

Bilaga 5 - skuggberäkningar

Project:

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VATTENFALL AB IT
Företagsenhet 1002
SE-962 80 Jokkmokk

Jenny Longworth / jenny.longworth@vattenfall.com

Calculated:

2013-10-18 18:41/2.9.250

SHADOW - Main Result

Calculation: 130923 V90, 18 Vindkraftverk, 150m Totalhöjd

Assumptions for shadow calculations

Maximum distance for influence

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

Please look in WTG table

Minimum sun height over horizon for influence 3 °

Day step for calculation 1 days

Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [VAXJO /KRONOBER G]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,36	1,52	2,62	6,08	8,82	7,64	6,65	5,42	4,02	2,68	1,38	0,88

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

VAT21_WAsP_100nm

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
462	419	433	556	529	629	737	873	1388	1138	572	397	8131

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

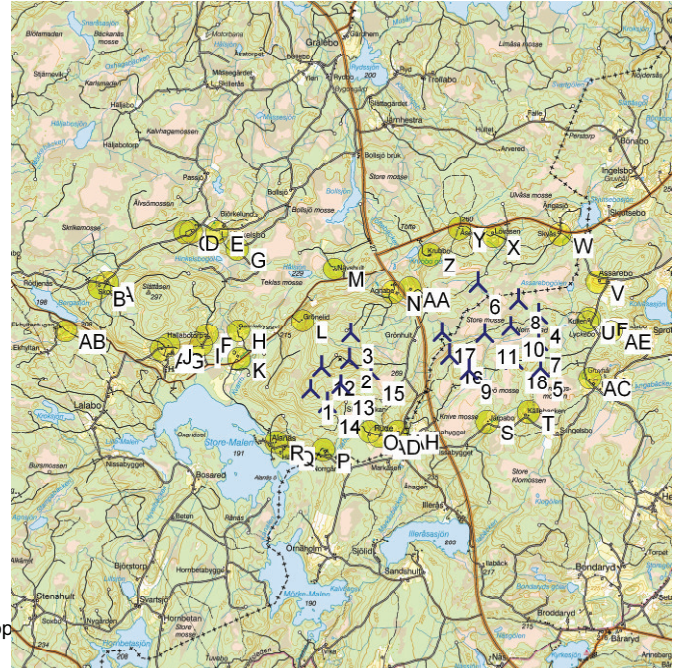
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: 120531_GH2mCont_2mScan_5mTop

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m



New WTG

Scale 1:125 000

Shadow receptor

WTGs

RN	East	North	Z	Row data/Description	WTG type			Shadow data				
					Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
			[m]				[kW]	[m]	[m]	[m]	[RPM]	
1	1 357 791	6 364 178	290,3	3. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
2	1 358 431	6 364 681	308,7	4. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
3	1 358 453	6 365 113	293,2	5. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
4	1 361 555	6 365 430	272,0	8. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
5	1 361 584	6 364 550	281,4	9. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
6	1 360 553	6 365 930	264,0	10. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
7	1 361 552	6 364 967	271,4	11. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
8	1 361 219	6 365 660	270,0	12. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
9	1 360 406	6 364 505	276,3	13. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
10	1 361 093	6 365 218	268,0	14. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
11	1 360 666	6 365 101	266,6	15. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
12	1 357 971	6 364 560	287,1	17. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
13	1 358 288	6 364 254	278,0	18. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
14	1 358 069	6 363 948	265,1	19. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
15	1 358 788	6 364 480	286,1	20. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
16	1 360 086	6 364 748	266,0	21. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
17	1 359 959	6 365 114	257,6	22. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9
18	1 361 149	6 364 673	274,3	23. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	105,0	1 424	14,9

Shadow receptor-Input

No.	Name	RN		Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
		East	North							
				[m]	[m]	[m]	[m]	[°]	[°]	
A	1	1 354 439	6 365 935	231,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"
B	2	1 354 303	6 365 863	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
C	3	1 355 719	6 366 777	230,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
D	4	1 355 823	6 366 785	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"

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SHADOW - Main Result**Calculation:** 130923 V90, 18 Vindkraftverk, 150m Totalhöjd

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No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
E 5	1 356 247	6 366 773	220,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
F 6	1 356 082	6 365 087	238,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
G 7	1 356 579	6 366 515	237,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
H 8	1 356 602	6 365 151	223,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
I 9	1 355 989	6 364 921	223,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
J 10	1 355 455	6 364 908	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
K 11	1 356 610	6 364 688	204,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
L 12	1 357 661	6 365 318	239,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
M 13	1 358 186	6 366 173	238,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
N 14	1 359 151	6 365 788	251,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
O 18	1 358 766	6 363 488	243,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
P 19	1 358 001	6 363 183	217,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Q 20	1 357 381	6 363 228	204,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
R 21	1 357 226	6 363 318	206,2	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
S 23	1 360 701	6 363 648	259,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
T 24	1 361 391	6 363 808	280,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
U 26	1 362 356	6 365 303	284,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
V 27	1 362 521	6 365 953	278,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
W 28	1 361 906	6 366 738	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
X 29	1 360 812	6 366 711	272,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Y 30	1 360 247	6 366 836	262,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Z 31	1 359 762	6 366 416	259,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AA 32	1 359 427	6 365 846	262,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AB 33	1 353 749	6 365 145	228,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AC 35	1 362 402	6 364 363	270,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AD 38	1 358 924	6 363 405	248,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AE 37	1 362 749	6 365 140	286,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AF 36	1 362 389	6 365 360	289,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AG 17	1 355 333	6 364 842	245,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AH 15	1 359 233	6 363 492	249,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case		Shadow, expected values	
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
A 1		0:00	0	0:00	0:00
B 2		0:00	0	0:00	0:00
C 3		0:00	0	0:00	0:00
D 4		0:00	0	0:00	0:00
E 5		0:00	0	0:00	0:00
F 6		0:00	0	0:00	0:00
G 7		0:00	0	0:00	0:00
H 8		0:00	0	0:00	0:00
I 9		0:00	0	0:00	0:00
J 10		0:00	0	0:00	0:00
K 11		8:44	41	0:17	1:27
L 12		59:17	151	0:46	6:19
M 13		16:51	53	0:22	1:20
N 14		39:04	114	0:43	4:38
O 18		27:54	58	0:34	6:33
P 19		0:00	0	0:00	0:00
Q 20		0:00	0	0:00	0:00
R 21		0:00	0	0:00	0:00
S 23		0:00	0	0:00	0:00
T 24		15:57	71	0:20	3:48
U 26		45:42	153	0:35	7:49

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SHADOW - Main Result**Calculation:** 130923 V90, 18 Vindkraftverk, 150m Totalhöjd

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No.	Name	Shadow, worst case		Max shadow hours per day [h/day]	Shadow, expected values
		Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
V 27		16:12	77	0:20	2:07
W 28		14:21	52	0:19	1:21
X 29		24:01	44	0:44	2:00
Y 30		14:54	44	0:24	1:09
Z 31		9:33	32	0:24	1:08
AA 32		45:13	141	0:35	5:03
AB 33		0:00	0	0:00	0:00
AC 35		37:41	109	0:31	8:45
AD 38		28:57	72	0:29	6:57
AE 37		13:17	67	0:18	2:21
AF 36		39:24	146	0:26	6:37
AG 17		0:00	0	0:00	0:00
AH 15		15:40	66	0:18	3:37

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

No.	Name	Worst case [h/year]	Expected [h/year]
1 3.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2012)	30:32	5:30
2 4.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2014)	18:17	2:00
3 5.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2015)	44:25	4:58
4 8.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2018)	32:17	6:34
5 9.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2019)	29:24	4:52
6 10.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2021)	48:45	5:30
7 11.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2022)	46:42	8:36
8 12.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2024)	34:04	4:26
9 13.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2025)	15:57	3:48
10 14.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2026)	5:29	0:54
11 15.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2027)	0:00	0:00
12 17.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2029)	24:33	2:45
13 18.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2030)	20:47	3:09
14 19.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2031)	34:39	8:16
15 20.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2032)	0:00	0:00
16 21.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2035)	21:28	1:51
17 22.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2036)	25:35	2:32
18 23.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2037)	9:38	1:44

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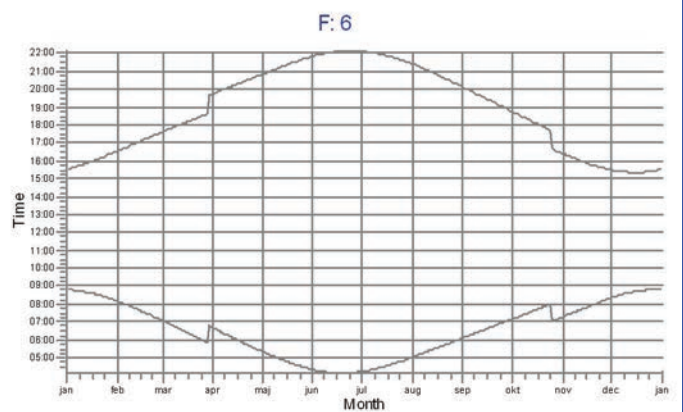
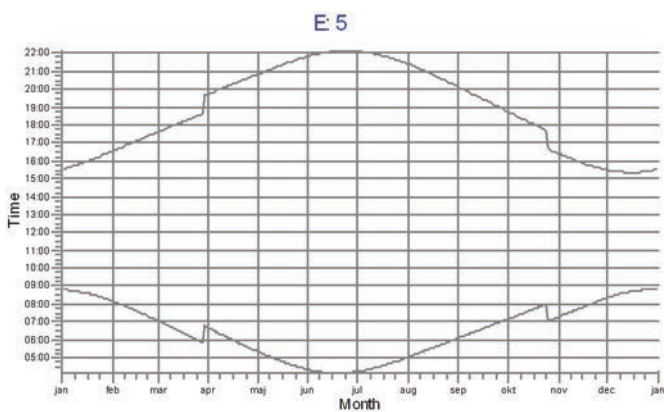
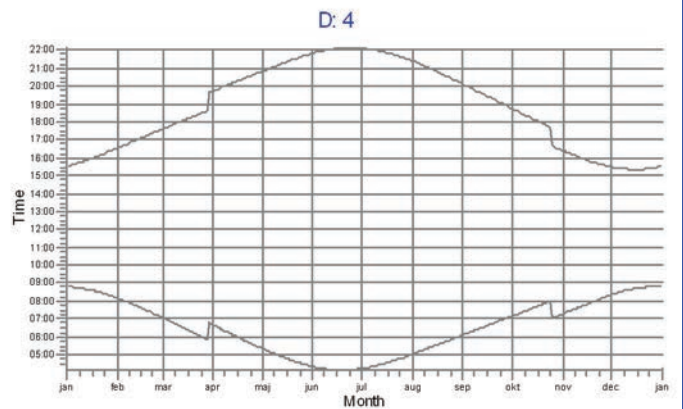
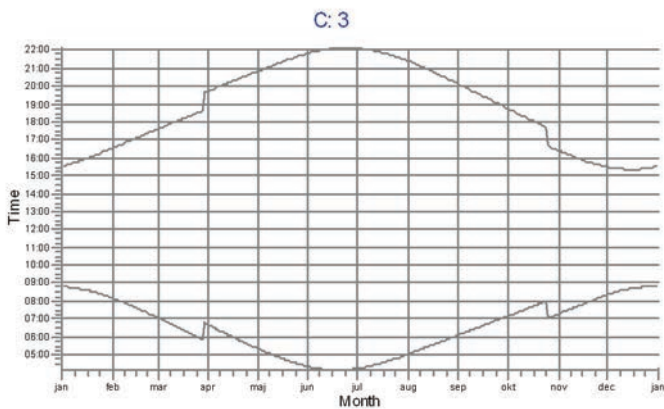
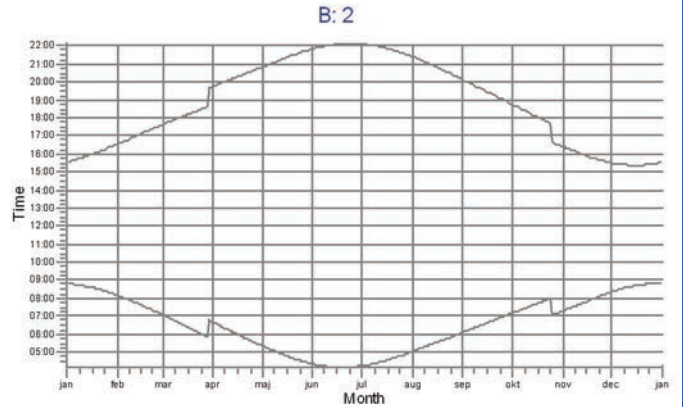
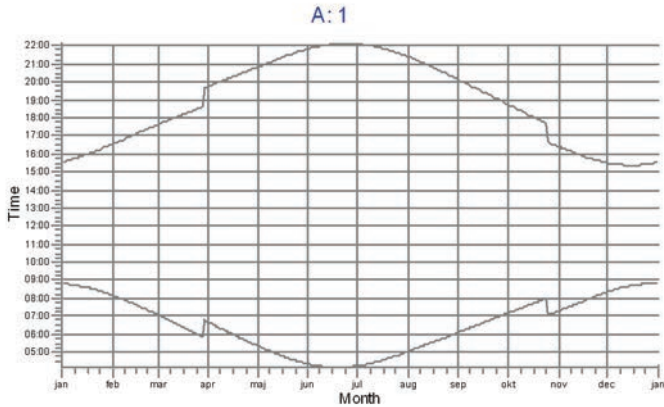
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SHADOW - Calendar, graphical

Calculation: 130923 V90, 18 Vindkraftverk, 150m Totalhöjd



WTGs

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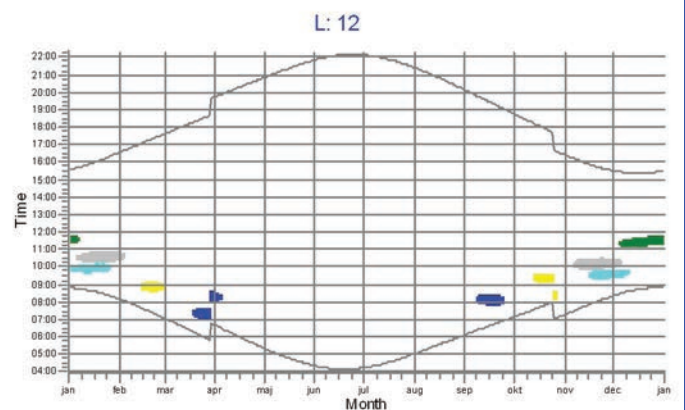
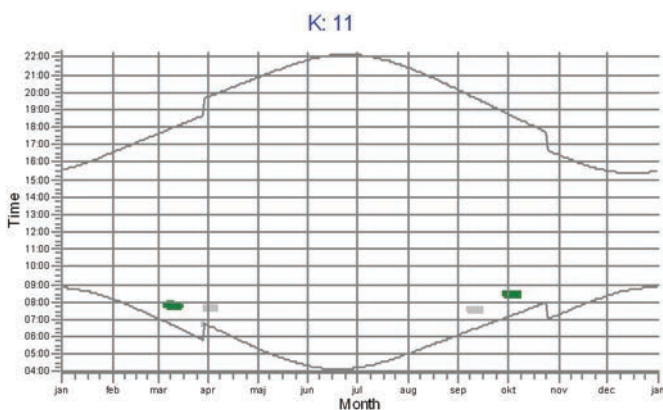
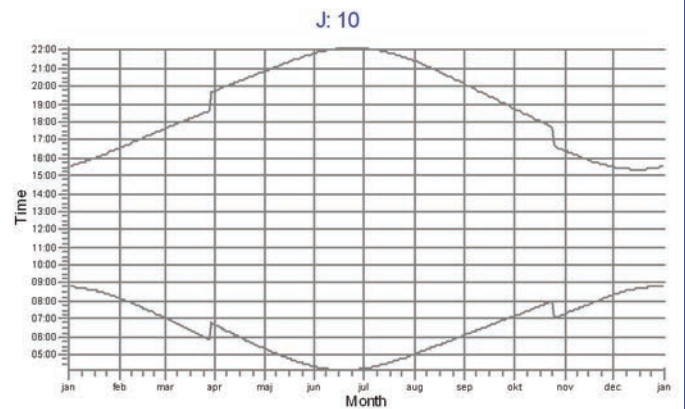
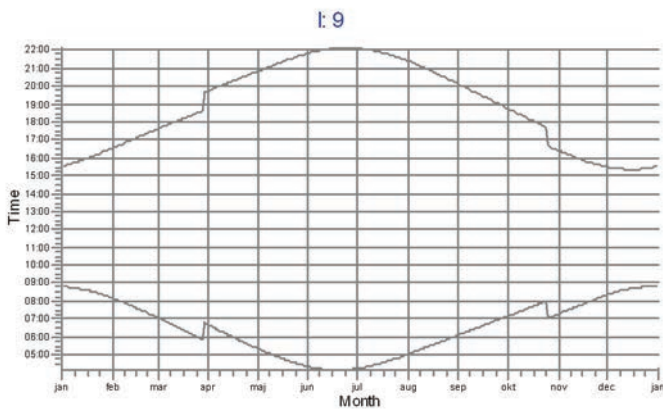
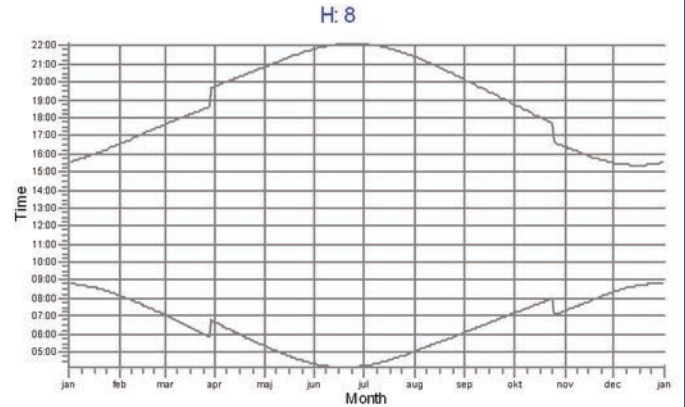
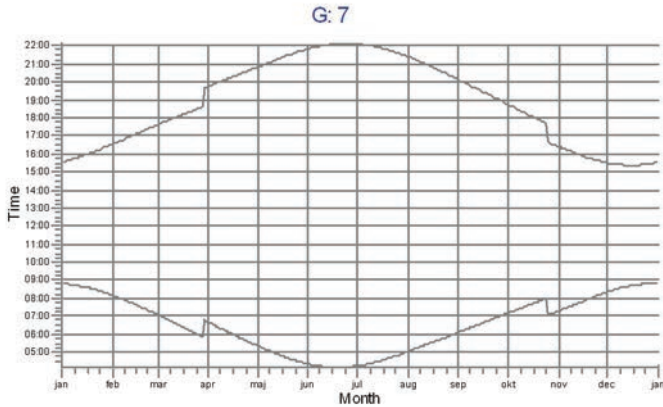
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SHADOW - Calendar, graphical

Calculation: 130923 V90, 18 Vindkraftverk, 150m Totalhöjd



WTGs

- 1: 3. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2012)
- 2: 4. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2014)
- 3: 5. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2015)

- 12: 17. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2029)
- 13: 18. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2030)

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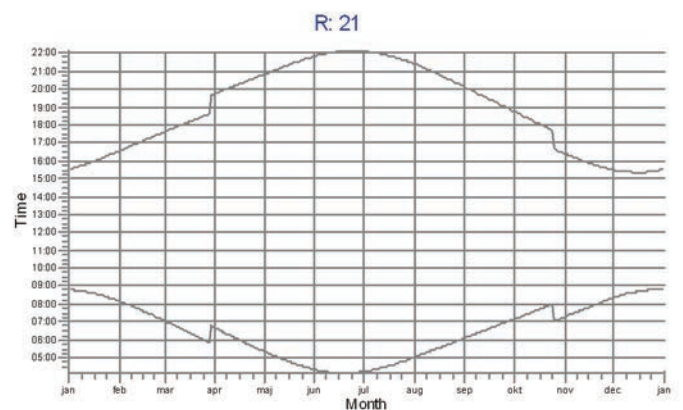
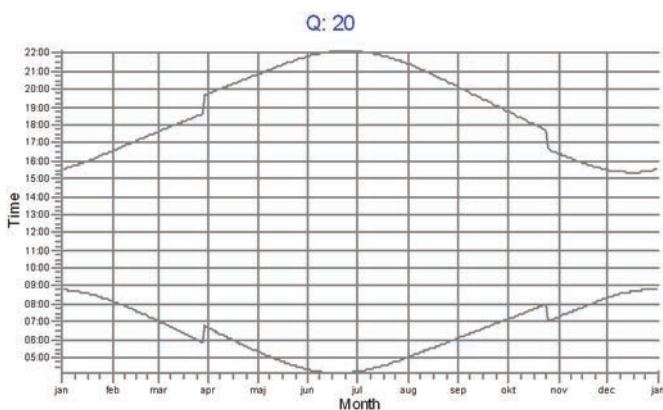
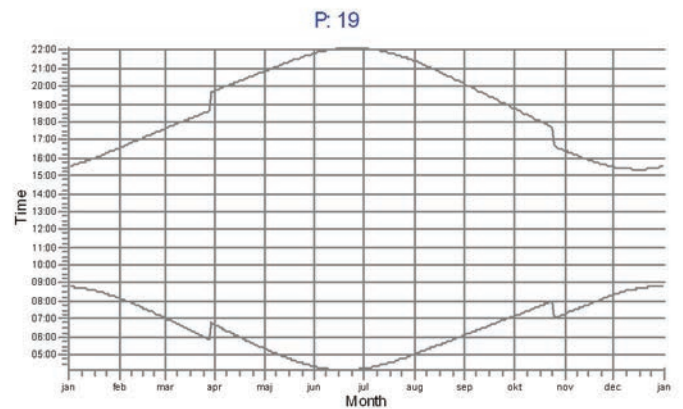
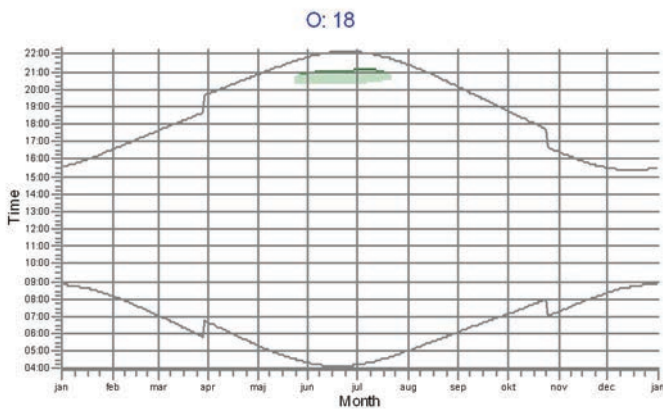
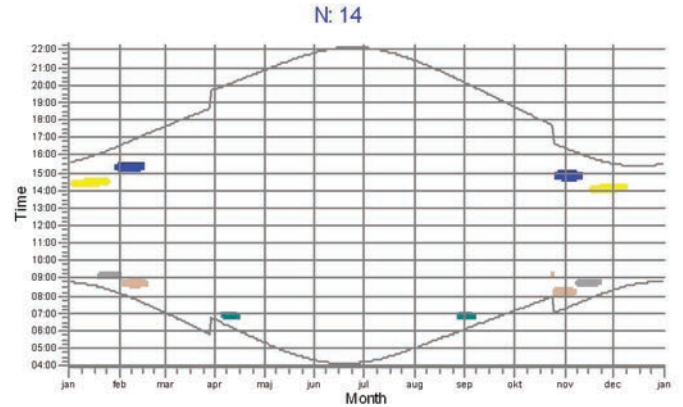
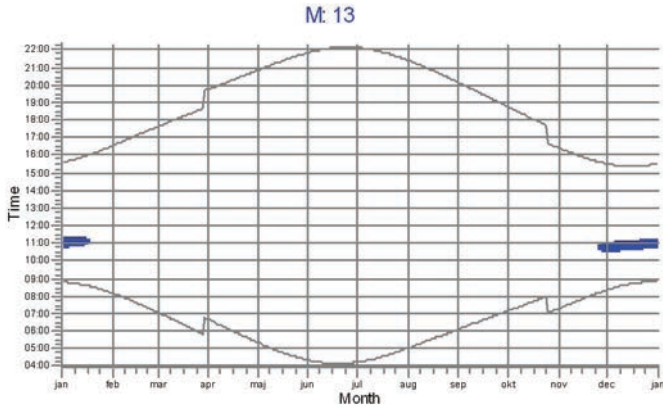
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WTGs

- 1: 3. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2012)
- 2: 4. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2014)
- 3: 5. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2015)
- 6: 10. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2021)

- 14: 19. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2031)
- 16: 21. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2035)
- 17: 22. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2036)

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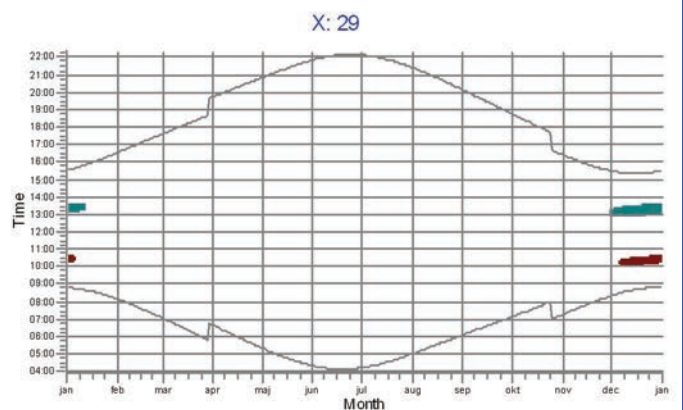
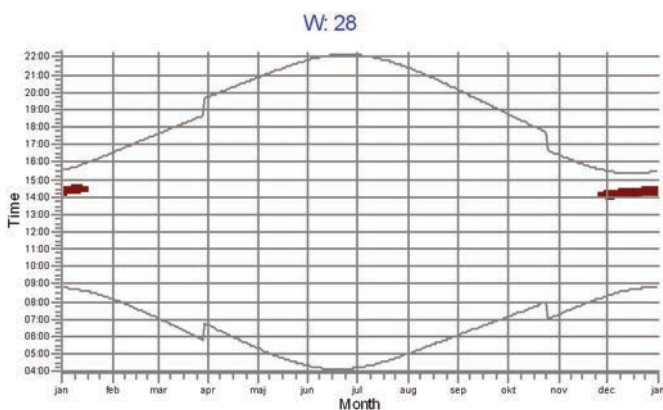
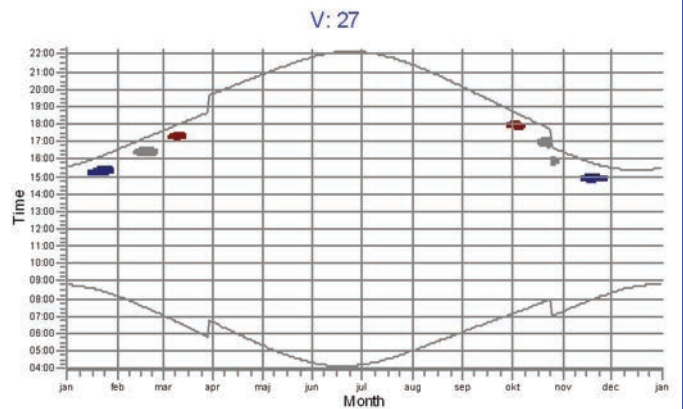
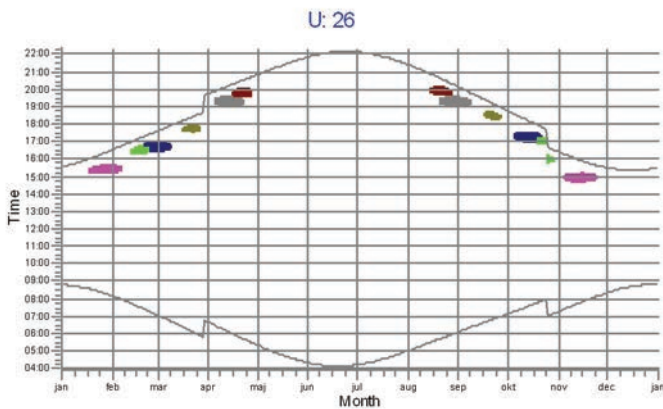
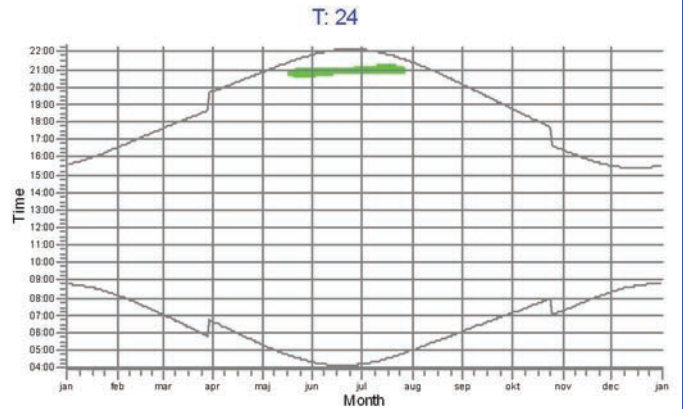
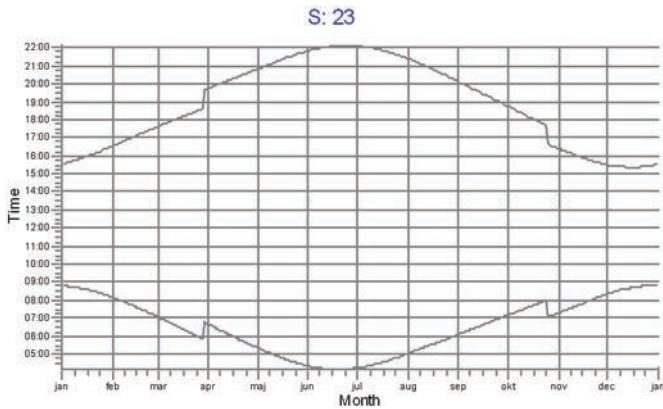
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WTGs

- 4: 8. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2018)
- 5: 9. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2019)
- 6: 10. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2021)
- 7: 11. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2022)

- 8: 12. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2024)
- 9: 13. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2025)
- 10: 14. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2026)
- 18: 23. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2037)

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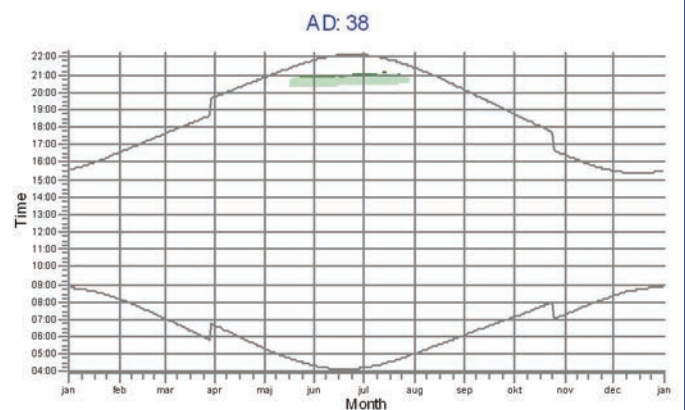
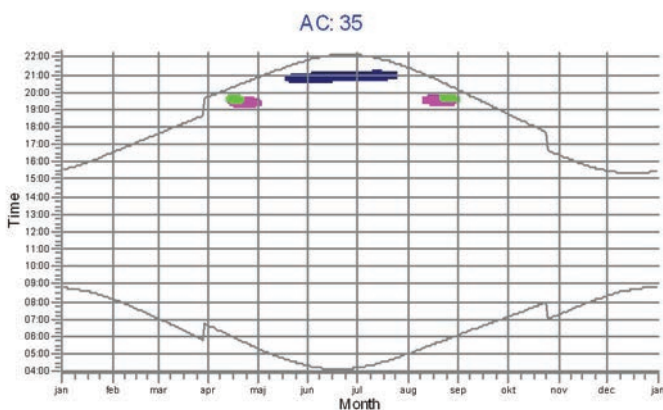
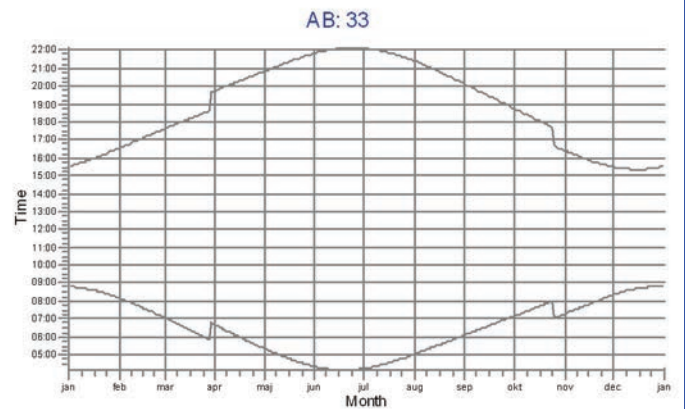
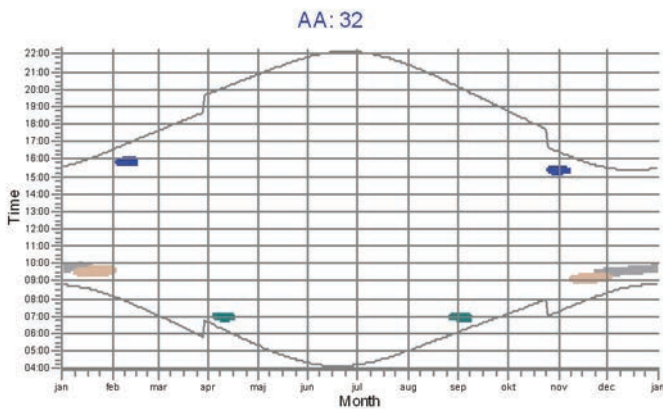
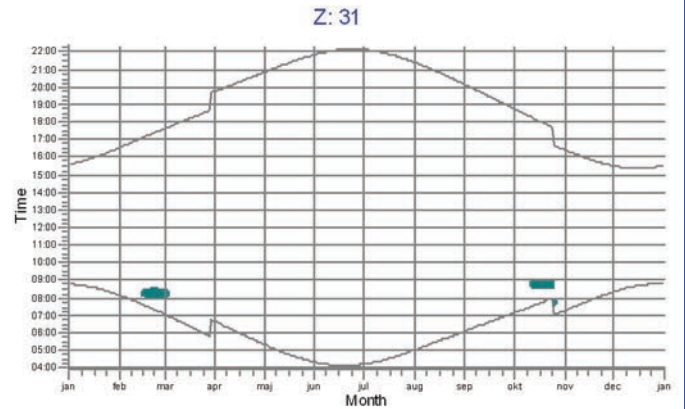
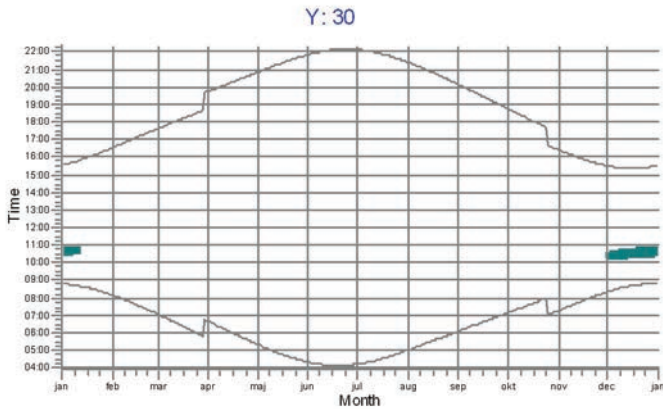
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SHADOW - Calendar, graphical

Calculation: 130923 V90, 18 Vindkraftverk, 150m Totalhöjd



WTGs

- 1: 3. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2012)
- 3: 5. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2015)
- 5: 9. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2019)
- 6: 10. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2021)
- 7: 11. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2022)

- 14: 19. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2031)
- 16: 21. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2035)
- 17: 22. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2036)
- 18: 23. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2037)

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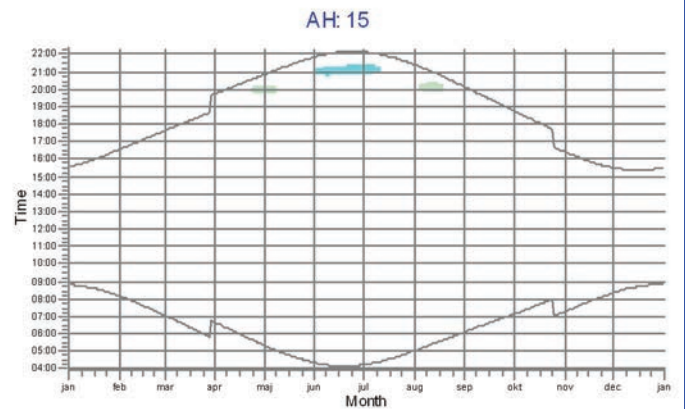
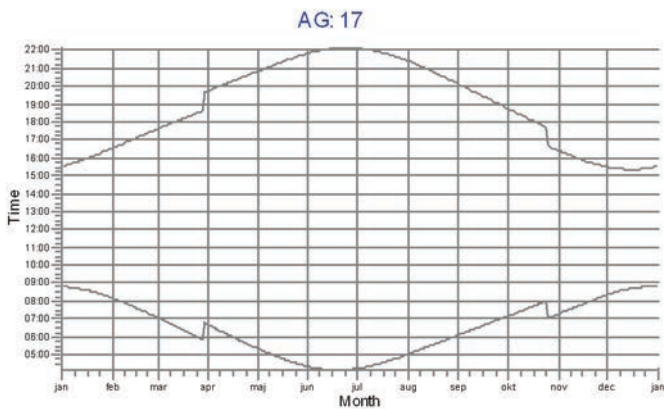
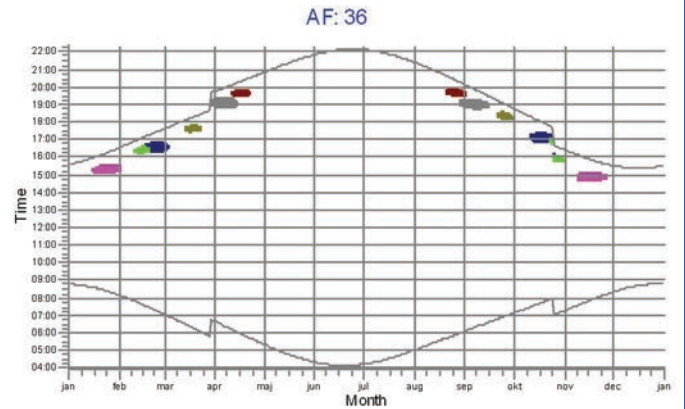
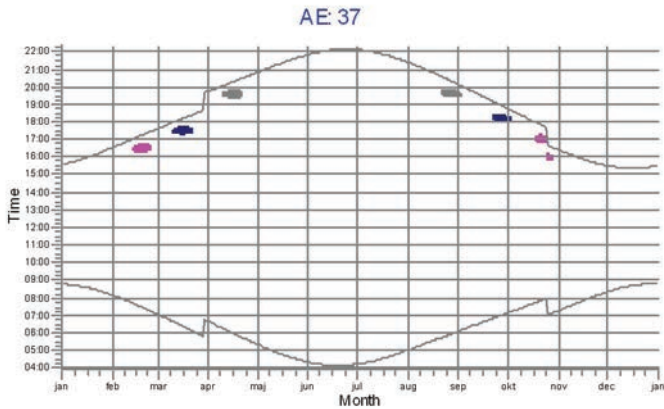
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SHADOW - Calendar, graphical

Calculation: 130923 V90, 18 Vindkraftverk, 150m Totalhöjd



WTGs

- 4: 8. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2018)
- 5: 9. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2019)
- 7: 11. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2022)
- 8: 12. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2024)

- 10: 14. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2026)
- 13: 18. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2030)
- 14: 19. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2031)
- 18: 23. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2037)

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SHADOW - Map

Calculation: 130923 V90, 18 Vindkraftverk, 150m Totalhöjd

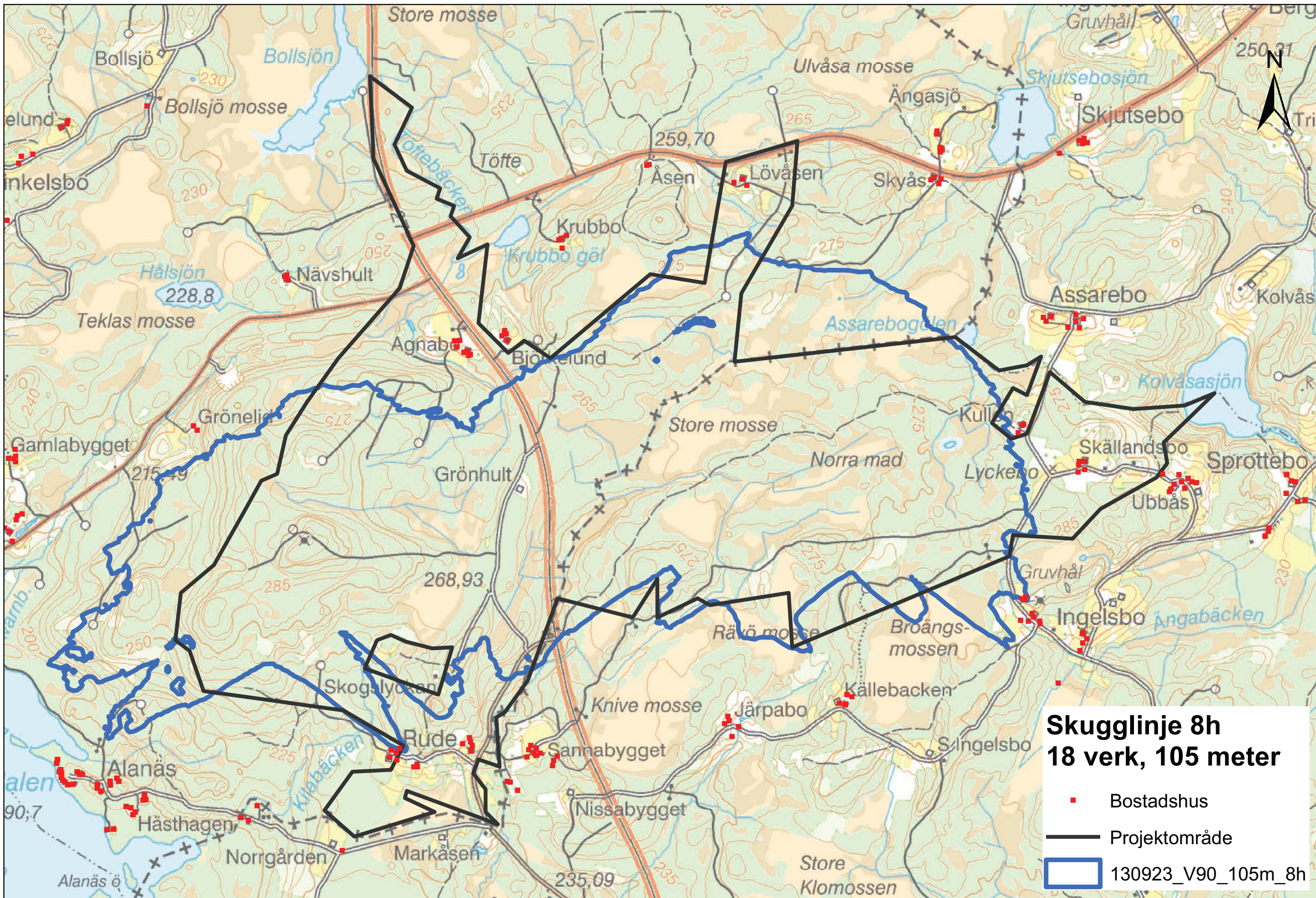


0 1 2 3 4 km

Map: Bitmap map: 06D.tif , Print scale 1:75 000, Map center RN East: 1 358 249 North: 6 365 009

New WTG

Shadow receptor



Skugglinje 8h
18 verk, 105 meter

- Bostadshus
- Projektområde
- 130923_V90_105m_8h

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SHADOW - Main Result

Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd

Assumptions for shadow calculations

Maximum distance for influence

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

Please look in WTG table

Minimum sun height over horizon for influence

3 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) [VAXJO /KRONOBER G]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,36	1,52	2,62	6,08	8,82	7,64	6,65	5,42	4,02	2,68	1,38	0,88

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

VAT21_WAsP_100nm

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
471	427	442	569	540	641	752	890	1 420	1 163	583	405	8 303

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

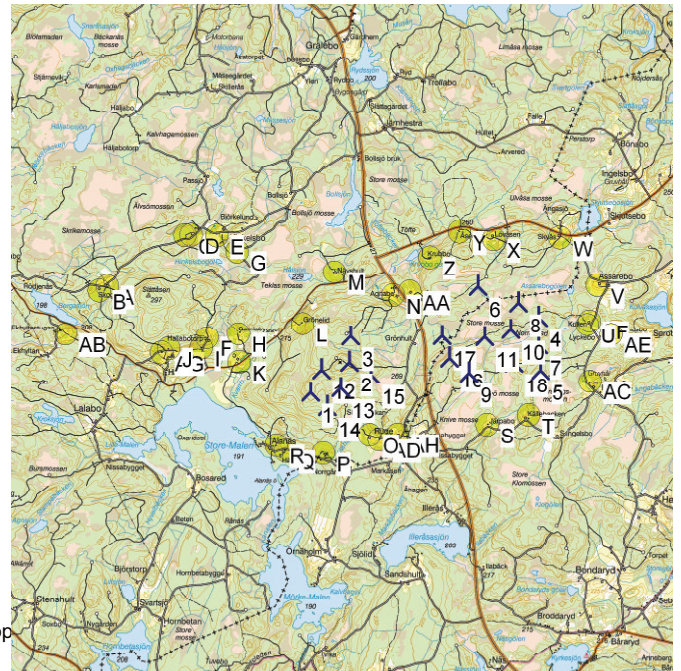
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: 120531_GH2mCont_2mScan_5mTop

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m



▲ New WTG

Scale 1:125 000
● Shadow receptor

WTGs

RN	East	North	Z	Row data/Description	WTG type			Shadow data				
					Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
			[m]				[kW]	[m]	[m]	[m]	[RPM]	
1	1 357 791	6 364 178	290,3	3. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
2	1 358 431	6 364 681	308,7	4. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
3	1 358 453	6 365 113	293,2	5. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
4	1 361 555	6 365 430	272,0	8. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
5	1 361 584	6 364 550	281,4	9. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
6	1 360 553	6 365 930	264,0	10. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
7	1 361 552	6 364 967	271,4	11. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
8	1 361 219	6 365 660	270,0	12. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
9	1 360 406	6 364 505	276,3	13. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
10	1 361 093	6 365 218	268,0	14. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
11	1 360 666	6 364 967	266,6	15. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
12	1 357 971	6 364 560	287,1	17. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
13	1 358 288	6 364 254	278,0	18. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
14	1 358 069	6 363 948	265,1	19. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
15	1 358 788	6 364 480	286,1	20. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
16	1 360 086	6 364 748	266,0	21. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
17	1 359 959	6 365 114	257,6	22. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9
18	1 361 149	6 364 673	274,3	23. VESTAS V90 2000 90.0 !O! ...	Yes	VESTAS	V90-2 000	2 000	90,0	155,0	1 419	14,9

Shadow receptor-Input

No.	Name	RN		Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
		East	North							
				[m]	[m]	[m]	[m]	[°]	[°]	
A	1	1 354 439	6 365 935	231,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"
B	2	1 354 303	6 365 863	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
C	3	1 355 719	6 366 777	230,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
D	4	1 355 823	6 366 785	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"

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2013-10-18 18:36/2.9.250

SHADOW - Main Result**Calculation:** 130923 V90 18 Vindkraftverk, 200m Totalhöjd

...continued from previous page

No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
E 5	1 356 247	6 366 773	220,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
F 6	1 356 082	6 365 087	238,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
G 7	1 356 579	6 366 515	237,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
H 8	1 356 602	6 365 151	223,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
I 9	1 355 989	6 364 921	223,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
J 10	1 355 455	6 364 908	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
K 11	1 356 610	6 364 688	204,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
L 12	1 357 661	6 365 318	239,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
M 13	1 358 186	6 366 173	238,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
N 14	1 359 151	6 365 788	251,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
O 18	1 358 766	6 363 488	243,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
P 19	1 358 001	6 363 183	217,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Q 20	1 357 381	6 363 228	204,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
R 21	1 357 226	6 363 318	206,2	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
S 23	1 360 701	6 363 648	259,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
T 24	1 361 391	6 363 808	280,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
U 26	1 362 356	6 365 303	284,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
V 27	1 362 521	6 365 953	278,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
W 28	1 361 906	6 366 738	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
X 29	1 360 812	6 366 711	272,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Y 30	1 360 247	6 366 836	262,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Z 31	1 359 762	6 366 416	259,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AA 32	1 359 427	6 365 846	262,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AB 33	1 353 749	6 365 145	228,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AC 35	1 362 402	6 364 363	270,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AD 38	1 358 924	6 363 405	248,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AE 37	1 362 749	6 365 140	286,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AF 36	1 362 389	6 365 360	289,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AG 17	1 355 333	6 364 842	245,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AH 15	1 359 233	6 363 492	249,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case		Shadow, expected values	
		Shadow hours per year	Shadow days per year	Max shadow hours per day	Shadow hours per year
		[h/year]	[days/year]	[h/day]	[h/year]
A 1		0:00	0	0:00	0:00
B 2		0:00	0	0:00	0:00
C 3		0:00	0	0:00	0:00
D 4		0:00	0	0:00	0:00
E 5		0:00	0	0:00	0:00
F 6		0:00	0	0:00	0:00
G 7		0:00	0	0:00	0:00
H 8		0:00	0	0:00	0:00
I 9		0:00	0	0:00	0:00
J 10		0:00	0	0:00	0:00
K 11		8:33	42	0:17	1:35
L 12		63:21	182	0:39	7:22
M 13		13:38	50	0:21	1:16
N 14		43:08	140	0:44	5:15
O 18		0:45	10	0:06	0:10
P 19		0:00	0	0:00	0:00
Q 20		0:00	0	0:00	0:00
R 21		0:00	0	0:00	0:00
S 23		0:00	0	0:00	0:00
T 24		14:21	51	0:20	3:23
U 26		48:05	149	0:43	8:50

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SHADOW - Main Result**Calculation:** 130923 V90 18 Vindkraftverk, 200m Totalhöjd

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No.	Name	Shadow, worst case			Shadow, expected values
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
V 27		17:00	76	0:20	2:19
W 28		14:22	70	0:18	1:29
X 29		47:46	74	0:48	4:28
Y 30		23:30	72	0:25	2:03
Z 31		8:53	29	0:24	1:10
AA 32		34:49	119	0:26	4:28
AB 33		0:00	0	0:00	0:00
AC 35		29:32	91	0:31	7:06
AD 38		19:50	47	0:30	4:42
AE 37		15:53	70	0:18	2:56
AF 36		43:37	147	0:38	7:50
AG 17		0:00	0	0:00	0:00
AH 15		7:10	31	0:18	1:51

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

No.	Name	Worst case [h/year]	Expected [h/year]
1 3.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2012)	32:13	4:35
2 4.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2014)	14:48	1:44
3 5.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2015)	39:31	5:23
4 8.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2018)	38:41	7:48
5 9.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2019)	29:48	5:25
6 10.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2021)	70:15	8:05
7 11.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2022)	36:24	6:17
8 12.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2024)	44:30	6:14
9 13.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2025)	14:21	3:23
10 14.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2026)	7:44	1:18
11 15.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2027)	0:00	0:00
12 17.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2029)	18:45	2:21
13 18.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2030)	8:04	0:47
14 19.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2031)	21:45	5:19
15 20.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2032)	13:56	1:20
16 21.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2035)	14:50	1:25
17 22.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2036)	20:30	2:10
18 23.	VESTAS V90 2000 90.0 !O! hub: 140,0 m (2037)	11:49	2:07

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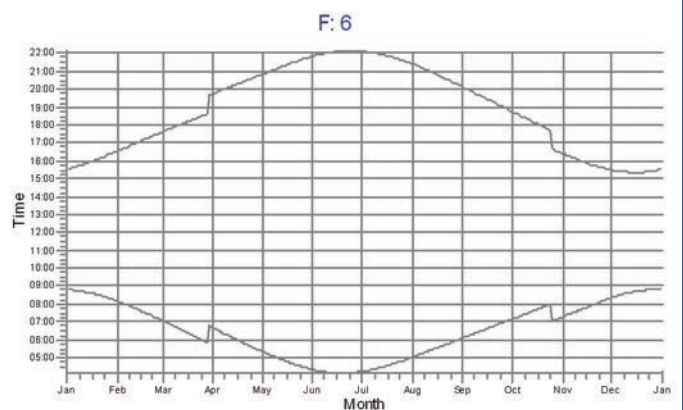
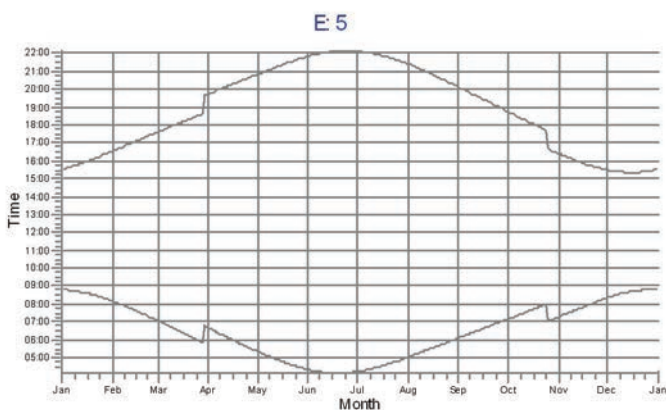
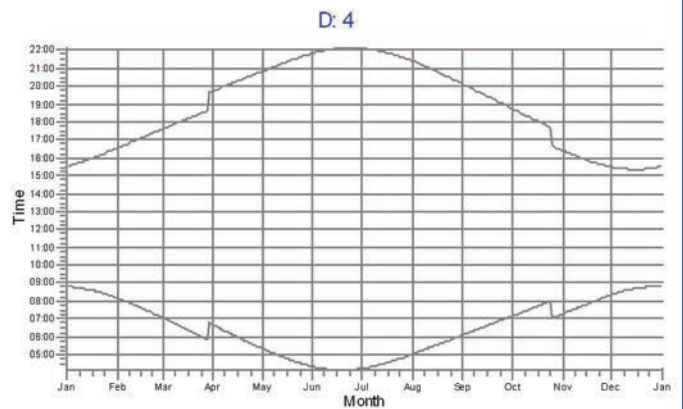
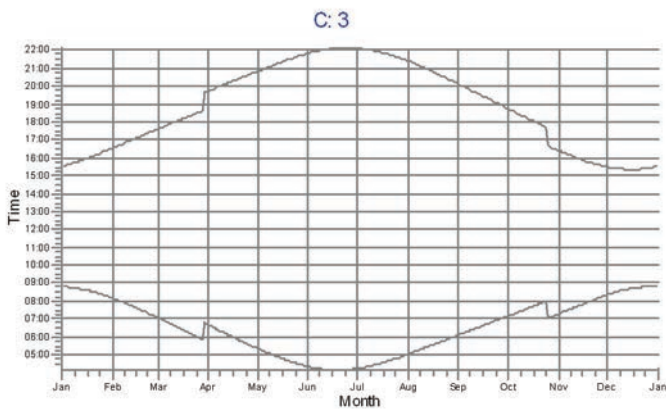
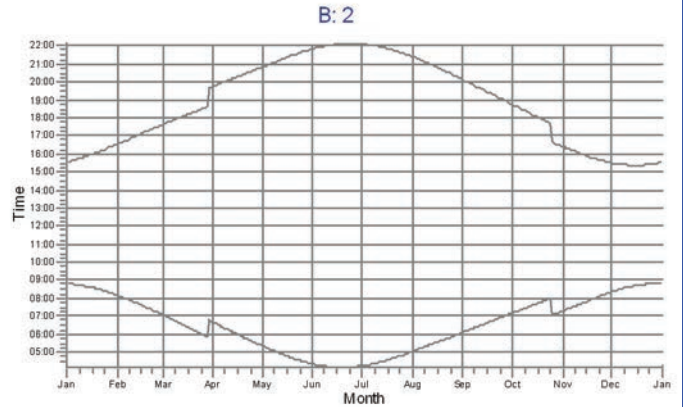
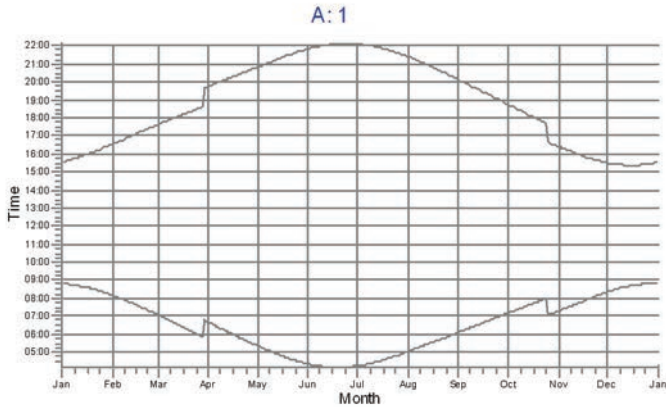
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SHADOW - Calendar, graphical

Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd



WTGs

Project:

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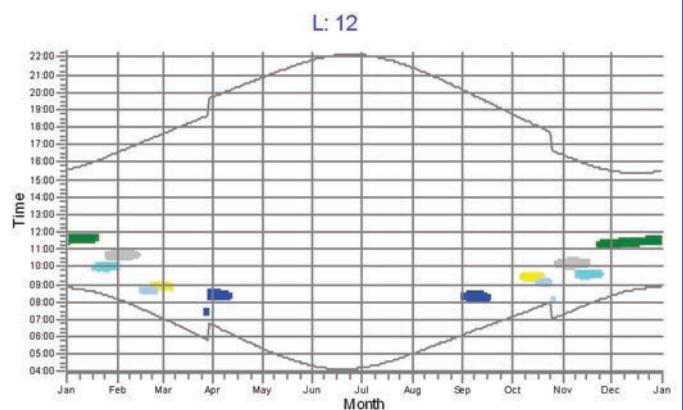
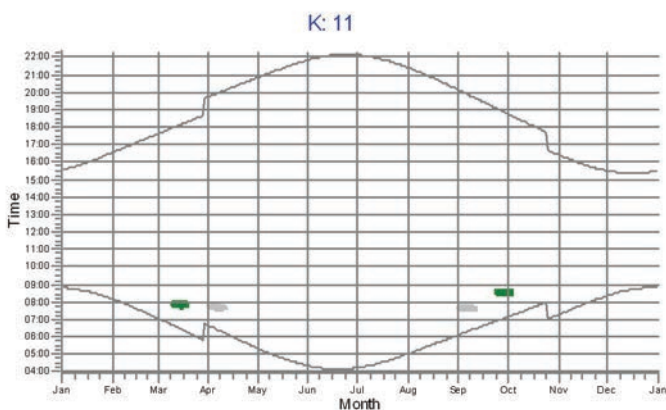
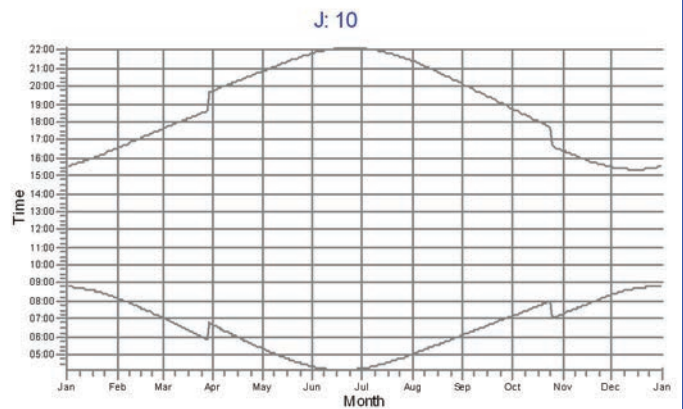
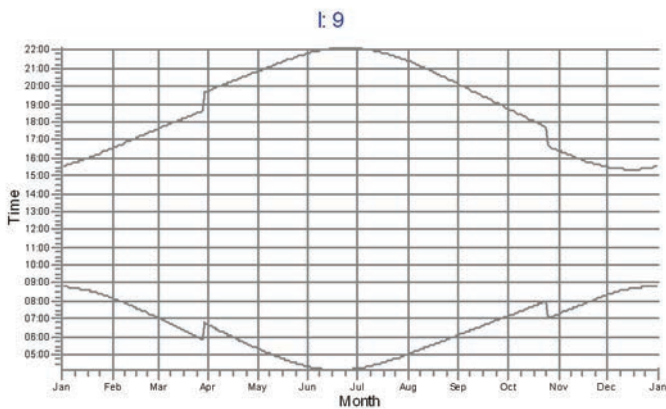
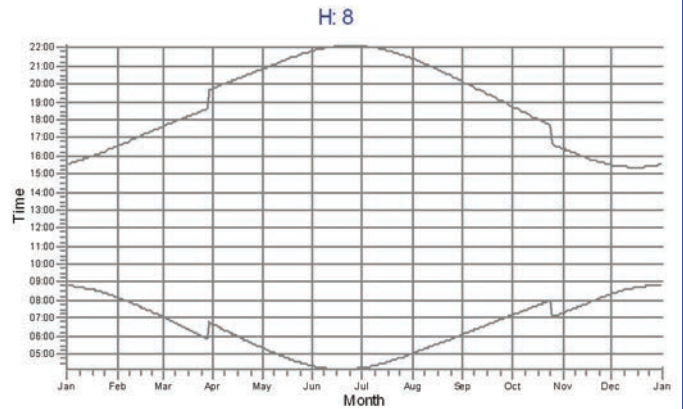
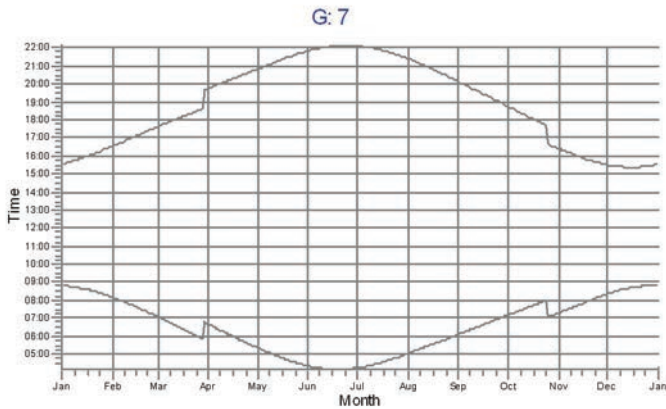
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Calculated:

2013-10-18 18:36/2.9.250

SHADOW - Calendar, graphical

Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd



WTGs

- 1: 3. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2012)
- 2: 4. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2014)
- 3: 5. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2015)

- 12: 17. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2029)
- 13: 18. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2030)
- 15: 20. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2032)

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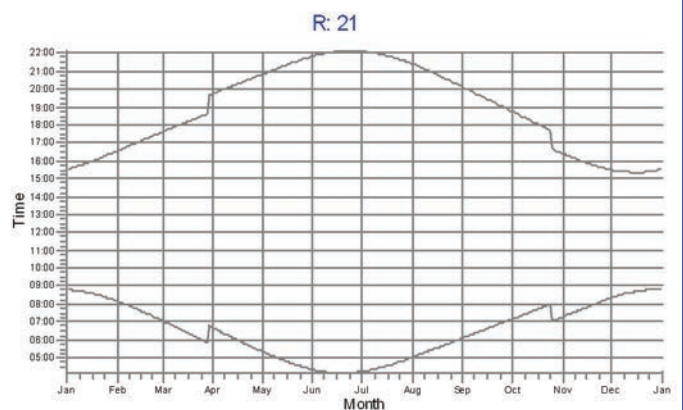
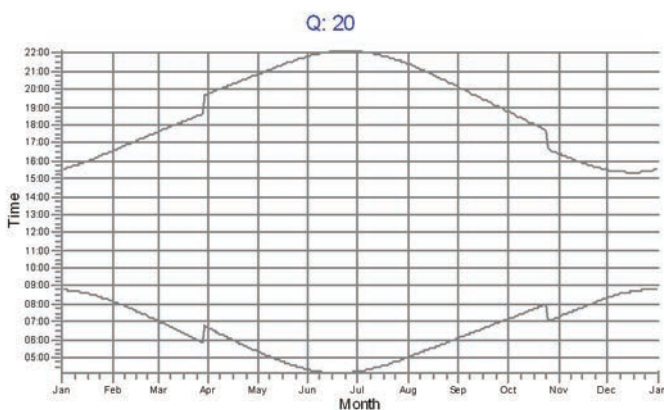
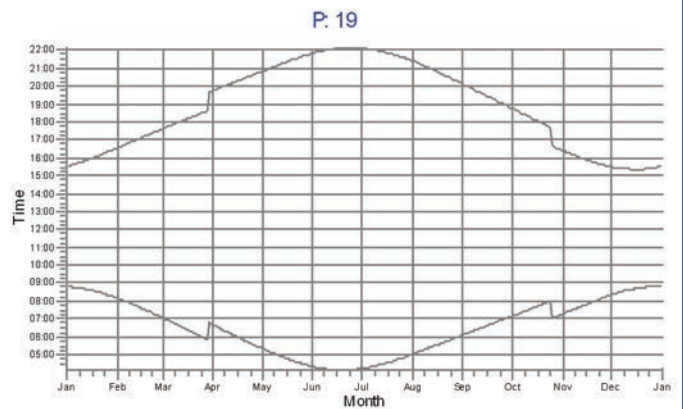
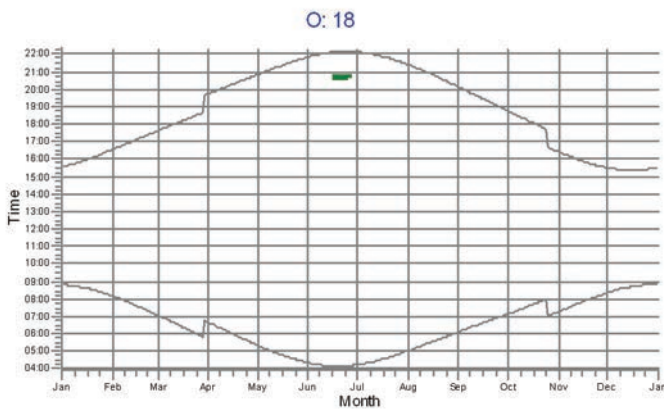
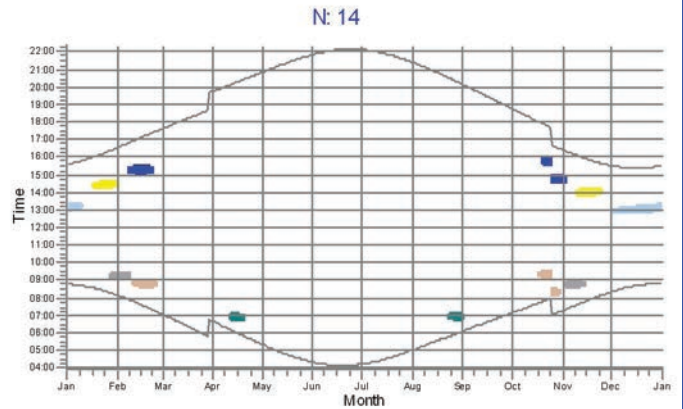
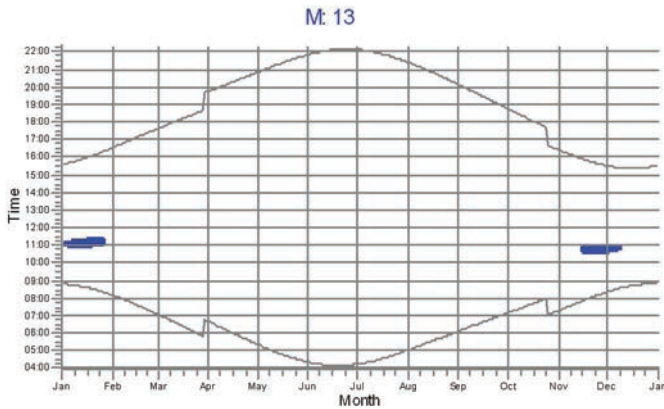
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Calculated:

2013-10-18 18:36/2.9.250

SHADOW - Calendar, graphical

Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd



WTGs

- 1: 3. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2012)
- 2: 4. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2014)
- 3: 5. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2015)
- 6: 10. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2021)

- 15: 20. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2032)
- 16: 21. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2035)
- 17: 22. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2036)

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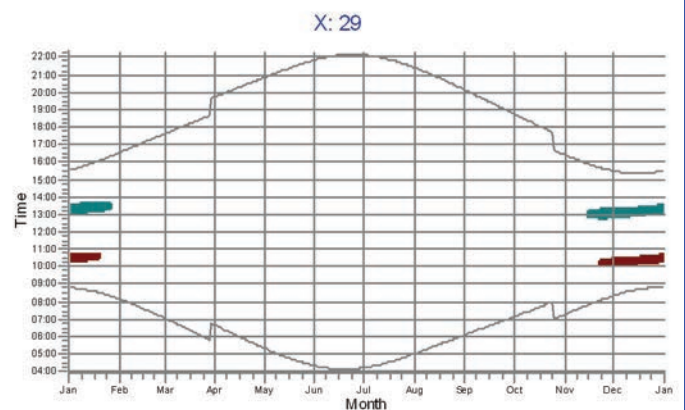
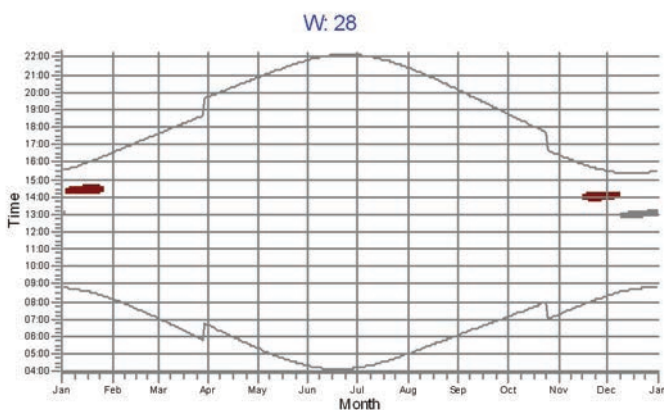
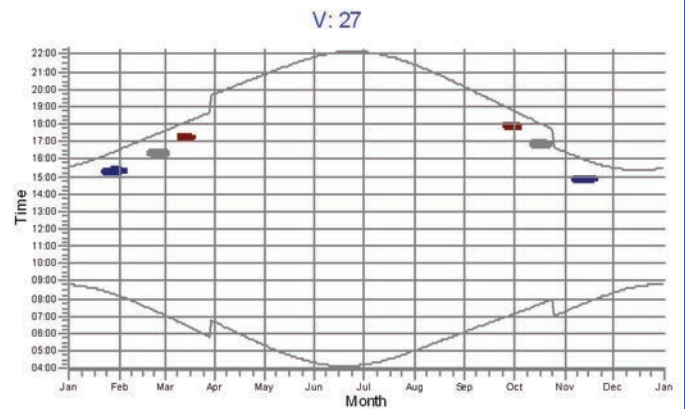
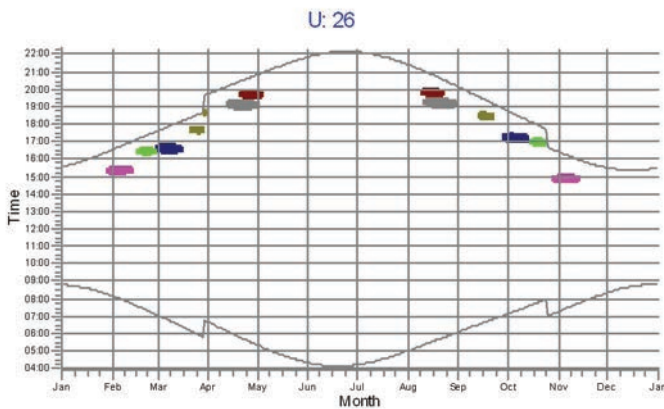
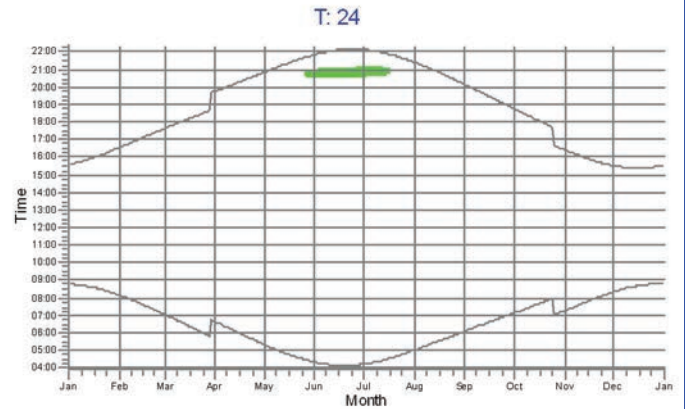
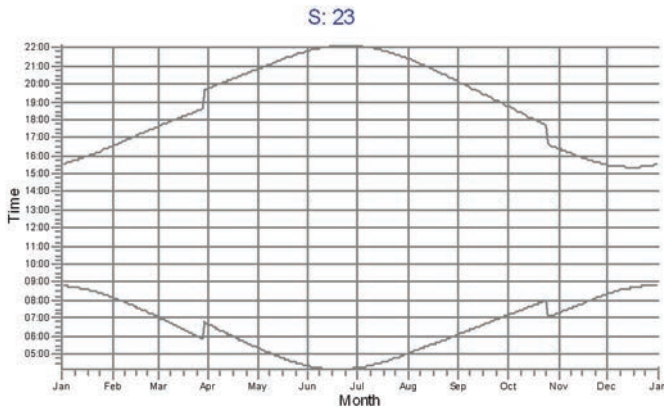
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Calculated:

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SHADOW - Calendar, graphical

Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd



WTGs

- 4: 8. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2018)
- 5: 9. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2019)
- 6: 10. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2021)
- 7: 11. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2022)

- 8: 12. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2024)
- 9: 13. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2025)
- 10: 14. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2026)
- 18: 23. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2037)

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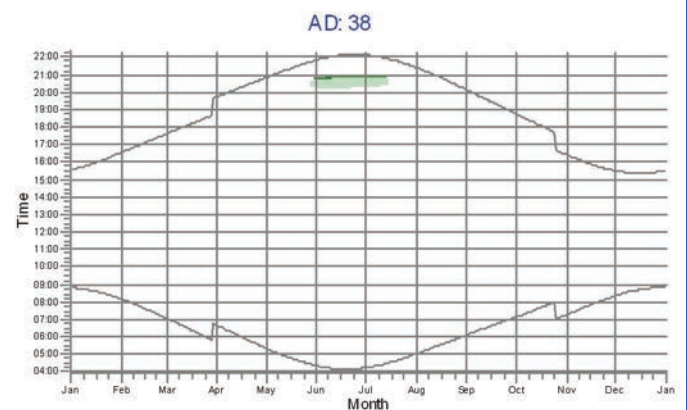
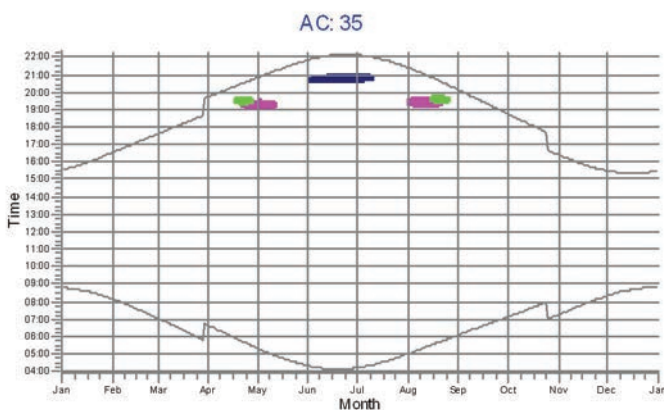
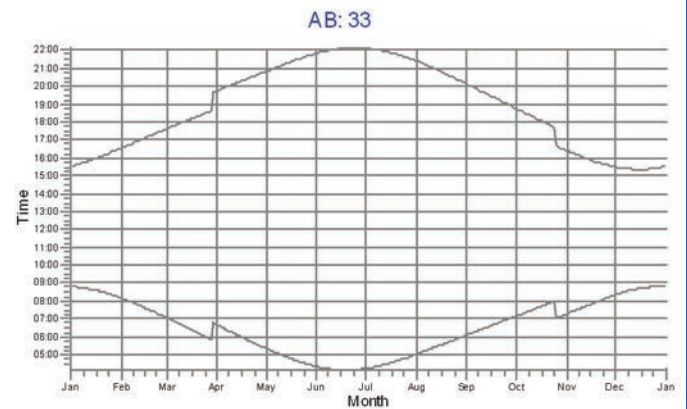
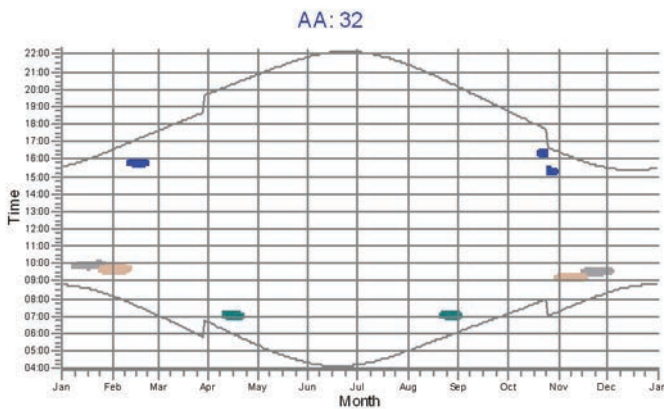
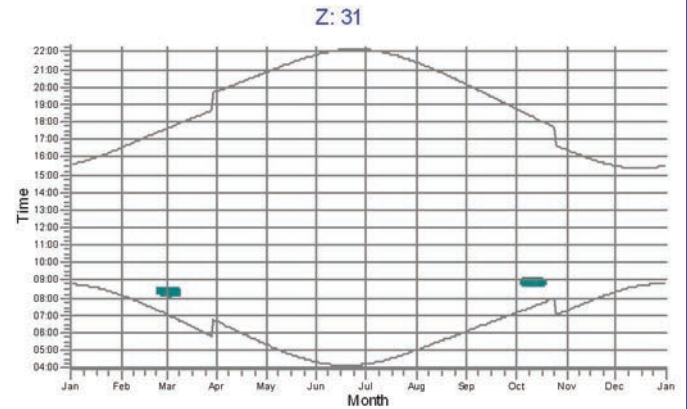
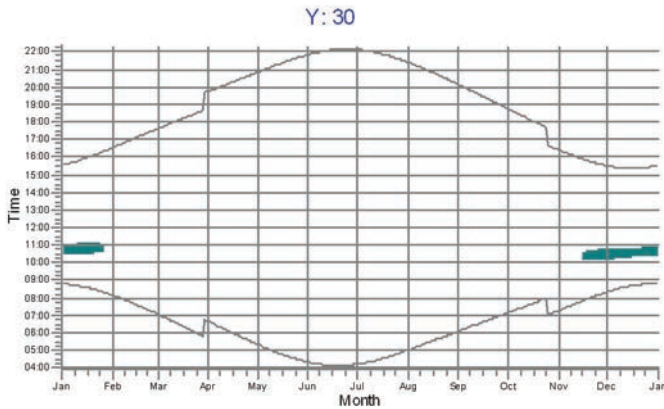
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Calculated:

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SHADOW - Calendar, graphical

Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd



WTGs

- 1: 3. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2012)
- 3: 5. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2015)
- 5: 9. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2019)
- 6: 10. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2021)
- 7: 11. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2022)

- 14: 19. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2031)
- 16: 21. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2035)
- 17: 22. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2036)
- 18: 23. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2037)

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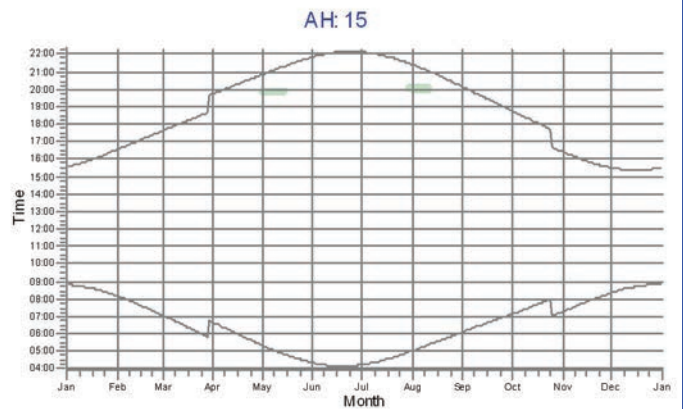
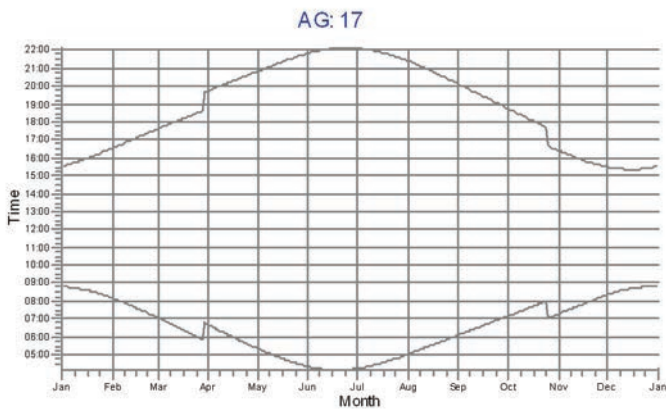
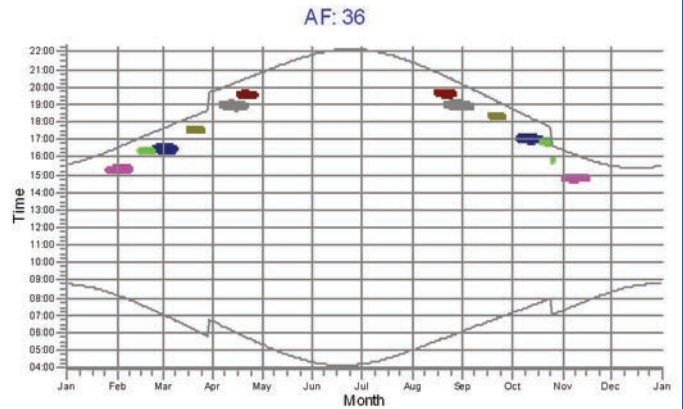
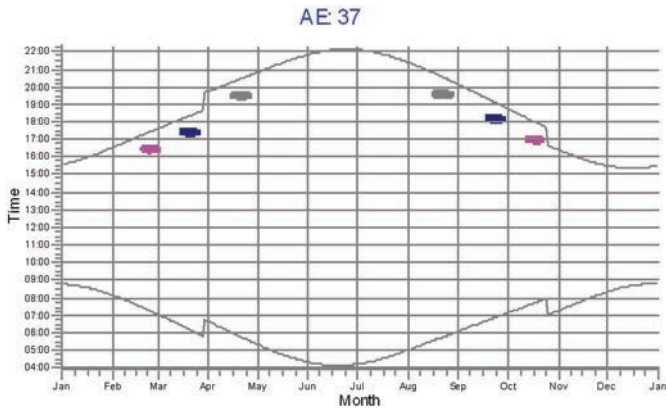
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Calculated:

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SHADOW - Calendar, graphical

Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd



WTGs

- 4: 8. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2018)
- 5: 9. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2019)
- 7: 11. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2022)
- 8: 12. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2024)

- 10: 14. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2026)
- 14: 19. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2031)
- 18: 23. VESTAS V90 2000 90.0 IO! hub: 140,0 m (2037)

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SHADOW - Map

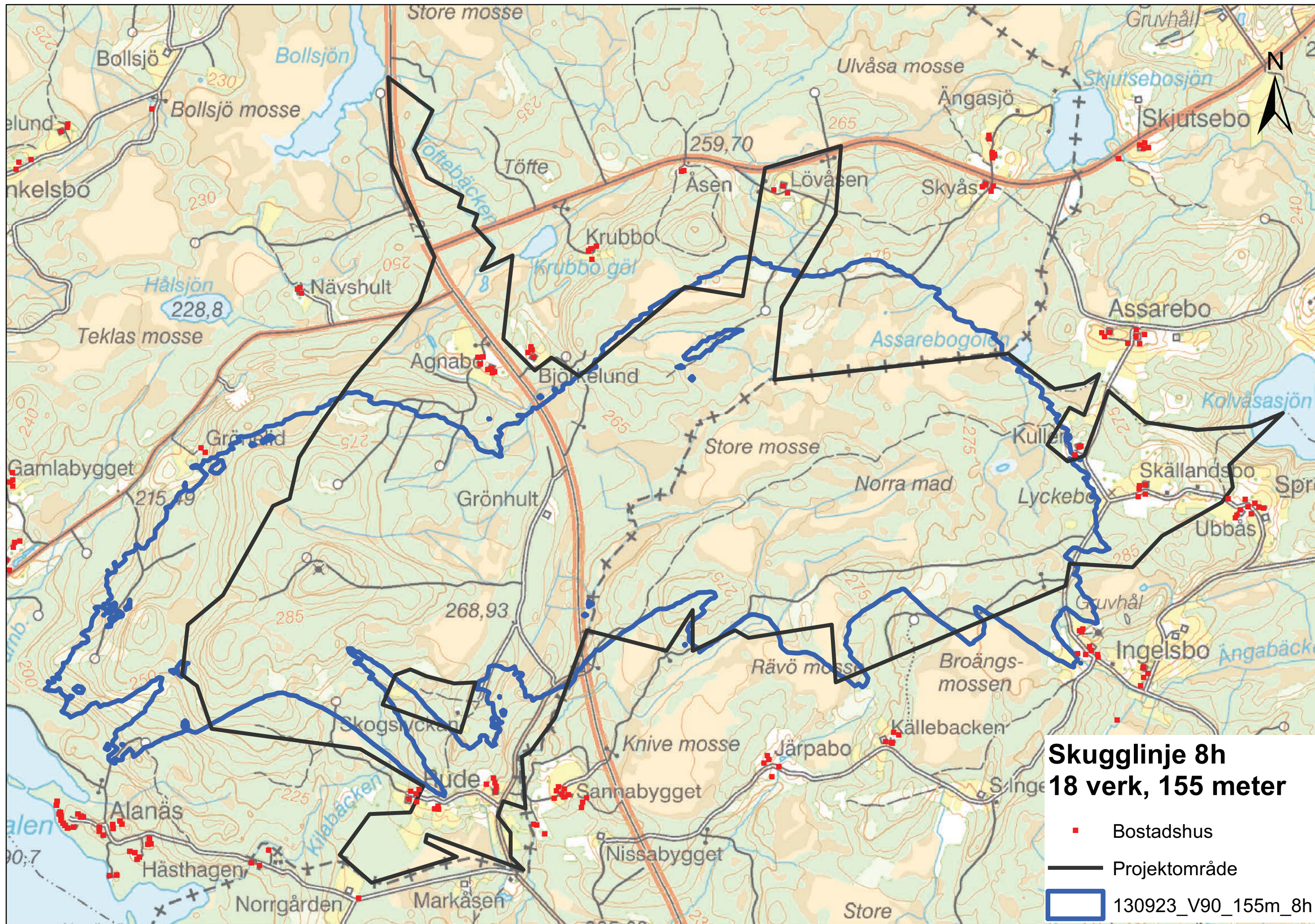
Calculation: 130923 V90 18 Vindkraftverk, 200m Totalhöjd



Map: Bitmap map: 06D.tif , Print scale 1:75 000, Map center RN East: 1 358 249 North: 6 365 009

Shadow receptor

New WTG



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SHADOW - Main Result

Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd

Assumptions for shadow calculations

Maximum distance for influence

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

Please look in WTG table

Minimum sun height over horizon for influence

3 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) [VAXJO /KRONOBER G]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,36	1,52	2,62	6,08	8,82	7,64	6,65	5,42	4,02	2,68	1,38	0,88

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

VAT21_WAsP_100nm

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
484	439	454	581	553	659	774	916	1453	1188	599	417	8517

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

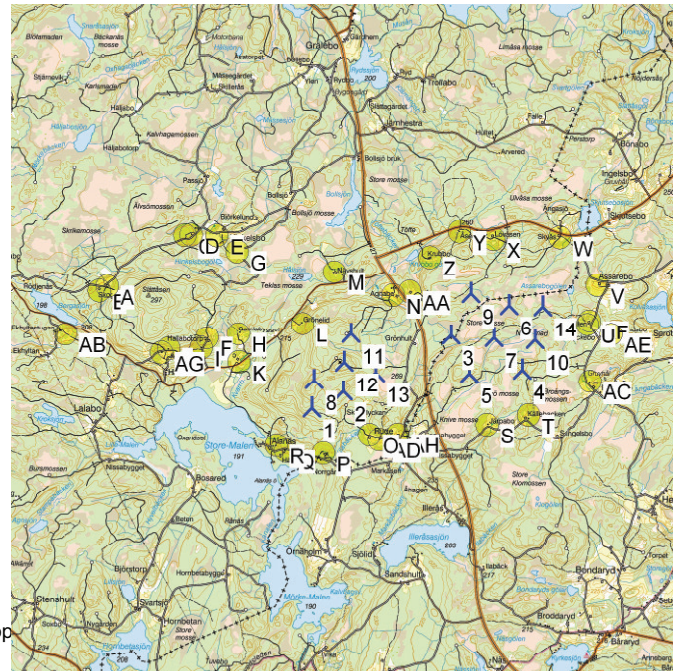
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: 120531_GH2mCont_2mScan_5mTop

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m



▲ New WTG

● Shadow receptor

WTGs

RN	East	North	Z	Row data/Description	WTG type			Shadow data			
					Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance
			[m]				[kW]	[m]	[m]	[m]	[RPM]
1	1 357 815	6 363 928	266,5	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
2	1 358 334	6 364 200	275,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
3	1 360 107	6 365 125	257,1	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
4	1 361 285	6 364 553	276,2	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
5	1 360 410	6 364 498	276,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
6	1 361 069	6 365 617	262,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
7	1 360 817	6 365 085	267,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
8	1 357 852	6 364 387	292,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
9	1 360 439	6 365 813	266,8	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
10	1 361 496	6 365 050	268,8	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
11	1 358 456	6 365 153	292,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
12	1 358 350	6 364 683	313,2	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
13	1 358 867	6 364 513	281,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6
14	1 361 620	6 365 596	272,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	93,0	1 718 12,6

Shadow receptor-Input

No.	Name	RN			Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
		East	North	Z						
				[m]	[m]	[m]	[°]	[°]		
A 1		1 354 439	6 365 935	231,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"
B 2		1 354 303	6 365 863	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
C 3		1 355 719	6 366 777	230,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
D 4		1 355 823	6 366 785	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
E 5		1 356 247	6 366 773	220,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"
F 6		1 356 082	6 365 087	238,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
G 7		1 356 579	6 366 515	237,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"
H 8		1 356 602	6 365 151	223,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"

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Calculated:

2013-10-18 18:46/2.9.250

SHADOW - Main Result**Calculation:** 130923 MM114, 14 vindkraftverk, 150m Totalhöjd

...continued from previous page

No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
I 9	1 355 989	6 364 921	223,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
J 10	1 355 455	6 364 908	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
K 11	1 356 610	6 364 688	204,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
L 12	1 357 661	6 365 318	239,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
M 13	1 358 186	6 366 173	238,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
N 14	1 359 151	6 365 788	251,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
O 18	1 358 766	6 363 488	243,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
P 19	1 358 001	6 363 183	217,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Q 20	1 357 381	6 363 228	204,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
R 21	1 357 226	6 363 318	206,2	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
S 23	1 360 701	6 363 648	259,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
T 24	1 361 391	6 363 808	280,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
U 26	1 362 356	6 365 303	284,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
V 27	1 362 521	6 365 953	278,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
W 28	1 361 906	6 366 738	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
X 29	1 360 812	6 366 711	272,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Y 30	1 360 247	6 366 836	262,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Z 31	1 359 762	6 366 416	259,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AA 32	1 359 427	6 365 846	262,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AB 33	1 353 749	6 365 145	228,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AC 35	1 362 402	6 364 363	270,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AD 38	1 358 924	6 363 405	248,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AE 37	1 362 749	6 365 140	286,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AF 36	1 362 389	6 365 360	289,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AG 17	1 355 333	6 364 842	245,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AH 15	1 359 233	6 363 492	249,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case		Shadow, expected values	
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
A 1		0:00	0	0:00	0:00
B 2		0:00	0	0:00	0:00
C 3		0:00	0	0:00	0:00
D 4		0:00	0	0:00	0:00
E 5		0:00	0	0:00	0:00
F 6		0:00	0	0:00	0:00
G 7		0:00	0	0:00	0:00
H 8		6:04	25	0:19	0:44
I 9		0:00	0	0:00	0:00
J 10		0:00	0	0:00	0:00
K 11		13:50	53	0:21	1:58
L 12		83:10	150	0:52	9:23
M 13		23:32	58	0:28	1:58
N 14		47:17	129	0:50	6:24
O 18		17:16	49	0:27	4:35
P 19		0:00	0	0:00	0:00
Q 20		0:00	0	0:00	0:00
R 21		0:00	0	0:00	0:00
S 23		0:00	0	0:00	0:00
T 24		19:42	76	0:24	4:57
U 26		47:09	144	0:36	9:58
V 27		19:44	70	0:28	2:46
W 28		14:49	58	0:21	1:32
X 29		23:56	66	0:26	2:15
Y 30		12:15	58	0:20	1:05

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SE-962 80 Jokkmokk

Jenny Longworth / jenny.longworth@vattenfall.com

Calculated:

2013-10-18 18:46/2.9.250

SHADOW - Main Result**Calculation:** 130923 MM114, 14 vindkraftverk, 150m Totalhöjd

...continued from previous page

No.	Name	Shadow, worst case		Max shadow hours per day	Shadow, expected values
		Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
Z 31		27:21	82	0:38	2:51
AA 32		58:44	159	0:44	7:34
AB 33		0:00	0	0:00	0:00
AC 35		32:15	100	0:26	7:47
AD 38		14:50	63	0:23	3:48
AE 37		13:35	68	0:22	2:47
AF 36		38:12	130	0:35	7:38
AG 17		0:00	0	0:00	0:00
AH 15		34:46	106	0:29	8:33

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2571)	29:48	6:48
2	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2572)	41:20	6:46
3	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2573)	24:37	2:43
4	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2574)	18:11	3:14
5	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2575)	27:27	5:45
6	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2576)	40:52	5:06
7	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2577)	11:42	1:26
8	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2578)	54:57	7:41
9	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2579)	45:50	6:09
10	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2580)	49:29	9:36
11	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2582)	69:12	8:38
12	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2583)	37:51	4:16
13	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2584)	0:00	0:00
14	REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2585)	57:08	11:28

Project:

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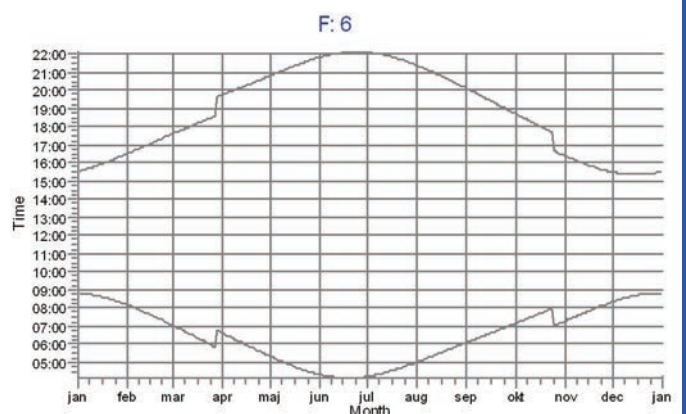
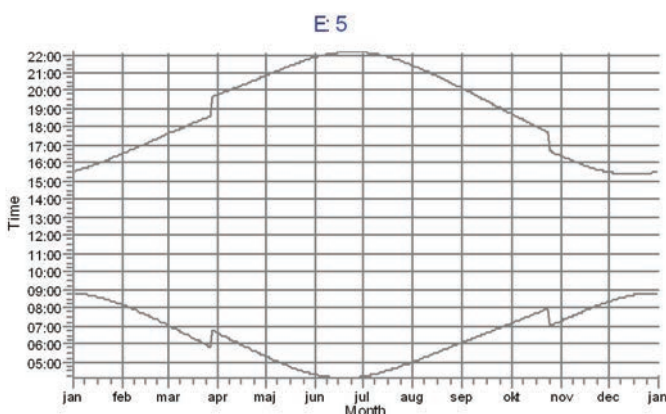
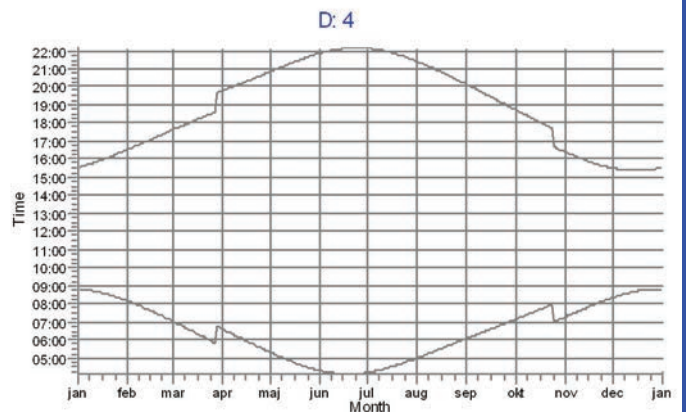
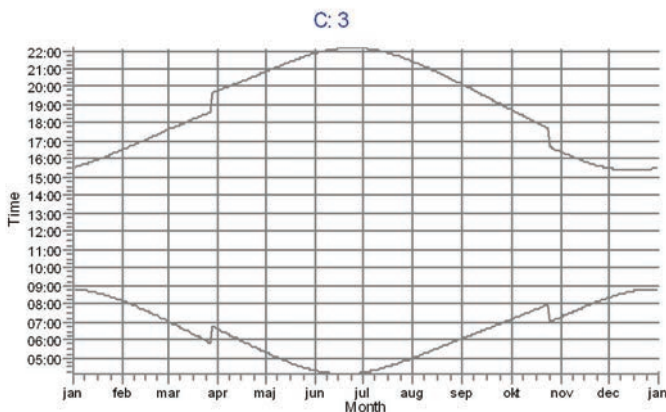
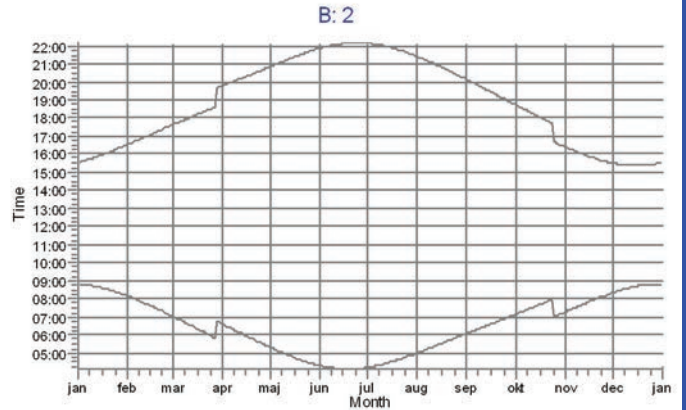
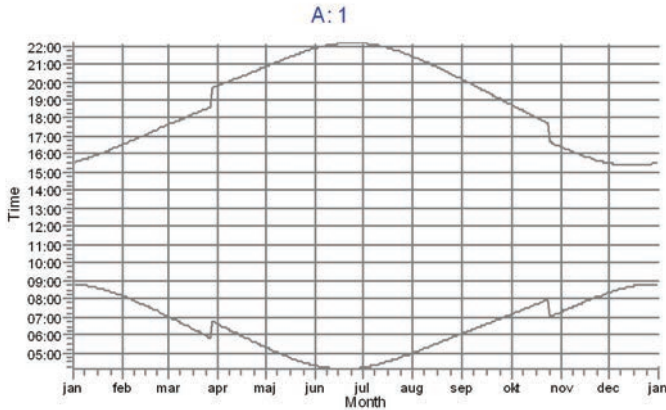
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Calculated:

2013-10-18 18:46/2.9.250

SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd



WTGs

Project:

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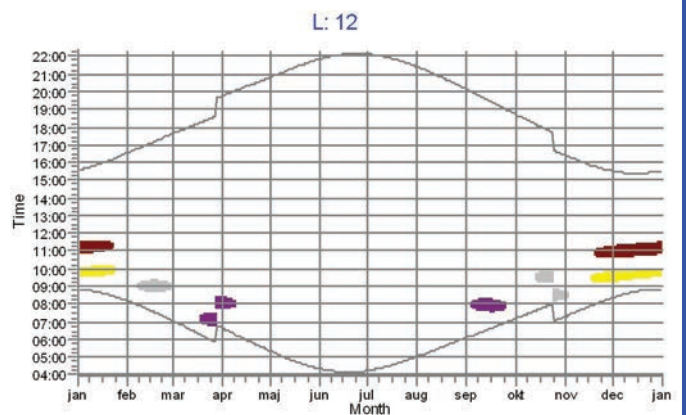
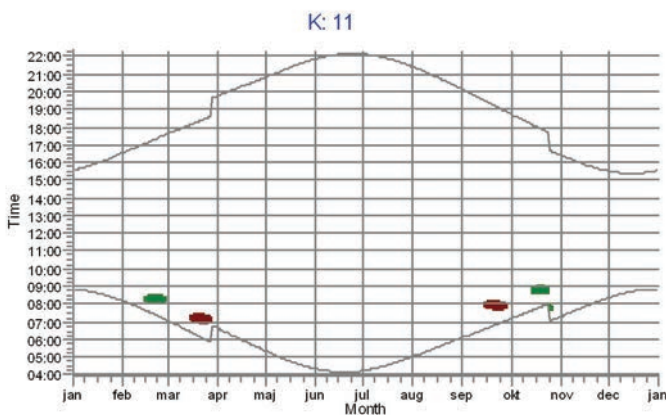
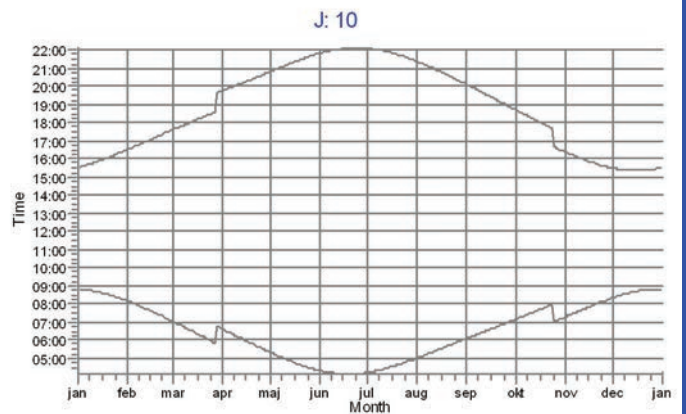
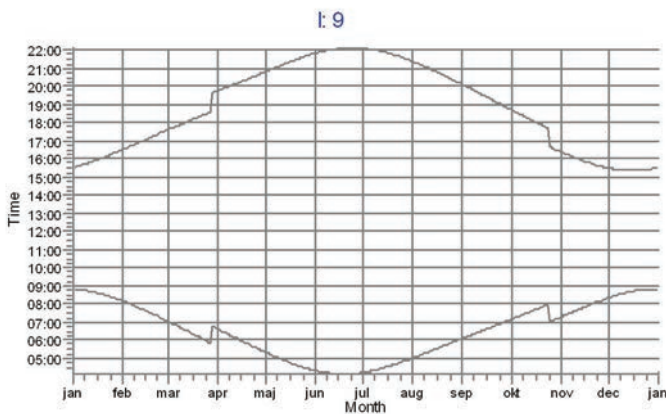
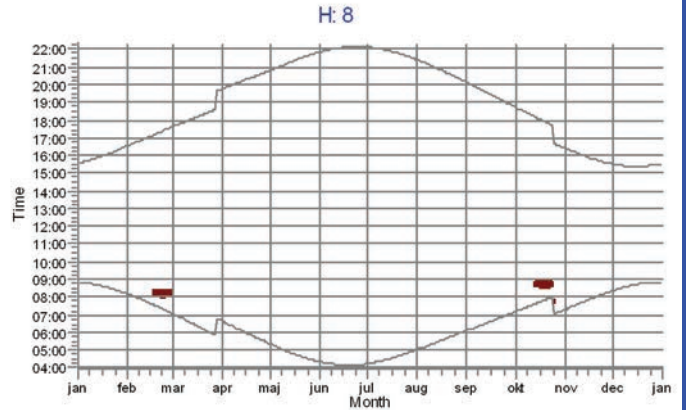
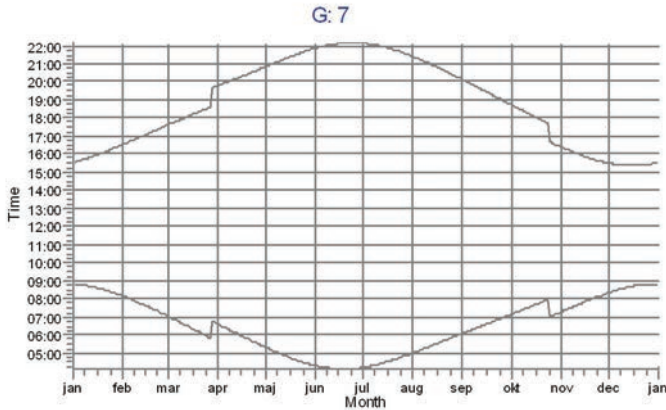
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd



WTGs

- 1: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2571)
- 2: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2572)
- 8: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2578)

- 11: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2582)
- 12: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2583)

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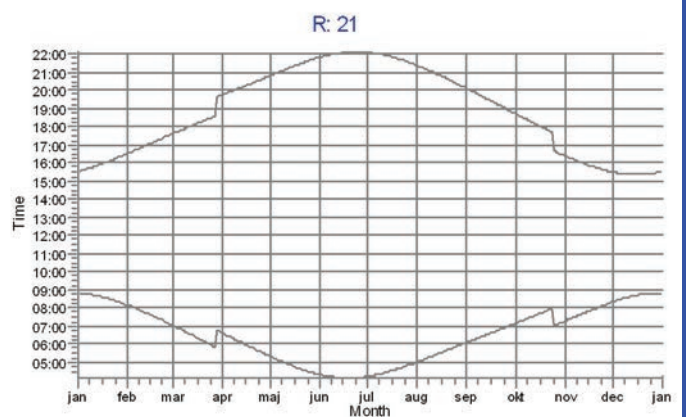
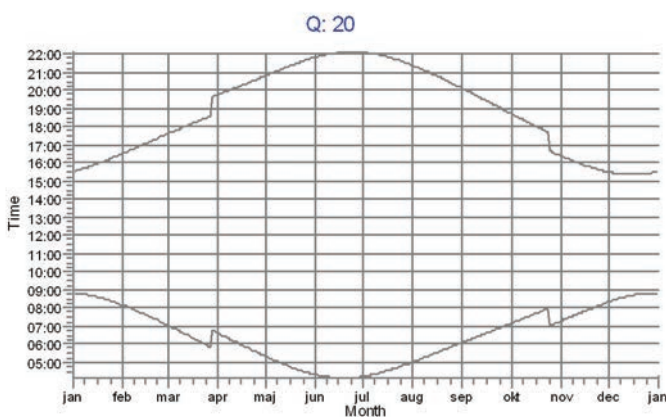
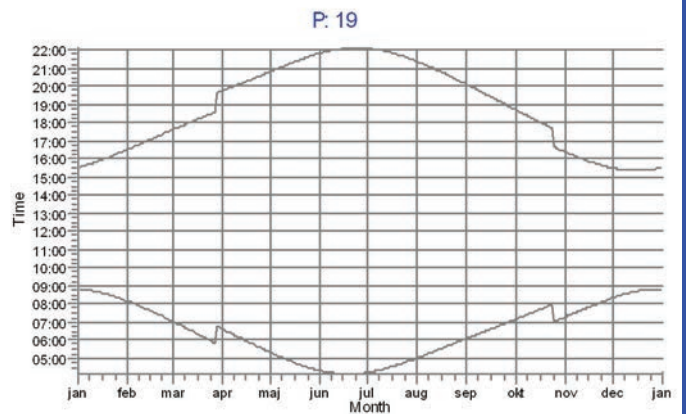
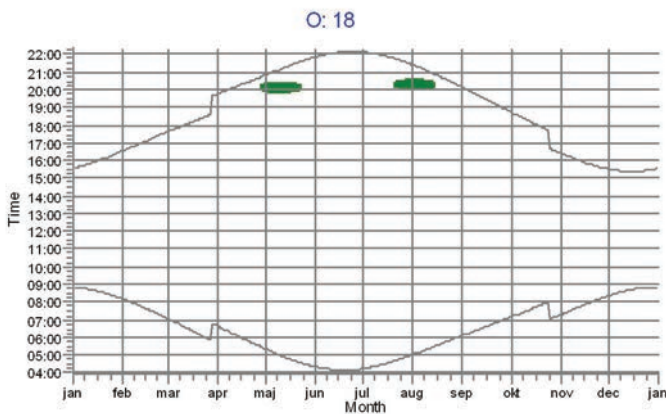
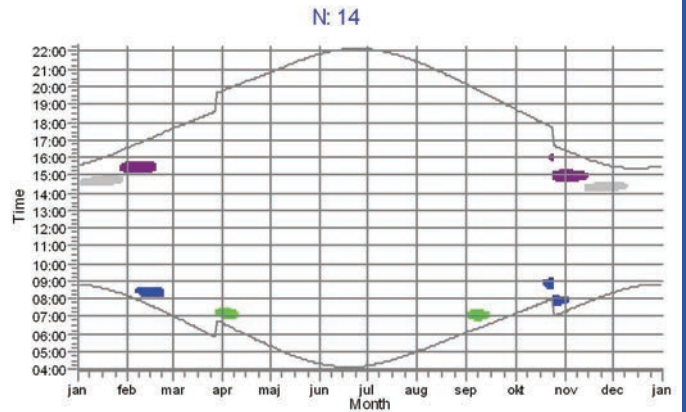
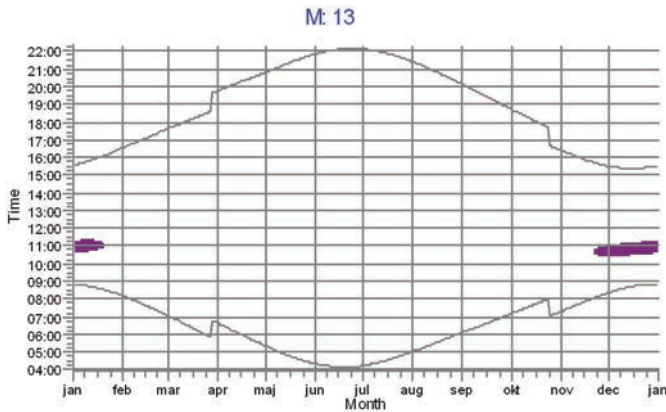
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd



WTGs

- 1: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2571)
- 3: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2573)
- 9: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2579)

- 11: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2582)
- 12: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2583)

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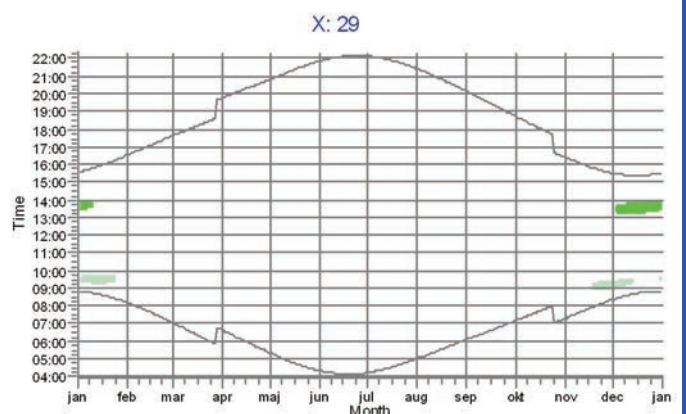
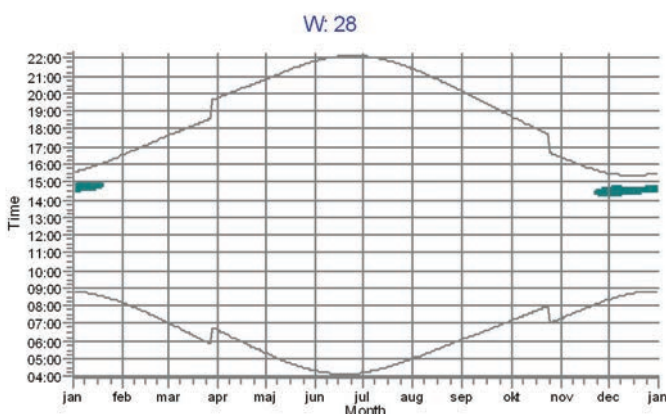
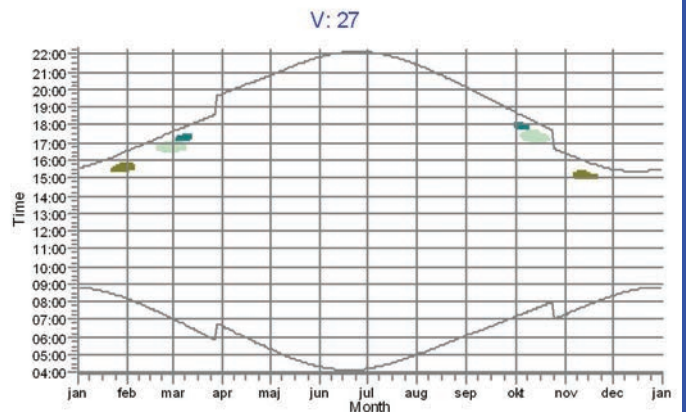
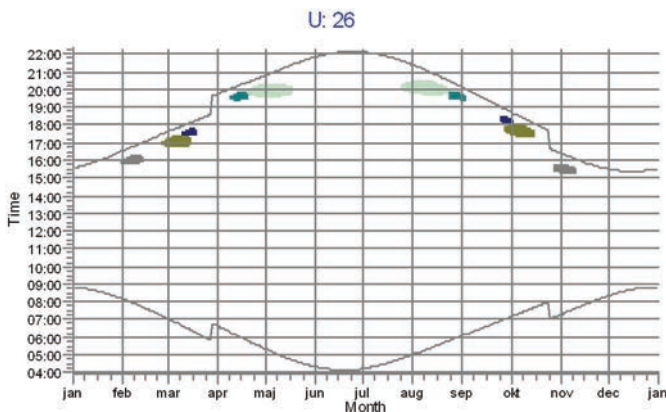
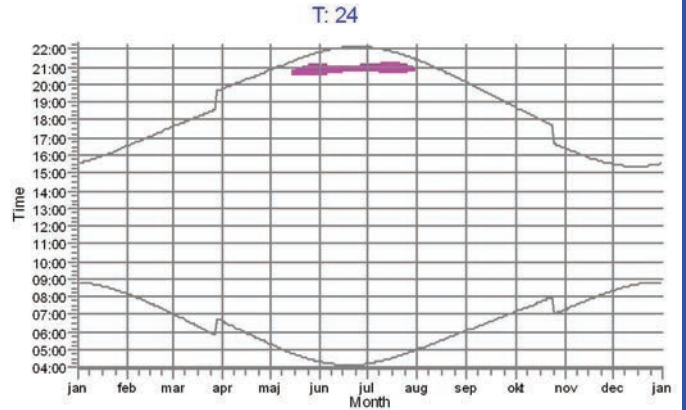
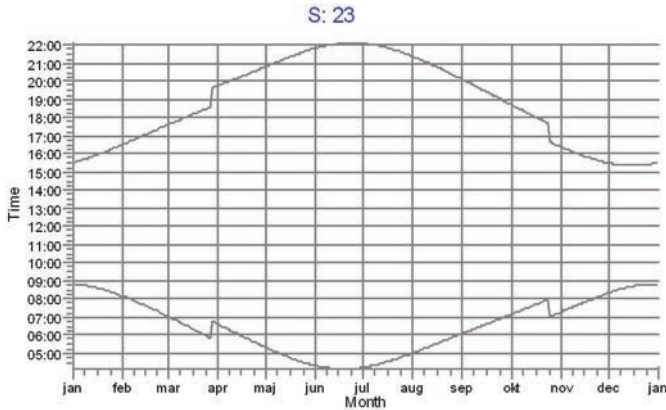
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Calculated:

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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd



WTGs

- 4: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2574)
- 5: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2575)
- 6: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2576)
- 7: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2577)

- 9: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2579)
- 10: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2580)
- 14: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2585)

Project:

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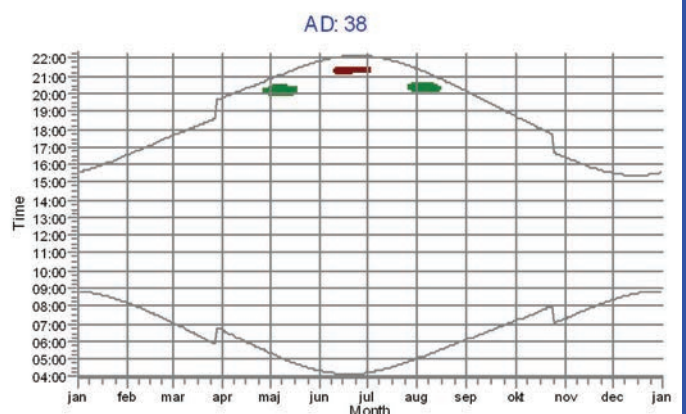
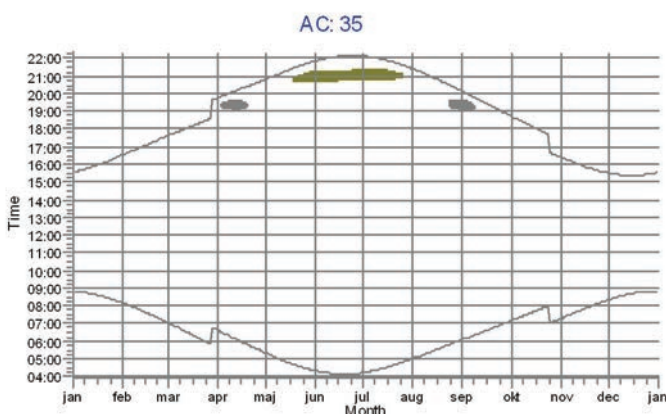
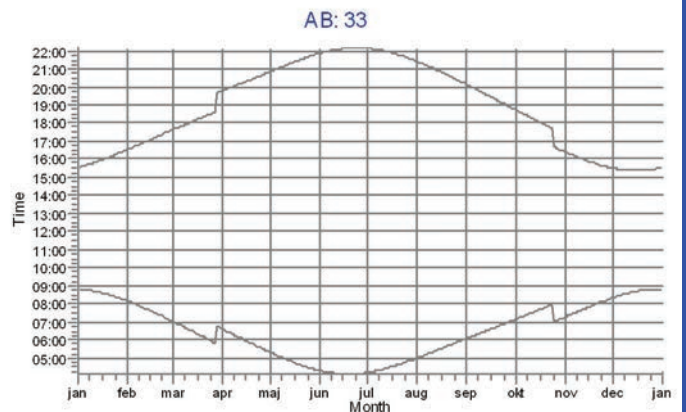
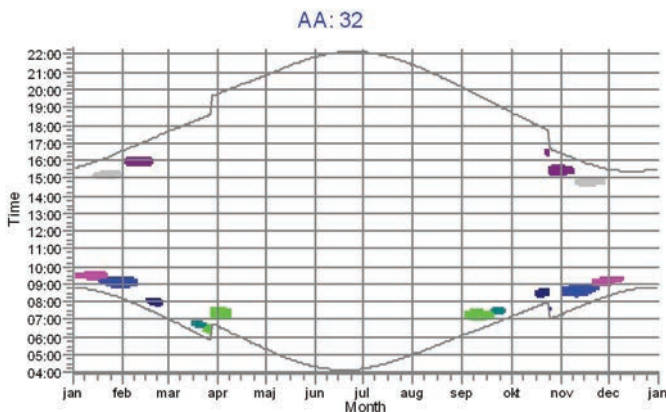
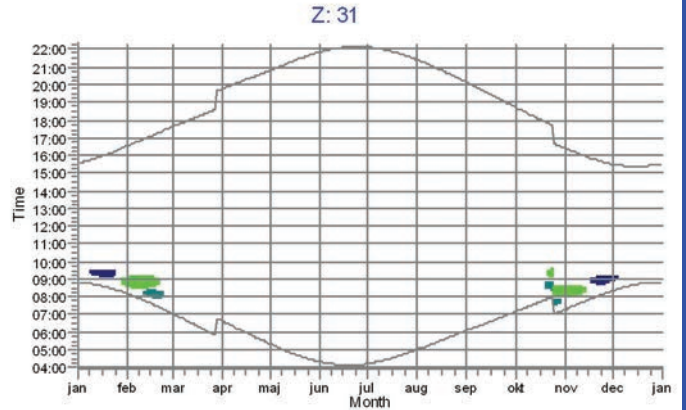
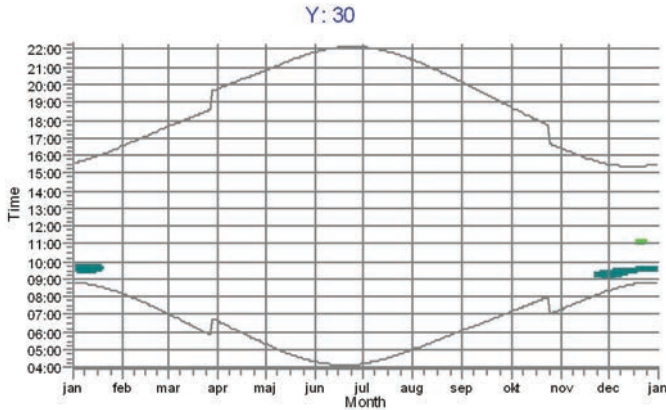
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Calculated:












2013-10-18 18:46/2.9.250

SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd



WTGs

- | | | | |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|  | 1: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2571) |  | 8: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2578) |
|  | 3: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2573) |  | 9: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2579) |
|  | 4: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2574) |  | 10: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2580) |
|  | 5: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2575) |  | 11: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2582) |
|  | 6: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2576) |  | 12: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2583) |
|  | 7: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2577) | | |

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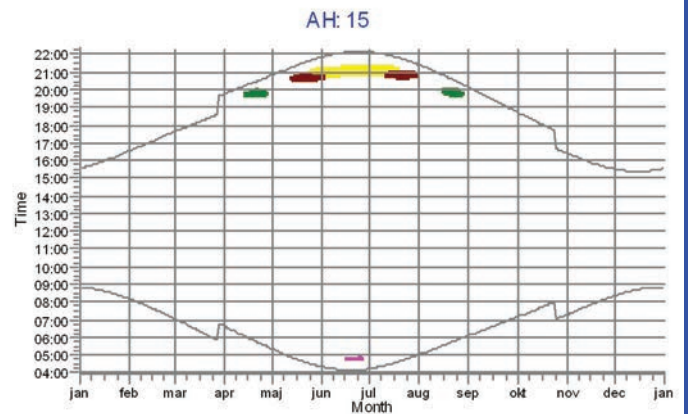
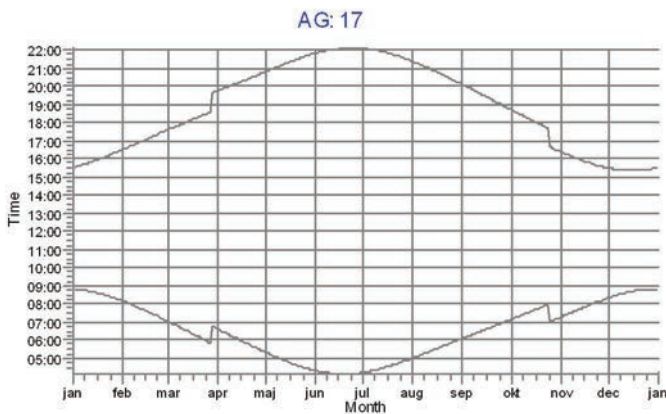
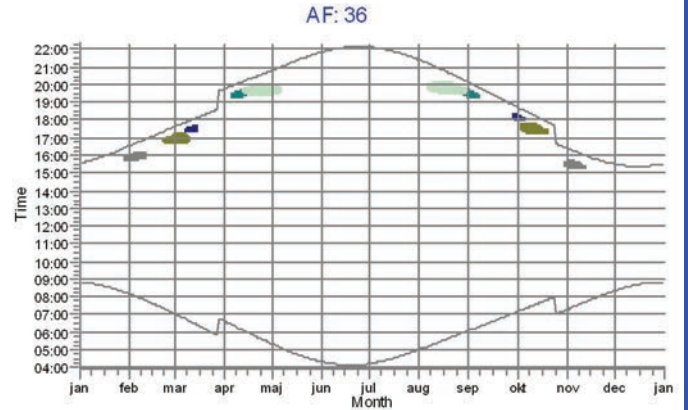
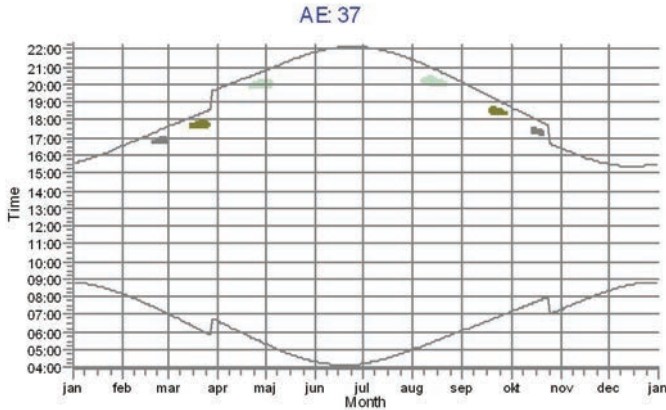
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Calculated:










2013-10-18 18:46/2.9.250

SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd



WTGs

- | | | | |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|  | 1: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2571) |  | 7: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2577) |
|  | 2: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2572) |  | 8: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2578) |
|  | 4: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2574) |  | 10: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2580) |
|  | 5: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2575) |  | 14: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2585) |
|  | 6: REpower 3.2M114 3200 114.0 !O! hub: 93,0 m (TOT: 150,0 m) (2576) | | |

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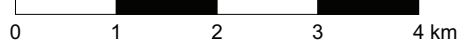
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Calculated:

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SHADOW - Map

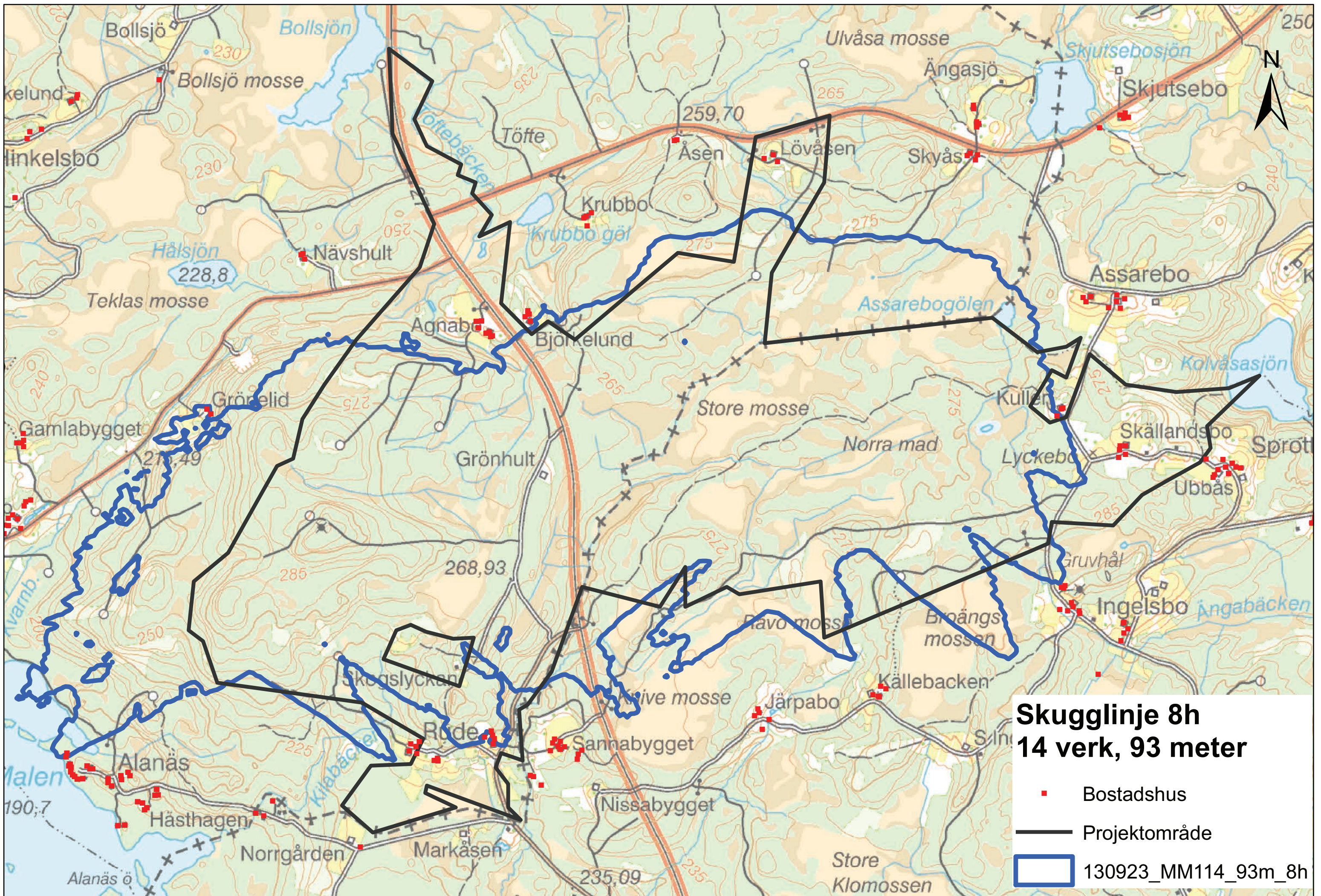
Calculation: 130923 MM114, 14 vindkraftverk, 150m Totalhöjd



Map: Bitmap map: 06D.tif , Print scale 1:75 000, Map center RN East: 1 358 249 North: 6 365 009

Shadow receptor

New WTG



Project:

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Calculated:

2013-10-18 18:06/2.9.207

SHADOW - Main Result

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd

Assumptions for shadow calculations

Maximum distance for influence

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

Please look in WTG table

Minimum sun height over horizon for influence

3 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) [VAXJO /KRONOBER G]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,36	1,52	2,62	6,08	8,82	7,64	6,65	5,42	4,02	2,68	1,38	0,88

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

VAT21_WAsP_100nm

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
488	443	458	589	559	664	779	922	1470	1203	603	419	8598

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

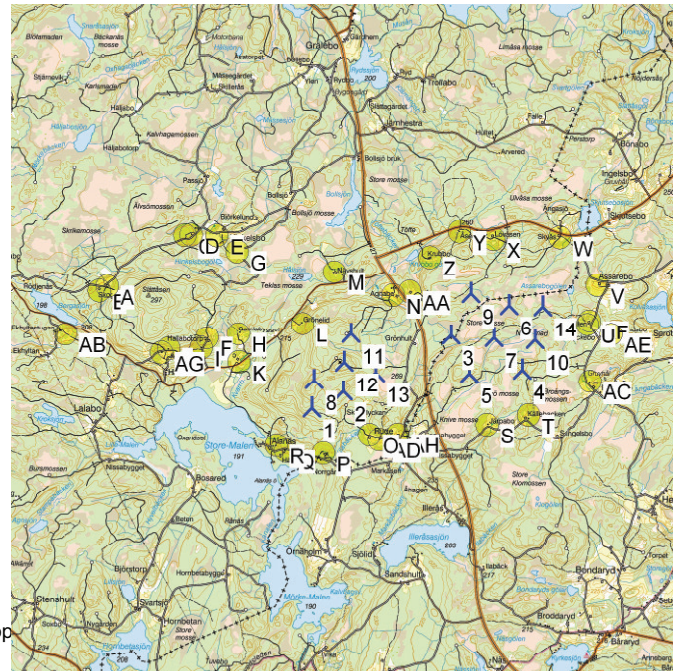
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used: Height Contours: 120531_GH2mCont_2mScan_5mTop

Obstacles not used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m



Scale 1:125 000

▲ New WTG

● Shadow receptor

WTGs

RN	East	North	Z	Row data/Description	WTG type				Shadow data		
					Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance
			[m]				[kW]	[m]	[m]	[RPM]	
1	1 357 815	6 363 928	266,5	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
2	1 358 334	6 364 200	275,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
3	1 360 107	6 365 125	257,1	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
4	1 361 285	6 364 553	276,2	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
5	1 360 410	6 364 498	276,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
6	1 361 069	6 365 617	262,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
7	1 360 817	6 365 085	267,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
8	1 357 852	6 364 387	292,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
9	1 360 439	6 365 813	266,8	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
10	1 361 496	6 365 050	268,8	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
11	1 358 456	6 365 153	292,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
12	1 358 350	6 364 683	313,2	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
13	1 358 867	6 364 513	281,6	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6
14	1 361 620	6 365 596	272,0	REpower 3.2M114 3200 114.0 !... Yes	Yes	REpower	3.2M114-3 200	3 200	114,0	143,0	1 714 12,6

Shadow receptor-Input

No.	Name	RN		Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
		East	North							
				[m]	[m]	[m]	[m]	[°]	[°]	
A 1		1 354 439	6 365 935	231,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"
B 2		1 354 303	6 365 863	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
C 3		1 355 719	6 366 777	230,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
D 4		1 355 823	6 366 785	228,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
E 5		1 356 247	6 366 773	220,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"
F 6		1 356 082	6 365 087	238,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"
G 7		1 356 579	6 366 515	237,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"
H 8		1 356 602	6 365 151	223,5	5,0	5,0	2,0	0,0	0,0	"Green house mode"

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2013-10-18 18:06/2.9.207

SHADOW - Main Result**Calculation:** 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd

...continued from previous page

No.	Name	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
I 9	1 355 989	6 364 921	223,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
J 10	1 355 455	6 364 908	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
K 11	1 356 610	6 364 688	204,9	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
L 12	1 357 661	6 365 318	239,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
M 13	1 358 186	6 366 173	238,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
N 14	1 359 151	6 365 788	251,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
O 18	1 358 766	6 363 488	243,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
P 19	1 358 001	6 363 183	217,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Q 20	1 357 381	6 363 228	204,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
R 21	1 357 226	6 363 318	206,2	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
S 23	1 360 701	6 363 648	259,7	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
T 24	1 361 391	6 363 808	280,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
U 26	1 362 356	6 365 303	284,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
V 27	1 362 521	6 365 953	278,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
W 28	1 361 906	6 366 738	260,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
X 29	1 360 812	6 366 711	272,4	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Y 30	1 360 247	6 366 836	262,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
Z 31	1 359 762	6 366 416	259,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AA 32	1 359 427	6 365 846	262,3	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AB 33	1 353 749	6 365 145	228,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AC 35	1 362 402	6 364 363	270,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AD 38	1 358 924	6 363 405	248,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AE 37	1 362 749	6 365 140	286,0	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AF 36	1 362 389	6 365 360	289,1	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AG 17	1 355 333	6 364 842	245,6	5,0	5,0	2,0	0,0	0,0	"Green house mode"	
AH 15	1 359 233	6 363 492	249,8	5,0	5,0	2,0	0,0	0,0	"Green house mode"	

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case		Shadow, expected values	
		Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
A 1		0:00	0	0:00	0:00
B 2		0:00	0	0:00	0:00
C 3		0:00	0	0:00	0:00
D 4		0:00	0	0:00	0:00
E 5		0:00	0	0:00	0:00
F 6		0:00	0	0:00	0:00
G 7		0:00	0	0:00	0:00
H 8		5:48	24	0:19	0:45
I 9		0:00	0	0:00	0:00
J 10		0:00	0	0:00	0:00
K 11		13:23	52	0:21	1:59
L 12		78:06	165	0:52	9:56
M 13		37:47	78	0:37	3:23
N 14		53:21	148	0:51	7:17
O 18		22:27	65	0:28	6:03
P 19		0:00	0	0:00	0:00
Q 20		0:00	0	0:00	0:00
R 21		0:00	0	0:00	0:00
S 23		0:00	0	0:00	0:00
T 24		22:57	63	0:25	5:42
U 26		69:02	174	0:46	15:28
V 27		27:09	72	0:45	3:56
W 28		27:58	74	0:33	2:52
X 29		55:02	82	0:53	5:18
Y 30		33:54	72	0:39	3:03

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SHADOW - Main Result**Calculation:** 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd

...continued from previous page

No.	Name	Shadow, worst case		Max shadow hours per day	Shadow, expected values
		Shadow hours per year [h/year]	Shadow days per year [days/year]		Shadow hours per year [h/year]
Z 31		35:29	103	0:48	3:47
AA 32		74:24	197	0:44	9:56
AB 33		0:00	0	0:00	0:00
AC 35		27:53	84	0:25	6:45
AD 38		14:03	47	0:24	3:49
AE 37		23:46	87	0:23	5:02
AF 36		58:02	154	0:40	12:13
AG 17		0:00	0	0:00	0:00
AH 15		26:03	96	0:22	6:27

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2571)	41:22	9:27
2	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2572)	17:15	2:20
3	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2573)	31:05	3:23
4	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2574)	26:25	4:42
5	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2575)	31:43	6:36
6	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2576)	66:40	8:59
7	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2577)	19:26	2:34
8	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2578)	58:15	8:41
9	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2579)	84:05	10:33
10	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2580)	54:42	9:57
11	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2582)	69:59	9:41
12	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2583)	42:05	4:33
13	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2584)	21:50	1:59
14	REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2585)	92:17	18:38

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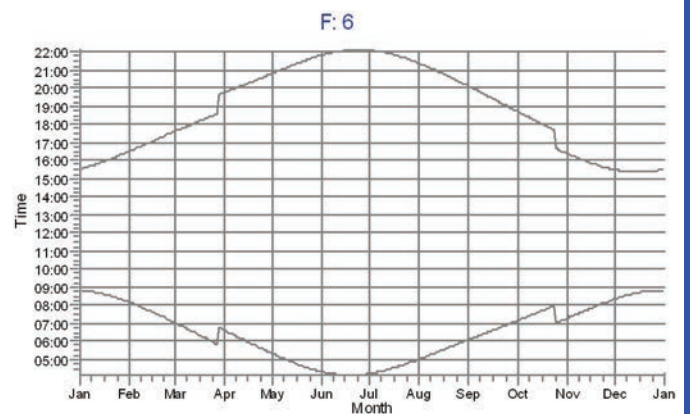
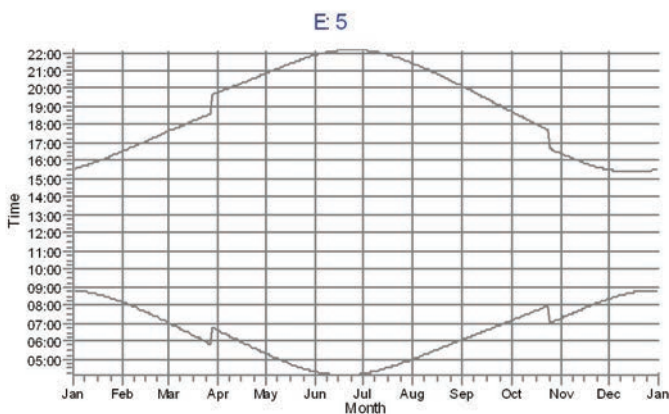
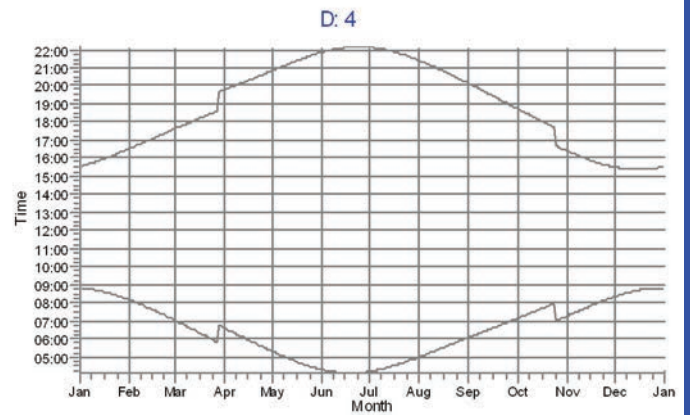
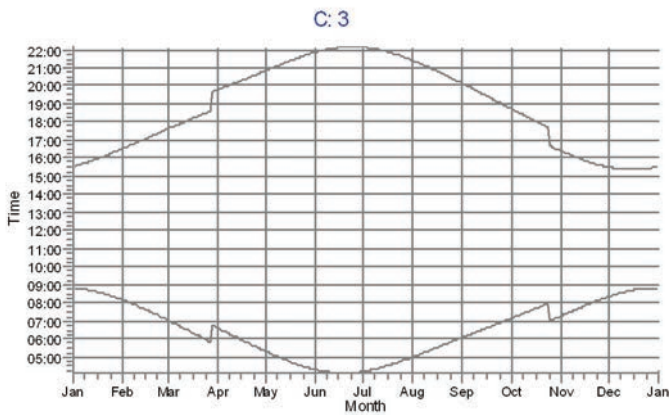
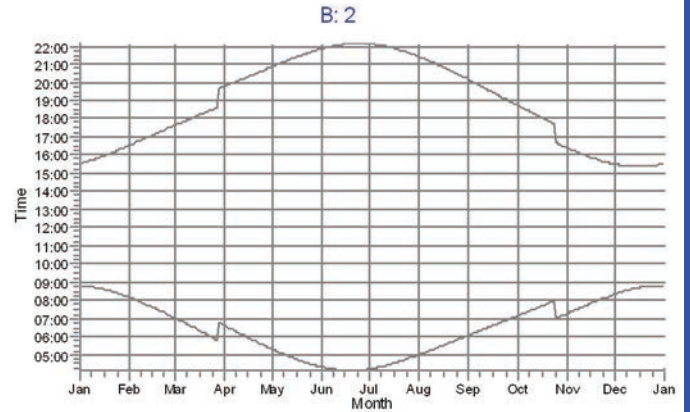
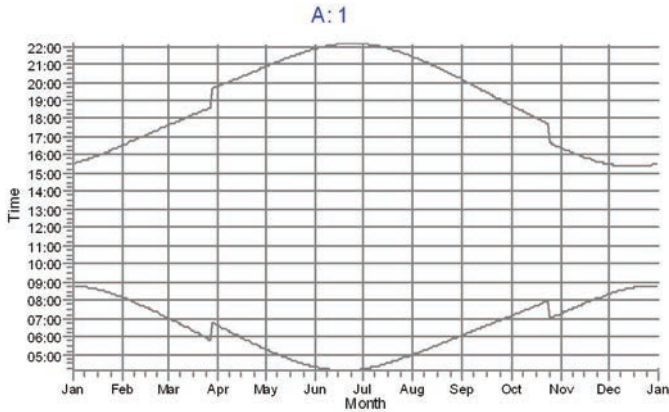
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd



WTGs

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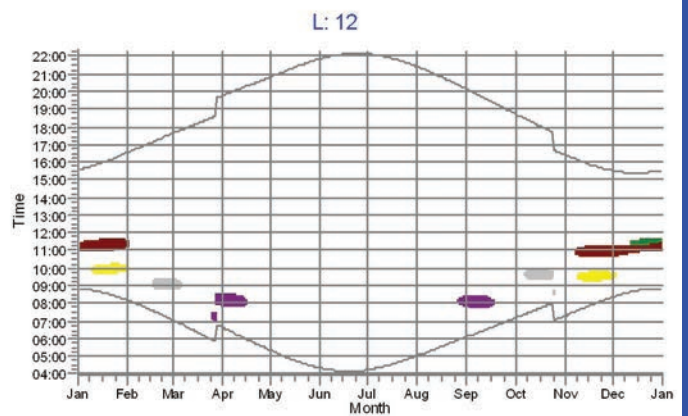
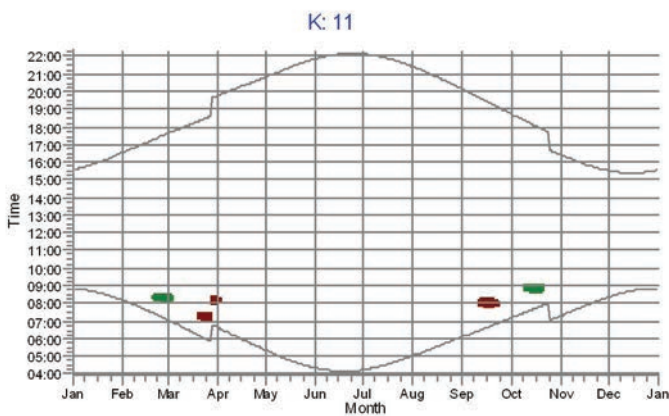
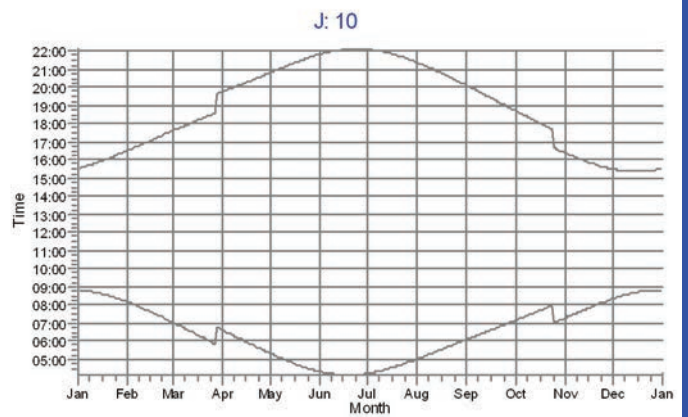
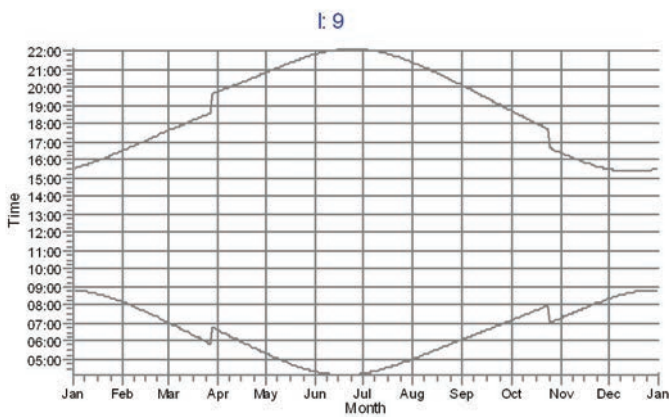
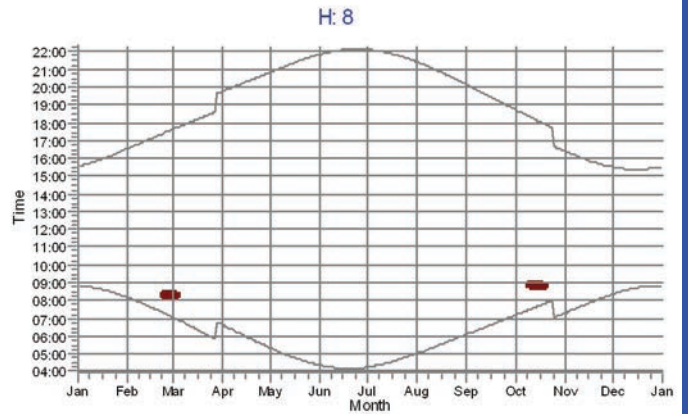
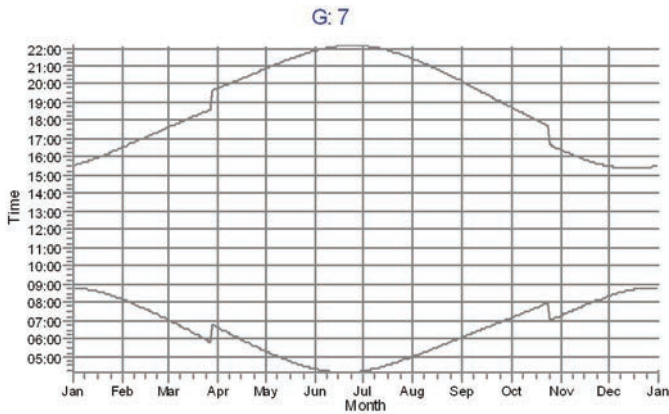
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd



WTGs

- 1: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2571)
- 2: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2572)
- 8: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2578)

- 11: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2582)
- 12: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2583)

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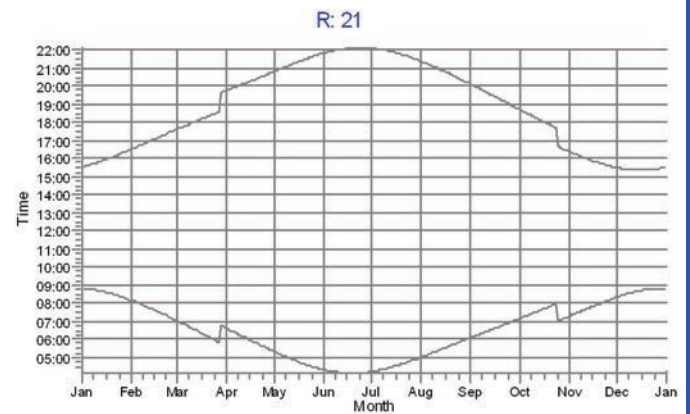
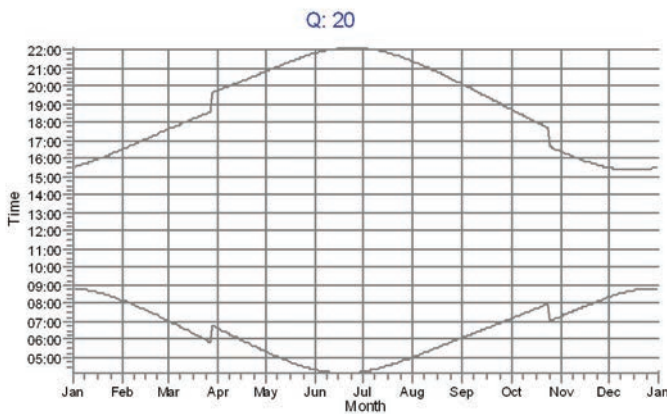
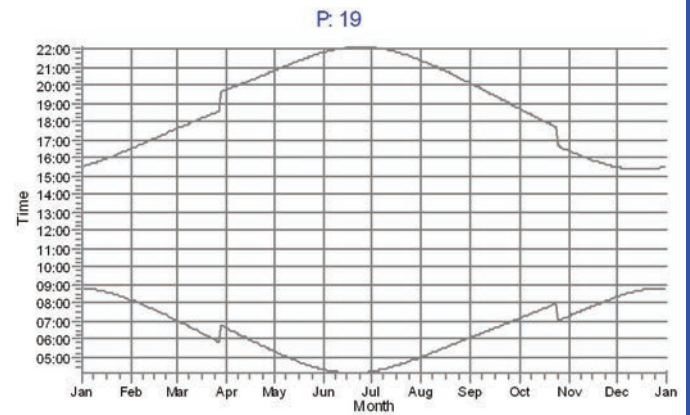
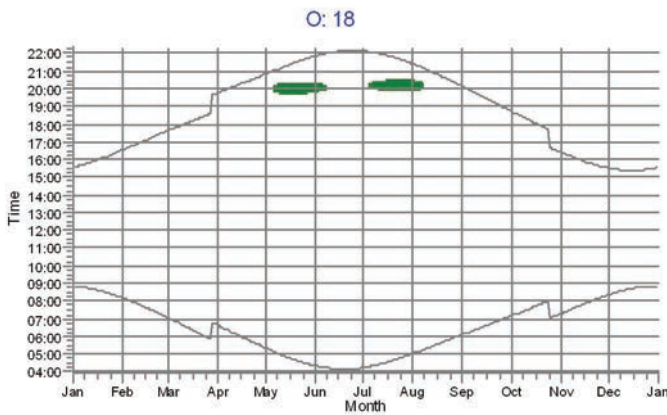
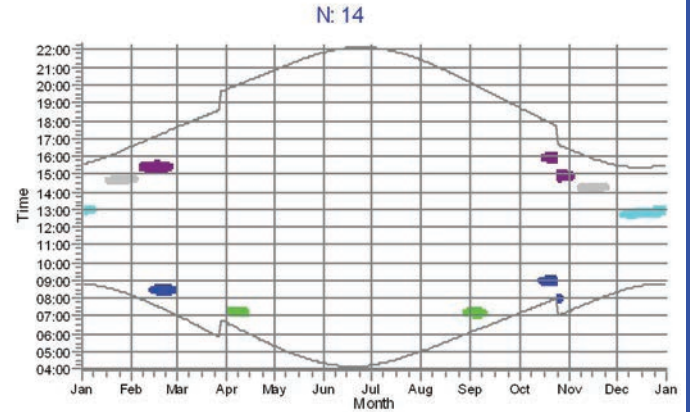
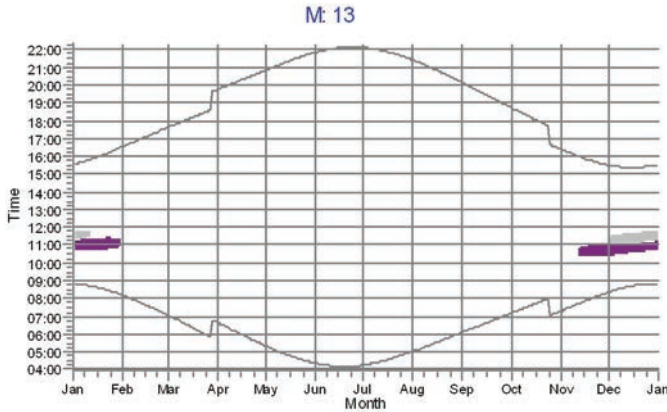
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd



WTGs

- 1: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2571)
- 3: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2573)
- 9: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2579)

- 11: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2582)
- 12: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2583)
- 13: REpower 3.2M114 3200 114.0 IO! hub: 143,0 m (TOT: 200,0 m) (2584)

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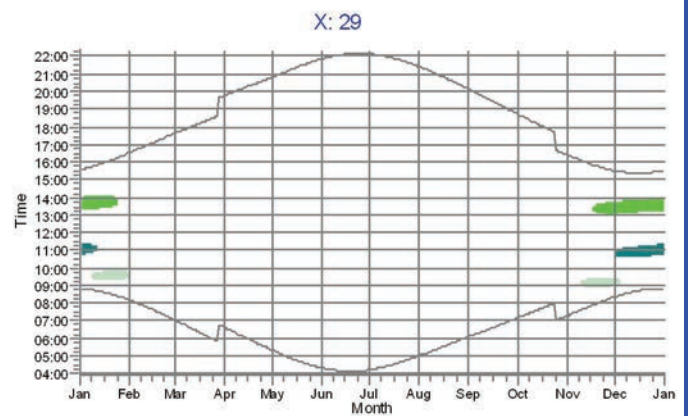
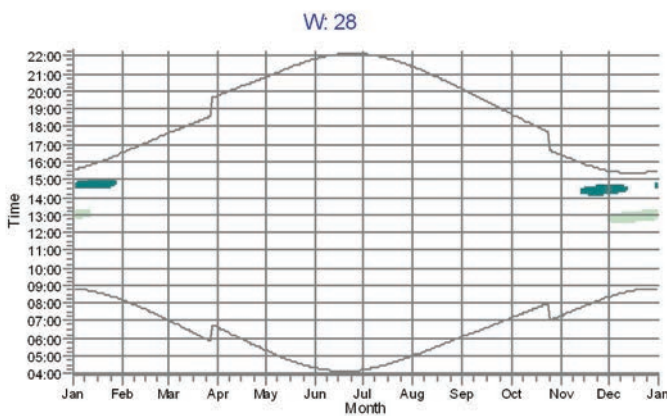
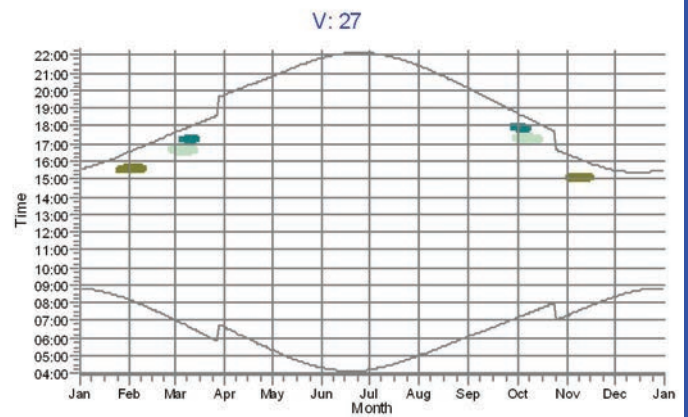
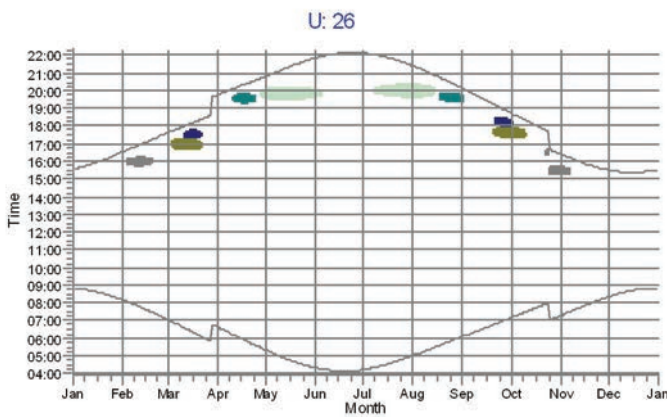
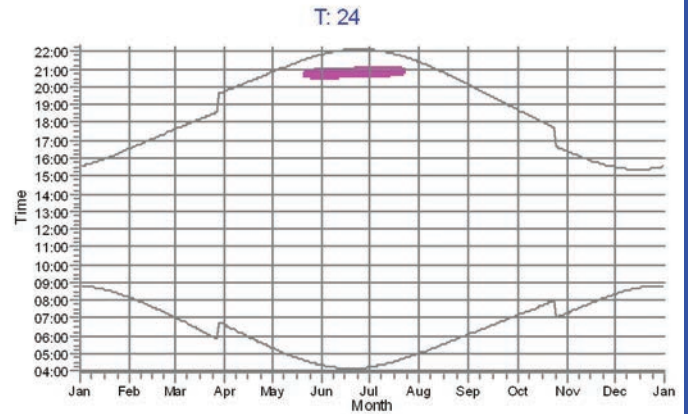
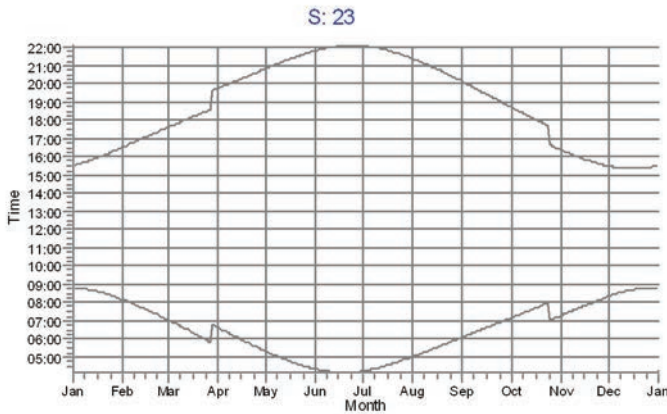
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd



WTGs

- 4: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2574)
- 5: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2575)
- 6: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2576)
- 7: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2577)

- 9: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2579)
- 10: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2580)
- 14: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2585)

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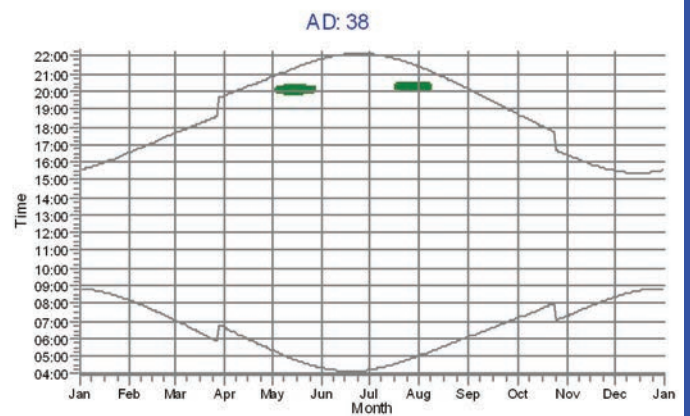
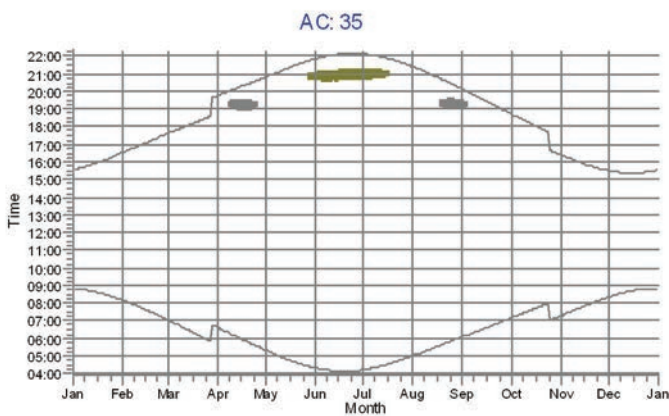
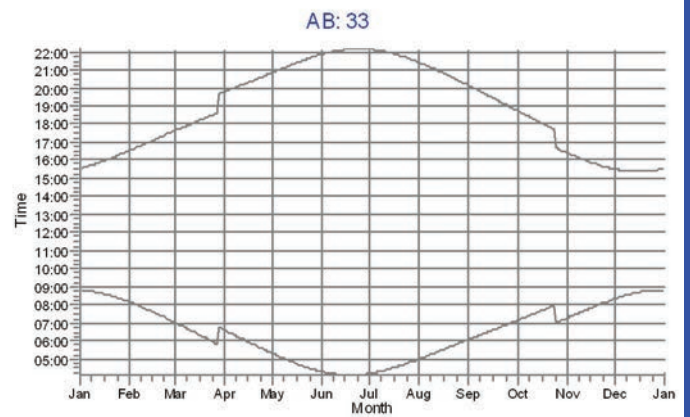
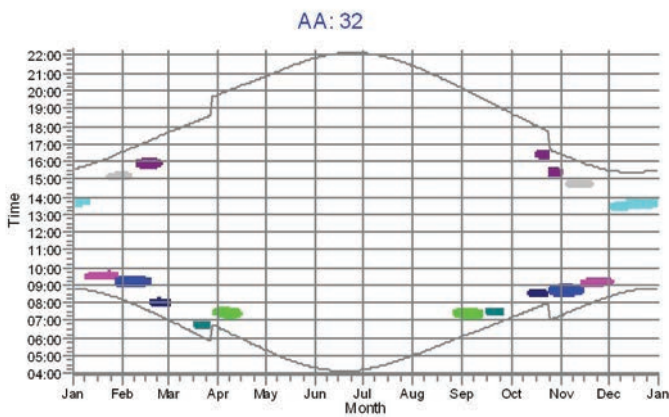
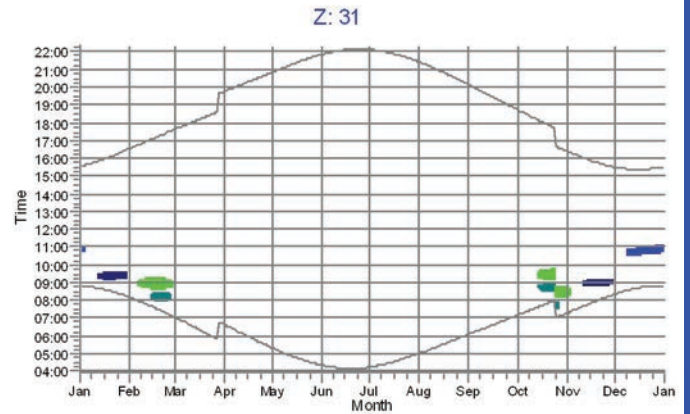
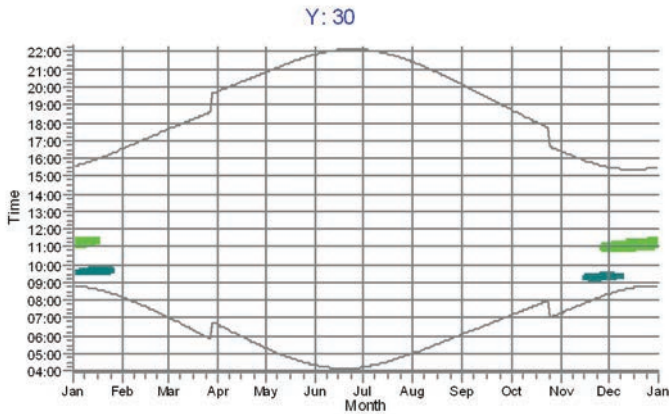
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd



WTGs

- | | | | |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|  | 1: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2571) |  | 9: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2579) |
|  | 3: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2573) |  | 10: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2580) |
|  | 4: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2574) |  | 11: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2582) |
|  | 5: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2575) |  | 12: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2583) |
|  | 6: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2576) |  | 13: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2584) |
|  | 7: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2577) | | |

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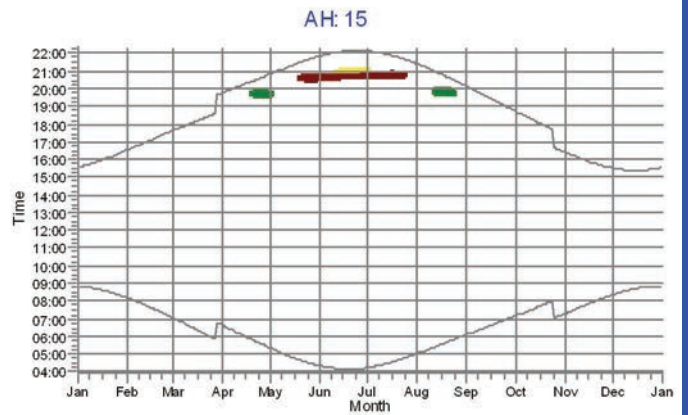
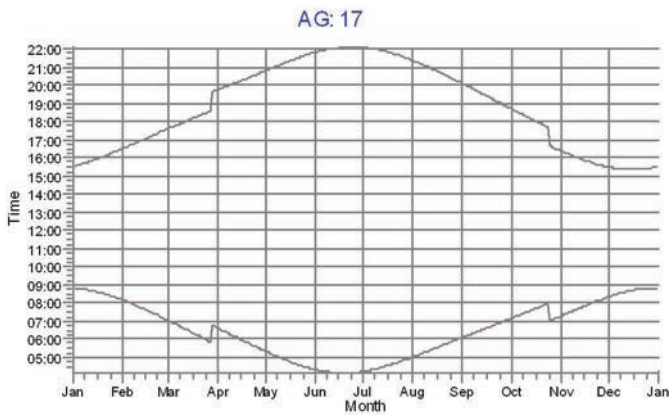
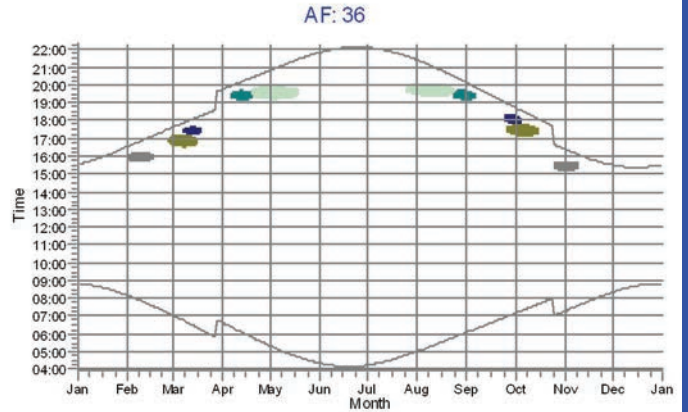
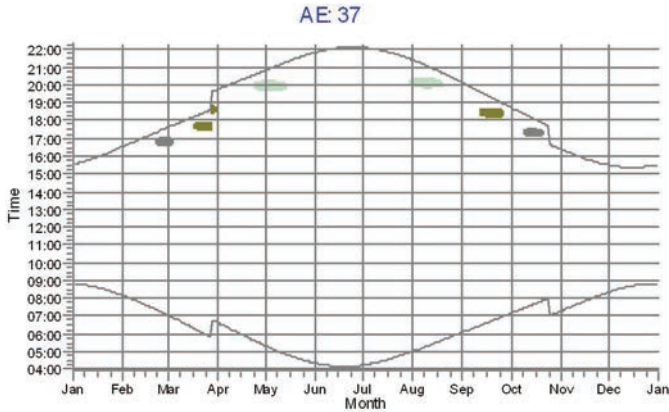
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SHADOW - Calendar, graphical

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd



WTGs

- 1: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2571)
- 2: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2572)
- 4: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2574)
- 6: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2576)

- 7: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2577)
- 8: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2578)
- 10: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2580)
- 14: REpower 3.2M114 3200 114.0 !O! hub: 143,0 m (TOT: 200,0 m) (2585)

Project:
Grönhult

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2013-10-28 11:39 / 10

Licensed user:
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Företagsenhet 1002
SE-962 80 Jokkmokk

Jenny Longworth / jenny.longworth@vattenfall.com
Calculated:
2013-10-18 18:06/2.9.207

SHADOW - Map

Calculation: 130923 MM114, 14 Vindkraftverk, 200m Totalhöjd



0 1 2 3 4 km

Map: Bitmap map: 06D.tif , Print scale 1:75 000, Map center RN East: 1 358 249 North: 6 365 009

Shadow receptor

New WTG

