05.28	07.01	08.33	09.17		10.22
	15.27	17.13		18.41	21.18	23.00	00.09	22.56	21.06	19.12	17.25	14.46		14.07
25	09.25	07.42		06.01	05.08	03.23	02.26	03.48	05.31	07.04	07.36	09.20		10.22
	15.31	17.16		18.44	21.21	23.04	00.08	22.52	21.02	19.09	16.21	14.43		14.08
26	09.22	07.38		05.57	05.04	03.20	02.27	03.52	05.34	07.07	07.39	11.47-11.55/8	09.23	10.22
	15.34	17.19		18.47	21.24	23.07	00.07	22.49	20.58	19.05	16.18	14.40		14.09
27	09.19	07.35		05.54	05.01	03.17	02.28	03.55	05.37	07.10	07.43	11.44-11.56/12	09.27	10.22
	15.38	17.23		18.50	21.28	23.10	00.07	22.45	20.55	19.01	16.14	14.38		14.10
28	09.16	07.31		05.50	04.57	03.13	02.30	03.59	05.40	07.13	07.46	11.43-11.57/14	09.30	10.21
	15.41	17.26		18.53	21.31	23.14	00.05	22.42	20.51	18.58	16.11	14.35		14.12
29	09.13			06.46	04.53	03.10	02.31	04.02	05.43	07.16	07.49	11.42-11.58/16	09.33	10.21
	15.45			19.56	21.34	23.17	00.04	22.39	20.47	18.54	16.08	14.33		14.13
30	09.10			06.43	04.50	03.07	02.33	04.05	05.46	07.19	07.52	11.42-11.58/16	09.36	10.20
	15.48			19.59	21.38	23.20	00.02	22.35	20.44	18.51	16.04	14.31		14.15
31	09.06			06.39		03.04		04.09	05.49		07.56	11.42-11.59/17	09.39	10.19
	15.52			20.02		23.24		22.32	20.40		16.01		14.17	
Potential sun hours	163	235	363	454	578	641	620	513	394	302	192	83	125	0
Sum of minutes with flicker	0	163	0	0	0	0	0	0	0	0	83	83	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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v**WTG: 2 - M5- E-70 E4 2,3 MW 2300**
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Assumptions for shadow calculations

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time

N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	January	February	March	April	May	June
1	10.18 09.03 14.19 15.55		07.28 09.02-09.11/9 17.29	06.35 04.46 20.05 21.41		03.01 05.21-05.32/11 23.27
2	10.17 09.00 14.21 15.58		07.24 09.00-09.12/12 17.32	06.32 04.43 20.08 21.44		02.58 05.22-05.32/10 23.30
3	10.16 08.57 14.23 16.02		07.21 08.59-09.12/13 17.35	06.28 04.39 20.11 21.48		02.55 05.22-05.32/10 23.33
4	10.14 08.54 14.26 16.05		07.17 09.00-09.13/13 17.39	06.24 04.35 20.14 21.51		02.53 05.23-05.31/8 23.36
5	10.13 08.50 14.28 16.09		07.13 08.59-09.13/14 17.42	06.21 04.32 20.17 21.54		02.50 05.24-05.31/7 23.39
6	10.11 08.47 14.31 16.12		07.10 08.59-09.12/13 17.45	06.17 04.28 20.20 21.58		02.47 05.24-05.30/6 23.42
7	10.09 08.44 14.33 16.16		07.06 09.00-09.10/10 17.48	06.13 04.25 20.24 22.01		02.45 05.26-05.29/3 23.45
8	10.08 08.40 14.36 16.19		07.03 09.02-09.09/7 17.51	06.10 04.21 20.27 22.05		02.42 23.48
9	10.06 08.37 14.39 16.23		06.59 17.54	06.06 04.18 20.30 22.08		02.40 23.50
10	10.04 08.34 14.42 16.26		06.55 17.57	06.02 04.14 20.33 22.12		02.38 23.53
11	10.01 08.30 14.45 16.30		06.52 18.00	05.59 04.11 20.36 22.15		02.36 23.55
12	09.59 08.27 14.48 16.33		06.48 18.04	05.55 04.07 20.39 22.18		02.34 23.57
13	09.57 08.24 14.51 16.36		06.45 18.07	05.51 04.04 20.42 22.22		02.32 00.00
14	09.55 08.20 14.54 16.40		06.41 18.10	05.48 04.00 20.45 22.25		02.30 00.01
15	09.52 08.17 14.57 16.43		06.37 18.13	05.44 03.57 20.49 22.29		02.29 00.03
16	09.50 08.13 15.00 16.46		06.34 18.16	05.41 03.53 20.52 22.32		02.28 00.05
17	09.47 08.10 15.04 16.50		06.30 18.19	05.37 03.50 20.55 22.36		02.27 00.06
18	09.45 08.06 15.07 16.53		06.26 18.22	05.33 03.46 20.58 22.39		02.26 00.07
19	09.42 08.03 15.10 16.56		06.23 18.25	05.30 03.43 21.01 22.43		02.25 00.08
20	09.39 07.59 15.14 17.00		06.19 18.28	05.26 03.39 21.05 22.46		02.25 00.09
21	09.36 07.56 15.17 17.03		06.16 18.31	05.22 03.36 05.24-05.28/4 21.08 22.50		02.24 00.09
22	09.34 07.52 15.20 17.06		06.12 18.34	05.19 03.33 05.22-05.29/7 21.11 22.53		02.24 00.09
23	09.31 07.49 15.24 17.10		06.08 18.37	05.15 03.29 05.21-05.30/9 21.14 22.57		02.25 00.09
24	09.28 07.45 15.27 17.13		06.05 18.40	05.11 03.26 05.21-05.31/10 21.18 23.00		02.25 00.09
25	09.25 07.42 15.31 17.16		06.01 18.44	05.08 03.23 05.20-05.31/11 21.21 23.04		02.26 00.08
26	09.22 07.38 15.34 17.19		05.57 18.47	05.04 03.20 05.20-05.31/11 21.24 23.07		02.27 00.07
27	09.19 07.35 15.38 17.23		05.54 18.50	05.01 03.17 05.20-05.32/12 21.28 23.10		02.28 00.07
28	09.16 07.31 09.06-09.09/3 15.41 17.26		05.50 18.53	04.57 03.13 05.20-05.32/12 21.31 23.14		02.30 00.05
29	09.13 15.45		06.46 19.56	04.53 03.10 05.20-05.32/12 21.34 23.17		02.31 00.04
30	09.10 15.48		06.43 19.59	04.50 03.07 05.21-05.32/11 21.38 23.20		02.33 00.02
31	09.06 15.52		06.39 20.02	03.04 05.21-05.32/11 23.24		
Potential sun hours	163	235	363	454	578	641
Sum of minutes with flicker	0	3	91	0	110	55

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

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

SHADOW - Calendar per WTG

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v**WTG: 2 - M5- E-70 E4 2,3 MW 2300**
 Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50 0,50

Operational time
 N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 336 290 258 618 1 095 913 457 524 726 653 632 498 7 000

	July	August	September	October	November	December
1	02.35	04.12	05.52	07.22	07.59	09.39
	00.01	22.28	20.36	18.47	15.57	14.28
2	02.37	04.15	05.55	07.25	08.02	09.42
	23.59	22.25	20.33	18.43	15.54	14.26
3	02.40	04.19	05.58	07.28	08.06	09.45
	23.57	22.21	20.29	18.40	15.51	14.24
4	02.42	04.22	06.01	07.31	08.09	09.48
	23.55	22.18	20.25	18.36	15.47	14.22
5	02.44	05.32-05.34/2	04.26	06.04	07.34	09.41-09.43/2
	23.52	22.14	20.22	18.32	15.44	14.20
6	02.47	05.31-05.36/5	04.29	06.07	07.37	09.37-09.46/9
	23.50	22.11	20.18	18.29	15.41	14.18
7	02.50	05.31-05.37/6	04.32	06.10	07.40	09.35-09.47/12
	23.47	22.07	20.14	18.25	15.37	14.16
8	02.53	05.30-05.37/7	04.36	06.13	07.43	09.34-09.47/13
	23.45	22.03	20.11	18.22	15.34	14.14
9	02.56	05.29-05.38/9	04.39	06.16	07.46	09.34-09.48/14
	23.42	22.00	20.07	18.18	15.31	14.13
10	02.59	05.29-05.39/10	04.42	06.19	07.49	09.34-09.47/13
	23.39	21.56	20.03	18.14	15.28	14.11
11	03.02	05.29-05.39/10	04.46	06.22	07.52	09.34-09.46/12
	23.37	21.53	20.00	18.11	15.24	14.10
12	03.05	05.29-05.40/11	04.49	06.25	07.55	09.34-09.45/11
	23.34	21.49	19.56	18.07	15.21	14.09
13	03.08	05.29-05.40/11	04.52	06.28	07.58	09.37-09.44/7
	23.31	21.45	19.52	18.04	15.18	14.08
14	03.11	05.30-05.41/11	04.55	06.31	08.01	08.43
	23.28	21.42	19.49	18.00	15.15	14.07
15	03.14	05.29-05.41/12	04.59	06.34	08.04	08.46
	23.25	21.38	19.45	17.56	15.12	14.06
16	03.18	05.29-05.41/12	05.02	06.37	08.07	08.50
	23.22	21.35	19.41	17.53	15.09	14.06
17	03.21	05.29-05.41/12	05.05	06.40	08.10	08.53
	23.19	21.31	19.38	17.49	15.06	14.05
18	03.24	05.30-05.41/11	05.08	06.43	08.14	08.57
	23.15	21.27	19.34	17.46	15.03	14.05
19	03.28	05.30-05.40/10	05.12	06.46	08.17	09.00
	23.12	21.24	19.30	17.42	15.00	14.05
20	03.31	05.31-05.41/10	05.15	06.49	08.20	09.03
	23.09	21.20	19.27	17.39	14.57	14.05
21	03.34	05.31-05.40/9	05.18	06.52	08.23	09.07
	23.06	21.17	19.23	17.35	14.54	14.05
22	03.38	05.33-05.39/6	05.21	06.55	08.26	09.10
	23.02	21.13	19.20	17.32	14.51	14.06
23	03.41		05.24	06.58	08.30	09.13
	22.59		21.09	19.16	17.28	14.48
24	03.45		05.27	07.01	08.33	09.17
	22.56		21.06	19.12	17.25	14.46
25	03.48		05.31	07.04	07.36	09.20
	22.52		21.02	19.09	16.21	14.43
26	03.52		05.34	07.07	07.39	09.23
	22.49		20.58	19.05	16.18	14.40
27	03.55		05.37	07.10	07.42	09.27
	22.45		20.55	19.01	16.14	14.38
28	03.58		05.40	07.13	07.46	09.30
	22.42		20.51	18.58	16.11	14.35
29	04.02		05.43	07.16	07.49	09.33
	22.39		20.47	18.54	16.08	14.33
30	04.05		05.46	07.19	07.52	09.36
	22.35		20.44	18.50	16.04	14.30
31	04.09		05.49		07.56	
	22.32		20.40		16.01	
Potential sun hours	620	513	394	302	192	125
Sum of minutes with flicker	164	0	0	93	0	0

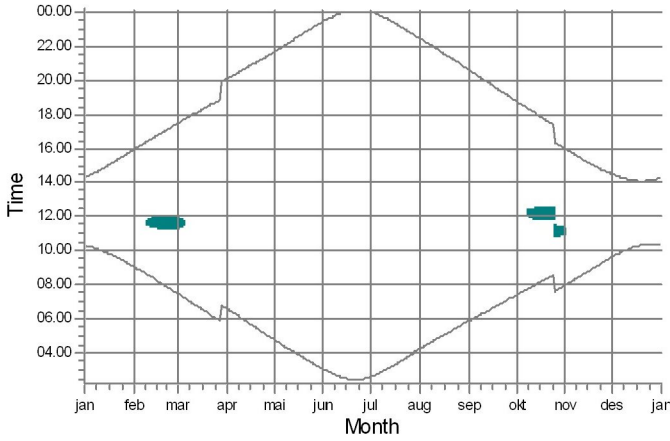
Table layout: For each day in each month the following matrix apply

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

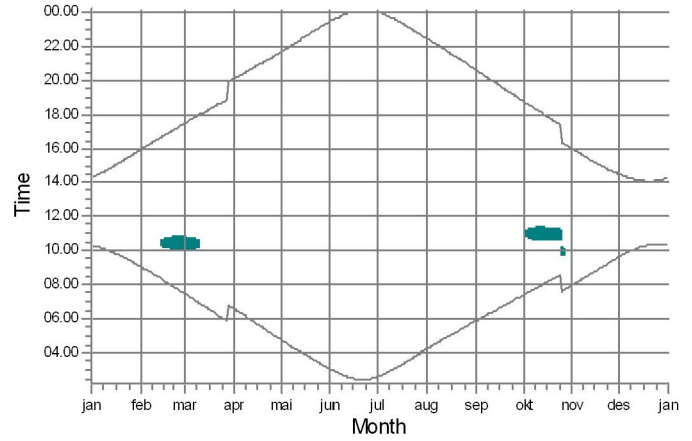
SHADOW - Calendar per WTG, graphical

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6

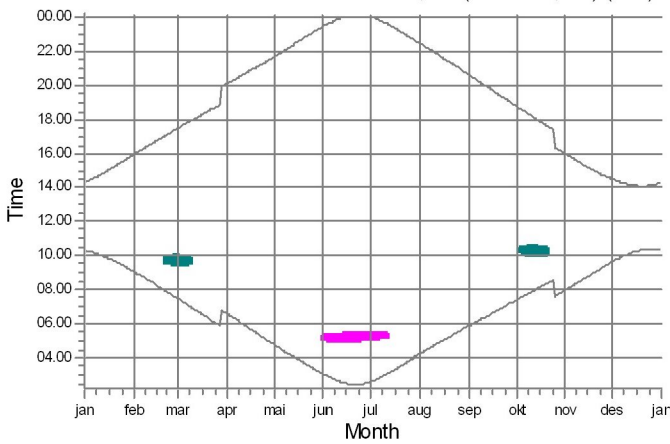
3: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (627)



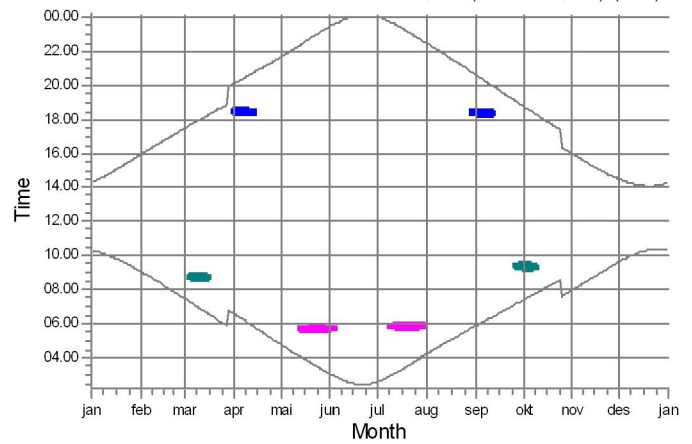
4: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (628)



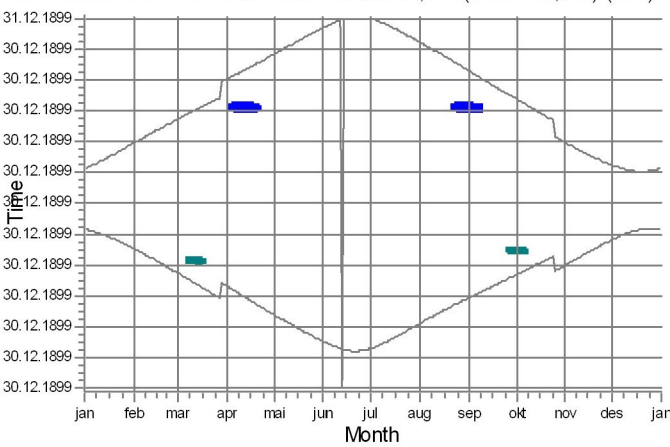
5: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (629)



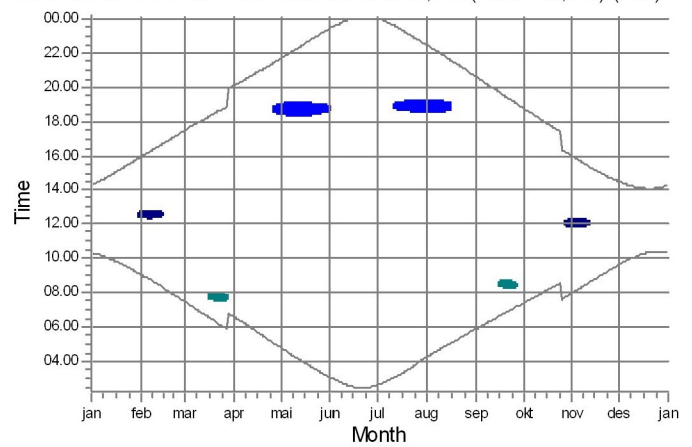
6: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (630)



7: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (631)



8: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (632)



Shadow receptors



C: Hundhammer



E: Løvmo



F: Storeienen

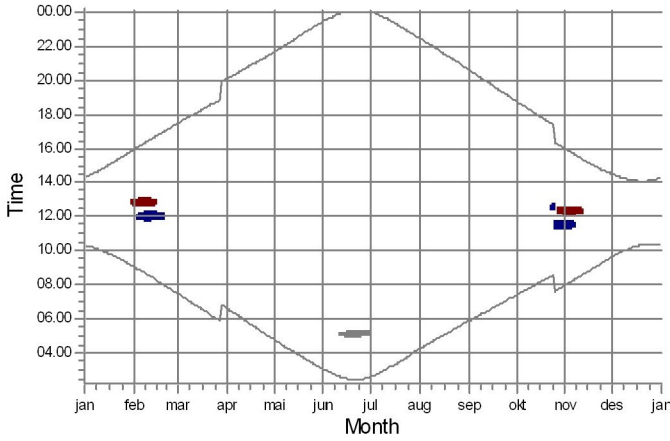


G: Hamland

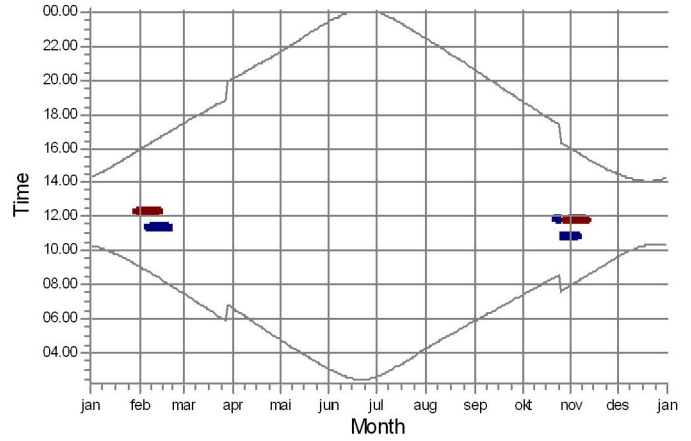
SHADOW - Calendar per WTG, graphical

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6

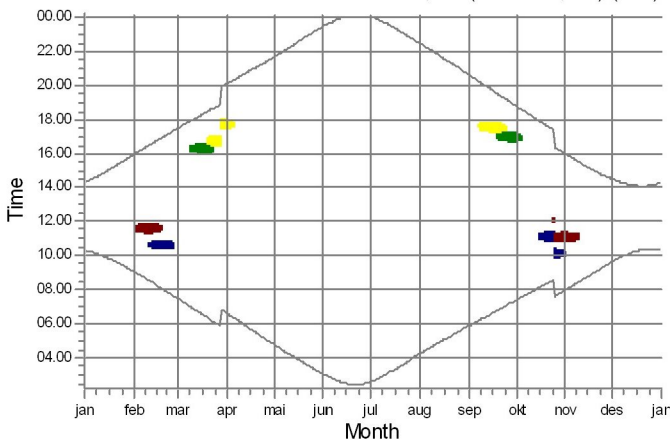
9: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (633)



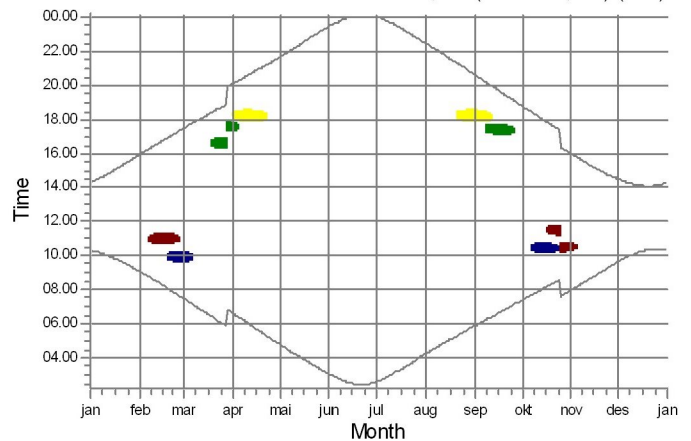
10: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (634)



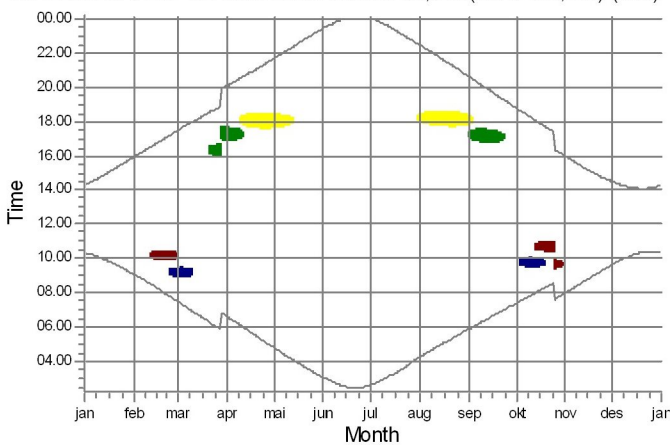
11: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (635)



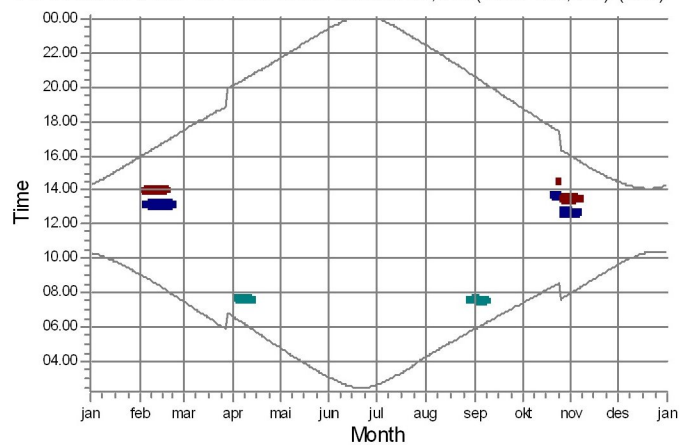
12: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (636)



13: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (637)



14: VESTAS V136-4.2 4200 136.0 !O! hub: 90,0 m (TOT: 158,0 m) (638)



Shadow receptors

- | | | | | | |
|---|-----------------|---|---------------|---|-------------|
|  | A: Hamlandsvika |  | D: Klungset |  | G: Hamland |
|  | B: Skogmo |  | F: Storeienen |  | H: Myhrvang |

Project:

Hundhammerfjellet Reetablering

NTE Energi AS

Licensed user:

Multiconsult v/Silje Aunehaugen

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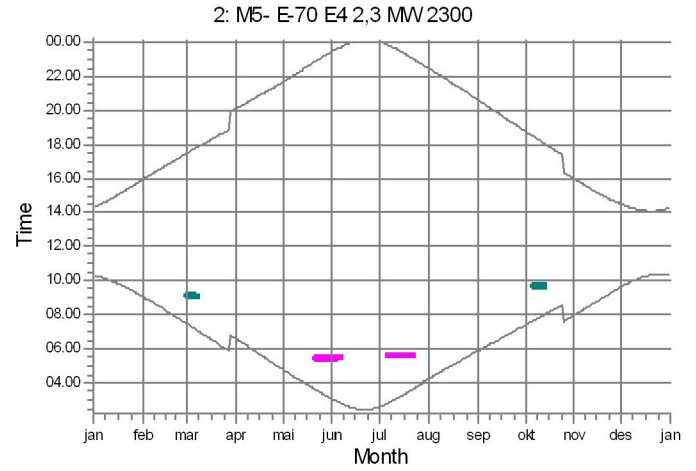
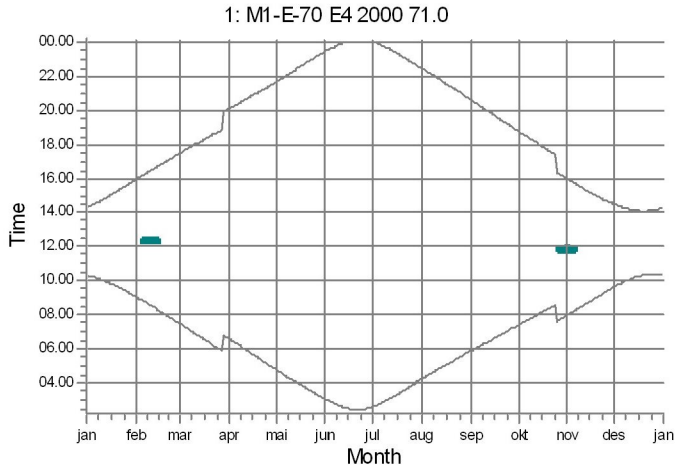
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

20.12.2018 10.43/3.2.737

SHADOW - Calendar per WTG, graphical

Calculation: Sannsynlig (real case) med solskinnsannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6



Shadow receptors



E: Løvmo



F: Storeienen

Project:

Hundhammerfjellet Reetablering

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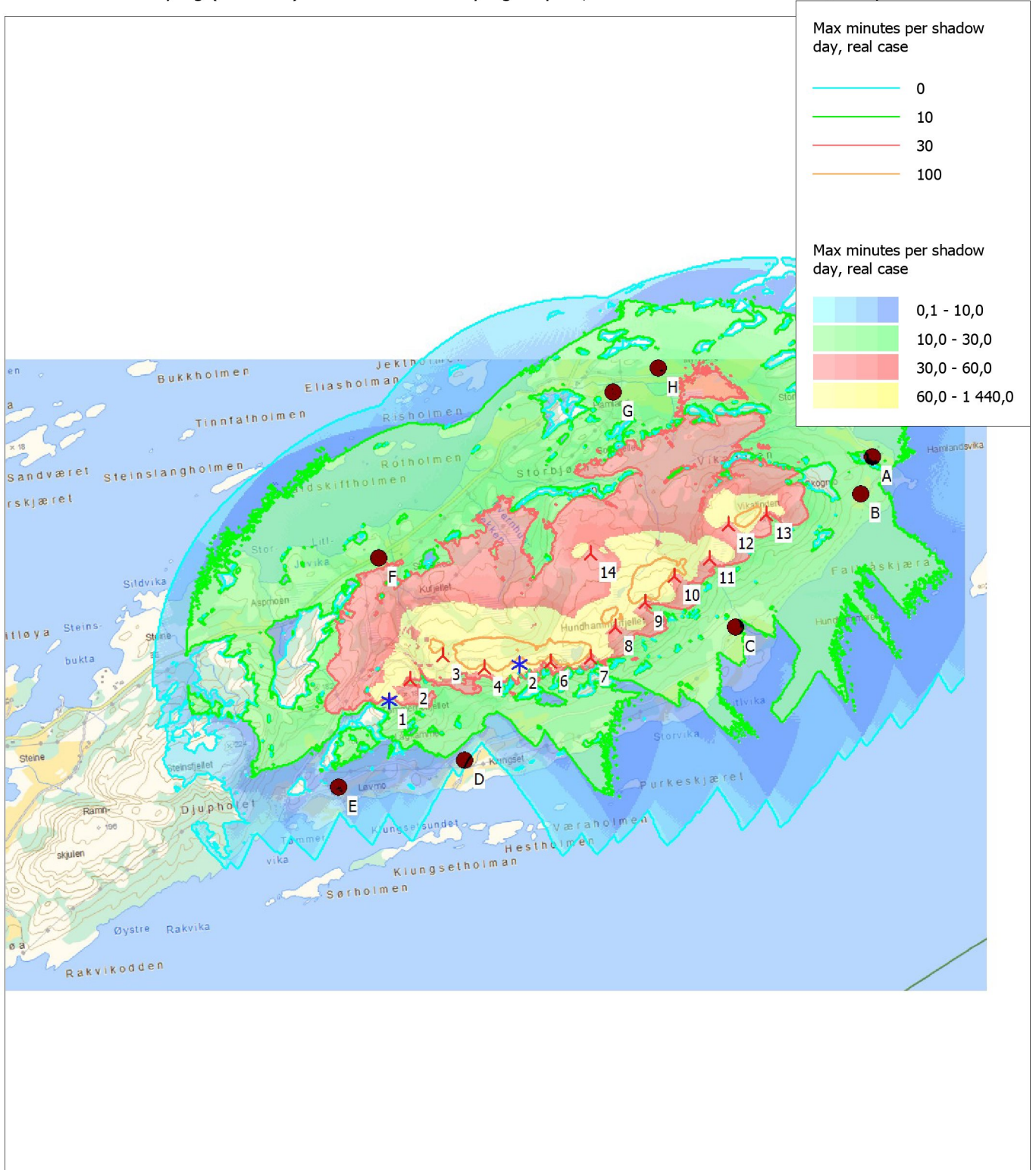
Helge Dalbu / helge.dalbu@multiconsult.no

Calculated:

20.12.2018 10.43/3.2.737

SHADOW - Map

Calculation: Sannsynlig (real case) med solskinnssannsynlighet på 0,5 12 x V136 + 2 x E70 timer/år layout v6



0 500 1000 1500 2000 m

Map: HHF, Print scale 1:40 000, Map center ETRS 89 Zone: 32 East: 612 510 North: 7 183 590

▲ New WTG

* Existing WTG

☉ Shadow receptor

Flicker map level: Height Contours 2013