CPC Finland Oy

Åbackin tuulivoimahanke

Melu- ja varjostusmallinnusraportti

Sisällysluettelo

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10.3.2021

Åbackin tuulivoimahanke

1 MELU- JA VARJOSTUSMALLINNUKSEN TAVOITTEET

Åbackin tuulivoimahankkeen hankeomistaja CPC Finland Oy suunnittelee 27 voimalan rakentamista Kristiinankaupunkiin. Tämä melu- ja varjostusmallinnusraportti on laadittu kaavaluonnosvaiheen voimaloiden sijoitussuunnitelman perusteella.

Tuulivoimaloiden aiheuttamia meluvaikutuksia on arvioitu WindPRO-ohjelman DECIBEL-moduulilla. Tuulivoimaloiden aiheuttamat varjostusvaikutukset on mallinnettu WindPro-ohjelman SHADOW-moduulilla voimalapaikkojen sijoitusten mukaisesti. Melu- ja varjostusmallinnukset on laatinut Liisa Karhu ja laaduntarkastuksen on tehnyt Henna-Riikka Rintamäki FCG Finnish Consulting Group Oy:stä

2 LÄHTÖTIEDOT JA MENETELMÄT

2.1 Melu

2.1.1 Melumallinnus ISO 9613-2

Tuulivoimaloiden aiheuttamat äänenpainetasot on mallinnettu WindPRO-laskentaohjelman Decibel-moduulilla ISO 9613-2 standardin mukaisesti. Ympäristöhallinnon tuulivoimaloiden melun mallintamista koskevan ohjeen 2/2014 mukaisesti tuulen nopeutena käytettiin 10 m korkeudella mitattuna 8 m/s, ilman lämpötilana 15 °C, ilmanpaineena 101,325 kPa, ilman suhteellisena kosteutena 70 % ja maanpinnan kovuutena arvoa 0,4. Laskenta on tehty 4,0 m maan pinnan tasosta.

Åbackin tuulivoimaloiden äänenpainetasot on mallinnettu käyttäen Vestaksen V162 6.0 MW voimalaitosta. Voimalaitoksen lähtömelutaso on 104,3 dB(A)m mikä on voimalan valmistajan antama takuuarvo, kun voimalassa käytetään hiljaista siipityyppiä (blades with serrated trailing edge). Voimalaitoksen siipityyppi on ääntä Melutaso vastaa ylempää luottamusväliä 95 % ja on voimalaitosvalmistajan mukaan melun takuuarvo.

Melumallinnusten laskentatuloksia on havainnollistettu ns. keskiäänitasokarttojen avulla. Keskiäänitasokartoissa on melun keskiäänitaso- eli ekvivalenttiäänitasokäyrät (LAeq) 5 dB välein.

Taulukko 1. Åbackin tuulivoimahankkeen mallinnusohjelma ja tuulivoimaloiden äänitehotasot sekä melun erityispiirteet.

MALLINNUSOHJELMAN TIEDOT							
Mallinnusohjelma ja versio: WindPRO version 3.4.388				Mallinnusmenetelmä: ISO 9613-2			
TUULIVOIMALAN (TUULIVOIMALOIDEN TIEDOT)							
Tuulivoimalan valmistaja: Vestas				Tyyppi: V162-6,0 MW		Sarjanumero/t:-	
Nimellisteho:6.0 MW		Napakorkeus:149 m		Roottorin halkaisija:162 m		Tornin tyyppi: teräs/hybridi	
Mahdollisuudet vaikuttaa tuulivoimalan melupäästöön käytön aikana ja sen vaikutus meluun							
Lapakulman säätö		Pyörimisnopeus		Muu, mikä			
Kyllä	- dB	Kyllä	- dB	Noise mode säätö: Mode P06000		Kyllä	
~~Ei~~		~~Ei~~		Noise mode, lähtömelutaso		104,3 dB	

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT							
Document nro: DMS no.: 0095-3732_00, 2020-06-10. Voimalaitosvalmistajan mukaan melutaso 104,3 dB(A) on IEC-standardin 61400-11 mukainen takuuarvo.							
Oktaaveittain [Hz],dB(A)		1/3-oktaaveittain [Hz] LWA dB					
		20	58,5	200	90,7	1600	92,0
63	84,1	25	63,0	250	92,1	2000	90,5
125	91,9	31,5	67,4	315	93,2	2500	88,8
250	96,9	40	71,6	400	94,1	3150	86,7
500	99,2	50	75,2	500	94,5	4000	84,1
1000	98,7	63	78,6	630	94,7	5000	81,4
2000	95,4	80	81,8	800	94,5	6300	78,3
4000	89,4	100	84,4	1000	94,0	8000	74,8
8000	80,4	125	86,8	1250	93,2	10000	71,1
104,3 dB(A)		160	89,0				

Melun erityispiirteiden mittaus ja havainnot:							
Kapeakaistaisuus / Tonaalisuus		Impulssimaisuus		Merkityksellinen sykintä (amplitudimodulaatio)		Muu, Mikä:	
~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei	~~kyllä~~	ei

2.1.2 Matalataajuinen melu

Matalataajuinen melu laskettiin Ympäristöministeriön ohjeen 2/2014 mukaisin menetelmin käyttäen voimalavalmistajilta saatuja arvioita niiden äänitehotasoista.

Ohje 2/2014 antaa menetelmän matalataajuisen melun laskentaan rakennusten ulkopuolelle. Sosiaali- ja terveysministeriön Asumisterveysasetus 2015 antaa matalataajuiselle melulle toimenpiderajat asuinhuoneissa. Rakennusten sisälle kantautuva äänitaso arvioitiin Turun AMK:n (Keränen, Hakala ja Hongisto, 2018) julkistamien Anojanssi projektin tulosten mukaisten ääneneristävyysarvoin ja tuloksia verrattiin toimenpiderajoihin.

Taulukko 2. Suomalaisen pientalon julkisivun äänitasoeron alalikiarvo Anojanssi projektin tulosten mukaisesti.

f [Hz]	20	25	31.5	40	50	63	80	100	125	160	200
DLσ [dB]	7.6	8.3	9.2	10.3	11.5	13.0	14.8	16.8	18.8	21.1	22.8

Matalataajuisen melun laskelmassa huomioitiin maanpinnan muodon vaikutus ohjeen 4/2014 mukaisesti. Tulokset on esitetty taajuuskohtaisena taulukkona hankealueen ympäröidyille asuin- ja lomarakennuksille.

Taulukko 3. Käytetyt mallinnusparametrit ISO 9613-2 laskelmissa sekä melulle altistuvat kohteet.

AKUSTISET TIEDOT/LASKENNAN LÄHTÖTIEDOT			
Laskenta korkeus		Laskentaruudun koko [m·m]	
ISO 9613-2: 4,0 m		25x25 m	
Suhteellinen kosteus		Lämpötila	
70 %	Muu, mikä ja miksi:	ISO 9613-2: 15 C°	
Maastomallin lähde ja tarkkuus			
Maastomallin lähde: MML maastotietokanta		Vaakaresoluutio:1,0	Pystyresoluutio:0,5
Maan- ja vedenpinnan absorption ja heijastuksen huomioiminen, käytetyt kertoimet			
ISO 9613-2	0,4		HUOM
Ilmakehän stabiilius laskennassa/meteorologinen korjaus			
Neutraali, (0): Neutraali		Muu, mikä ja miksi:	
Sääolosuhteiden huomiointi; laskennassa käytetty tuulen suunnat ja nopeus			
Tuulen suunta: 0-360°		Tuulen nopeus: 10 metrin korkeudella mitattuna 8 m/s	
Voimalan äänen suuntaavuus ja vaimentuminen			
Vapaa avaruus: kyllä		Muu, mikä, miksi:	

2.2 Varjostusmallinnus

Tuulivoimaloiden varjostusvaikutuksia mallinnettiin WindPRO-ohjelman Shadow-moduulilla. Laskennassa varjot huomioidaan, kun aurinko on yli 3 astetta horisontin yläpuolella. Varjoksi lasketaan tilanne, jossa siipi peittää vähintään 20 % auringosta.

Varjostusmallin laskennassa on huomioitu hankealueen korkeustiedot, tuulivoimaloiden sijainnit, tuulivoimalan napakorkeudet ja roottorin halkaisija sekä hankealueen aikavyöhyke. Mallinnuksessa otettiin huomioon auringon asema horisontissa eri kellon- ja vuodenaikoina, pilvisyys kuukausittain eli kuinka paljon aurinko paistaa ollessaan horisontin yläpuolella sekä tuulivoimalaitosten arvioitu vuotuinen käyntiaika.

Varjostuksen tarkastelukorkeutena lähialueen asuin- tai lomarakennusten pihapiirissä käytettiin 1,0 metriä ja laskenta-alueen kokoa 5,0 x 5,0 metriä. Laskentaikkunoiden suunnat asennettiin voimaloita kohti ns. ”greenhouse mode”.

Auringon keskimääräiset paistetunnit perustuvat Uumajan sääaseman mitattuihin säätietoihin 1981-2010. Laskentojen tuulen suunta ja nopeusjakaumana käytettiin NASA:n MERRA-dataa (Modern Era Retrospective-analysis for Research and Applications) hankealueen läheisyydeltä.

Varjostusmallinnuksissa (Luke forest) on huomioitu puuston peittävyys käyttämällä Luonnonvarakeskuksen vuoden 2017 puuston keskipituus aineistoa.

Varjostusmallinnuksen tuloksia on havainnollistettu kartan avulla. Kartalla esitetään varjostusvaikutuksen (1, 8 ja 20 tuntia vuodessa) laajuus. Sen lisäksi mallinnuksessa on erikseen laskettu vaikutus tuulivoimapuistoalueen ympäristössä oleviin herkkiin kohteisiin.

2.3 Mallinnusten laskentapisteet

Melumallinnuksen, varjostusmallinnuksen ja matalataajuisen melun mallinnuksen laskentapisteet perustuvat Maanmittauslaitoksen Maastotietokannan rakennuskantaa koskeviin tietoihin sekä Kristiinankaupungin rakennusvalvonnan tietoihin Maanmittauslaitoksen Maastotietokannassa asuin- ja lomarakennuksiksi merkittyjen rakennusten käyttötarkoituksesta. Hankealueella sijaitsevat rakennuskanta-aineistossa asuin- tai lomarakennuksiksi merkityt rakennukset ovat joko vailla rakennuslupaa olevia rakennuksia tai statuksella muu rakennus olevia metsätalouteen liittyviä taukotupia tai eräkämppiä. Näitä rakennuksia ei huomioida mallinnuksen laskentapisteinä, koska niihin ei sovelleta tuulivoimaloiden aiheuttaman melun tai varjostuksen raja- ja ohjearvoja tai matalataajuisen melun toimenpiderajoja (kts. 2.4).

2.4 Raja- ja ohjearvot

2.4.1 Melu

Valtioneuvoston asetuksessa (1107/2015) tuulivoimaloille on määritelty suunnitteluarvot päivä- ja yöajan keskiäänitasojen maksimiarvolle. Jos tuulivoimalan melu sisältää tonaalisia, kapeakaistaisia tai impulssimaisia komponentteja, tai se on selvästi amplitudimoduloitunutta, mallinnustuloksiin tulee ohjeen mukaan lisätä viisi desibeliä ennen ohjearvoon vertaamista. Koska ohjearvo sisältää jo tyypillisen tuulivoimamelun piirteet, edellä mainitut äänenpiirteiden tulee olla tuulivoimalalle epätyypillisen voimakkaita, jotta mallinnustuloksissa täytyy huomioida viiden desibelin lisä äänenvoimakkuuteen.

Taulukko 4. Valtioneuvoston asetuksen mukaiset tuulivoimaloiden melutason toimenpiderajat (Valtioneuvoston asetus 27.8.2015).

Vaikutuskohde	Päivä (7-22)	Yö (22-7)
Pysyvä asutus	45 dB	40 dB
Loma-asutus	45 dB	40 dB
Hoitolaitokset	45 dB	40 dB
Oppilaitokset	45 dB	—
Virkistysalueet	45 dB	—
Leirintäalueet	45 dB	40 dB
Kansallispuistot	40 dB	40 dB

Sosiaali- ja terveysministeriön asetuksessa (545/2015) on annettu matalataajuiselle melulle toimenpiderajoja. Toimenpiderajat koskevat asuinhuoneita ja ne on annettu taajuuspainottamattomina yhden tunnin keskiäänitasoina tersseittäin. Toimenpiderajat koskevat yöaikaa ja päivällä sallitaan 5 dB suuremmat arvot.

Taulukko 5. Matalataajuisen sisämelun tunnin keskiäänitason toimenpiderajat nukkumiseen tarkoitetuissa tiloissa.

Terssikaista Hz	20	25	31,5	40	50	63	80	100	125	160	200
Keskiäänitaso LZeq,1h, dB	74	64	56	49	44	42	40	38	36	34	32
Edellisestä laskettu keski-äänitaso A-painotettuna LAeq,1h, dB	24	19	17	14	14	16	18	19	20	21	21

Lisäksi yöaikainen mahdollisesti unihäiriötä aiheuttava melu, joka erottuu selvästi taustamelusta, ei saa ylittää 25 dB yhden tunnin keskiäänitasona LAeq,1h mitattuna niissä tiloissa, jotka on tarkoitettu nukkumiseen.

2.4.2 Varjostus

Suomessa ei ole viranomaisten antamia yleisiä määräyksiä tuulivoimaloiden muodostaman varjostuksen enimmäiskestoista eikä varjonmuodostuksen arviointiperusteista. Ympäristöministeriön tuulivoimarakentamisen suunnitteluohjeistuksessa esitetään käytettäväksi muiden maiden suosituksia välkkeen rajoittamisesta (Ympäristöministeriö 2012).

Useissa maissa on annettu raja-arvoja tai suosituksia hyväksyttävän välkevaikutuksen määrästä. Esimerkiksi Ruotsissa suositus on kahdeksan tuntia vuodessa ja 30 minuuttia päivässä.

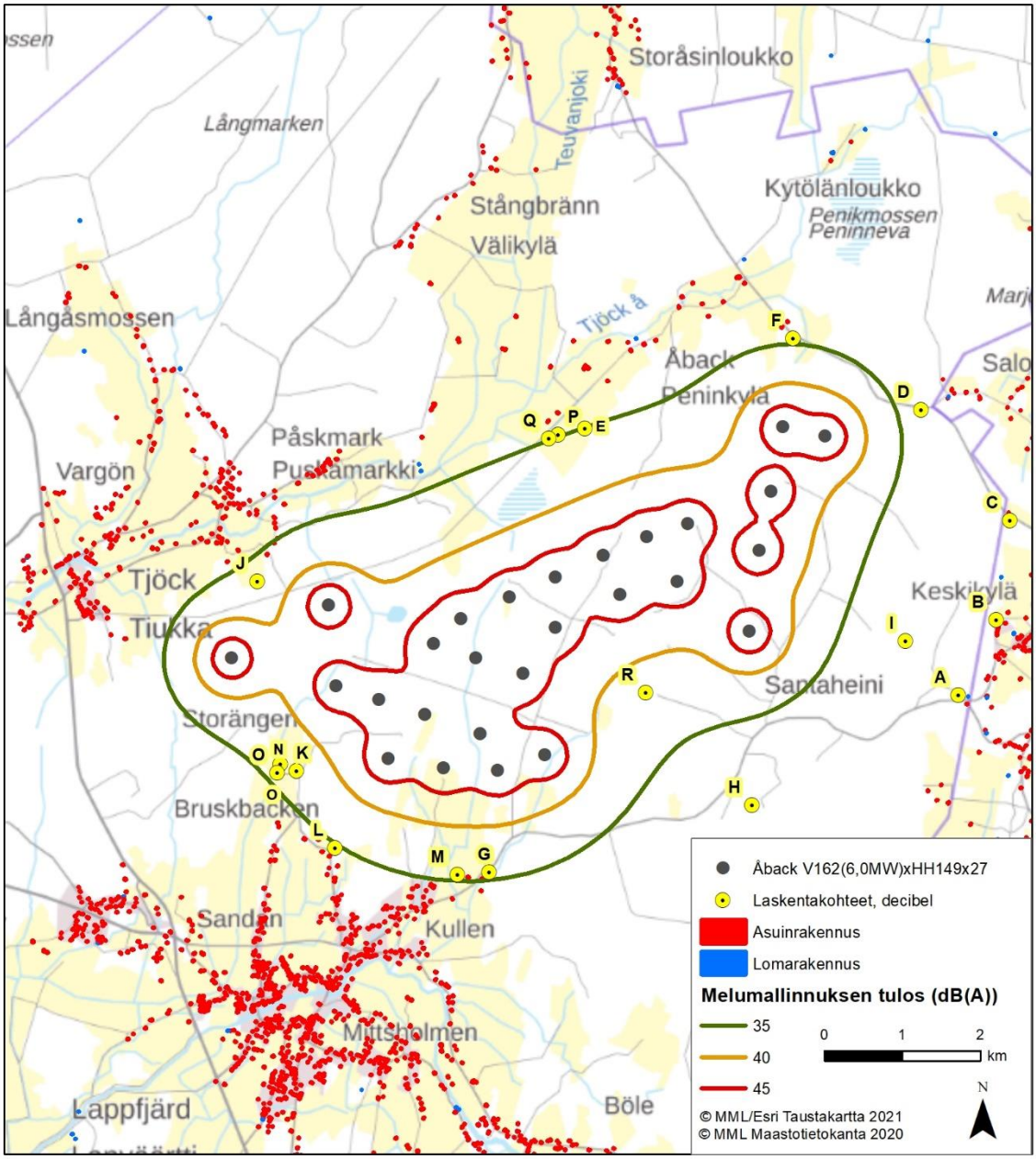
Arvioinnissa on tarkasteltu vaikutuksia alueella, jossa varjoja tai välkettä mallinnuksen mukaisessa todellisessa tilanteessa (”real case”) esiintyy vähintään kahdeksan tuntia vuodessa.

3 MELU- JA VARJOSTUSMALLINNUSTEN TULOKSET

3.1 Melu

3.1.1 Melun laskentatulokset ISO 9613-2

Melumallinnuksen mukaan melutaso 40 dB(A) ei ylity lähimmillä asuin- ja lomarakennuksilla. Katso tarkemmat laskentatulokset liitteestä 1.



Kuva 1. Melumallinnuksen tulos

Taulukko 6. Laskennalliset melutasot Åbackin tuulivoimahankkeen ympäristössä

Laskentapiste	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskenta-korkeus (m)	Melutaso dB(A)
Asuinrakennus A (Karijoentie 918)	224041	6918543	79,4	4,0	27,4
Asuinrakennus B (Vuorenalantie 55)	224523	6919504	64,4	4,0	27,2
Asuinrakennus C (Kirkkotie 160)	224701	6920777	68,5	4,0	27,5
Asuinrakennus D (Kirkkotie 352)	223560	6922191	79,6	4,0	32,7
Asuinrakennus E (Lidenintie 733)	219254	6921953	26,6	4,0	35,1
Asuinrakennus F (Kirkkotie 548)	221916	6923106	40	4,0	34,5
Asuinrakennus G (Karijoentie 203)	218025	6916275	13,9	4,0	35,6
Liikerakennus H (Hiihtokeskus Pyhävuori)	221397	6917130	102,7	4,0	30,7
Laskentakohde I (Susivuoren näkötorni)	223360	6919231	130,7	4,0	30,8
Asuinrakennus J (Lidenintie 351)	215058	6919995	21,6	4,0	36,9
Asuinrakennus K (Storängintie 49)	215557	6917569	12,2	4,0	37,0
Asuinrakennus L (Nyskiftanintie 1493)	216049	6916584	12,3	4,0	34,7
Asuinrakennus M (Karijoentie 144)	217623	6916240	11,4	4,0	35,5
Asuinrakennus N (Storängsvägen 78)	215355	6917654	12,1	4,0	36,4
Asuinrakennus O (Storängsvägen 68)	215312	6917545	11	4,0	35,8
Asuinrakennus P (Lidenintie 709)	218911	6921880	25	4,0	34,9
Asuinrakennus Q (Lidenintie 697)	218788	6921826	25	4,0	34,9
Lomarakennus R (Påskmossberget)	220030	6918573	50,1	4,0	38,1

3.1.2 Matalataajuiset melutasot

Sisätilojen laskennallisia tuloksia on verrattu Sosiaali- ja terveysministeriön (STM) Asumisterveysasetuksessa (545/2015) annettuihin toimenpiderajoihin. Nämä ovat enimmäisarvoja, jotka on laadittu yöaikaiselle melulle nukkumiseen tarkoitettuihin tiloihin. Toimenpiderajaa on verrattu myös äänitasoon tarkasteltujen rakennusten ulkopuolella.

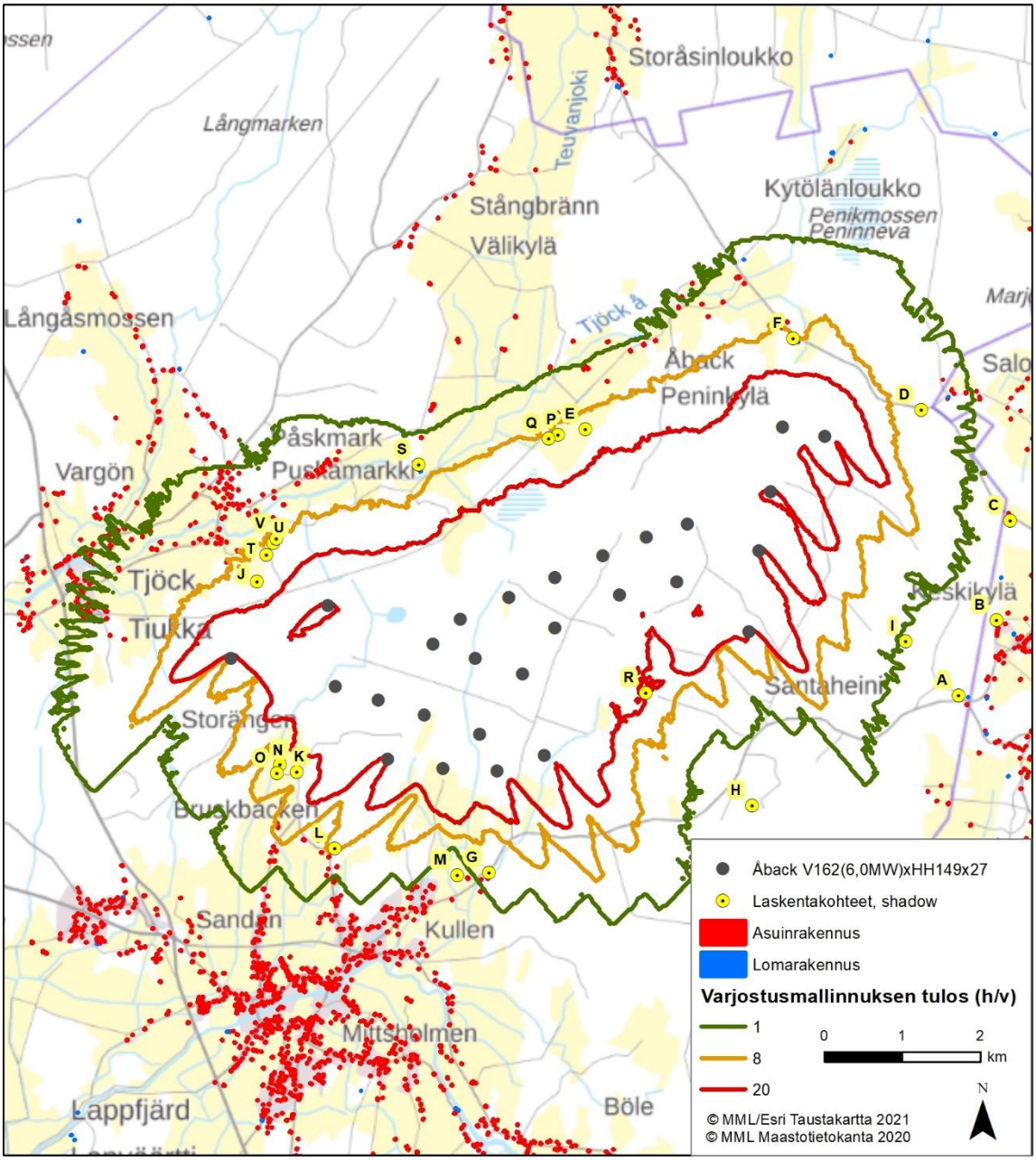
Mallinnettaessa voimalaitostyypillä Vestas V162 6.0 MW matalataajuinen melu ei ylitä Sosiaali- ja terveysministeriön asumisterveysohjearvoa. Taulukoissa näkyy toimenpiderajan alitus (negatiivinen arvo) tai ylitys (positiivinen arvo).

Taulukko 7. Matalataajuisen melun laskentatulokset

Rakennus	Äänitaso ulkona		Äänitaso sisällä	
	L eq,1h – Asumis-terveys ohje sisällä	Hz	L eq,1h – Asumis-terveys ohje sisällä	Hz
Asuinrakennus A (Karijoentie 918)	-3,3	100	-20,5	50
Asuinrakennus B (Vuorenalantie 55)	-3,5	100	-20,8	50
Asuinrakennus C (Kirkkotie 160)	-3,2	100	-20,7	50
Asuinrakennus D (Kirkkotie 352)	0,9	100	-17,9	50
Asuinrakennus E (Lidenintie 733)	4,0	100	-15,3	50
Asuinrakennus F (Kirkkotie 548)	2,5	100	-16,6	50
Asuinrakennus G (Karijoentie 203)	3,8	100	-15,2	50
Liikerakennus H (Hiihtokeskus Pyhävuori)	-0,1	100	-18,0	50
Asuinrakennus I (Lidenintie 351)	4,3	100	-17,5	50
Asuinrakennus J (Storängintie 49)	4,8	100	-14,7	50
Asuinrakennus K (Nyskiftanintie 1493)	3,0	100	-14,3	50
Asuinrakennus L (Karijoentie 144)	3,6	100	-15,8	50
Asuinrakennus M (Storängsvigen 78)	4,4	100	-15,3	50
Asuinrakennus N (Storängsvägen 68)	3,9	100	-14,7	50
Asuinrakennus O (Lidenintie 709)	4,0	100	-15,1	50
Asuinrakennus P (Lidenintie 697)	4,1	100	-15,4	50
Lomarakennus R (Påskmossberget)	6,0	100	-15,4	50

3.2 Varjostus

Tuulivoimapuistoa lähimpien asuin- ja lomarakennusten pihapiirissä varjostusvaikutus on yli 8 h/a kahdessatoista laskentapisteessä, kun puuston suojaavaa vaikutusta ei ole huomioitu.



Kuva 2. Varjostusmallinnuksen tulos, kun puuston suojaavaa vaikutusta ei ole huomioitu.

Taulukko 8. Varjostusmallinnuksen tulos, kun puuston suojaavaa vaikutusta ei ole huomioitu "real case, no forest".

	ETRS89-TM35 Itä	ETRS89-TM35 Pohjoinen	Z (m)	Laskentaikkuna (m)	Varjostus (h/a)
Asuinrakennus A (Karijoentie 918)	224041	6918543	79,4	5,0 x 5,0	0:00
Asuinrakennus B (Vuorenalantie 55)	224523	6919504	64,4	5,0 x 5,0	0:00
Asuinrakennus C (Kirkkotie 160)	224701	6920777	68,5	5,0 x 5,0	0:00
Asuinrakennus D (Kirkkotie 352)	223560	6922191	79,6	5,0 x 5,0	3:56
Asuinrakennus E (Lidenintie 733)	219254	6921953	26,6	5,0 x 5,0	12:33
Asuinrakennus F (Kirkkotie 548)	221916	6923106	40	5,0 x 5,0	9:45
Asuinrakennus G (Karijoentie 203)	218025	6916275	13,9	5,0 x 5,0	5:04
Liikerakennus H (Hiihtokeskus Pyhävuori)	221397	6917130	102,7	5,0 x 5,0	0:00
Laskentakohde I (Susivuoren näkötorni)	223360	6919231	130,7	5,0 x 5,0	0:27
Asuinrakennus J (Lidenintie 351)	215058	6919995	21,6	5,0 x 5,0	14:03
Asuinrakennus K (Storängintie 49)	215557	6917569	12,2	5,0 x 5,0	13:12
Asuinrakennus L (Nyskiftanintie 1493)	216049	6916584	12,3	5,0 x 5,0	8:49
Asuinrakennus M (Karijoentie 144)	217623	6916240	11,4	5,0 x 5,0	0:00
Asuinrakennus N (Storängsvägen 78)	215355	6917654	12,1	5,0 x 5,0	13:39
Asuinrakennus O (Storängsvägen 68)	215312	6917545	11	5,0 x 5,0	12:24
Asuinrakennus P (Lidenintie 709)	218911	6921880	25	5,0 x 5,0	10:08
Asuinrakennus Q (Lidenintie 697)	218788	6921826	25	5,0 x 5,0	9:43
Lomarakennus R (Påskmossberget)	220030	6918573	50,1	5,0 x 5,0	20:39
Lomarakennus S (Brannängskullen)	217 124	6 921 498	25,4	5,0 x 5,0	6:01
Asuinrakennus T (Kaasbackantie 85)	215 175	6 920 340	22,5	5,0 x 5,0	11:49
Asuinrakennus U (Kaasbackantie 107/1)	215 266	6 920 493	21,8	5,0 x 5,0	11:02
Asuinrakennus V (Kaasbackantie 107/2)	215 303	6 920 548	23,2	5,0 x 5,0	10:39

LIITE 1. Åbackin tuulivoimahanke - Melun leviämismallinnuksen tulokset ISO 9613-2, YM 2 /2014

Licensed user:
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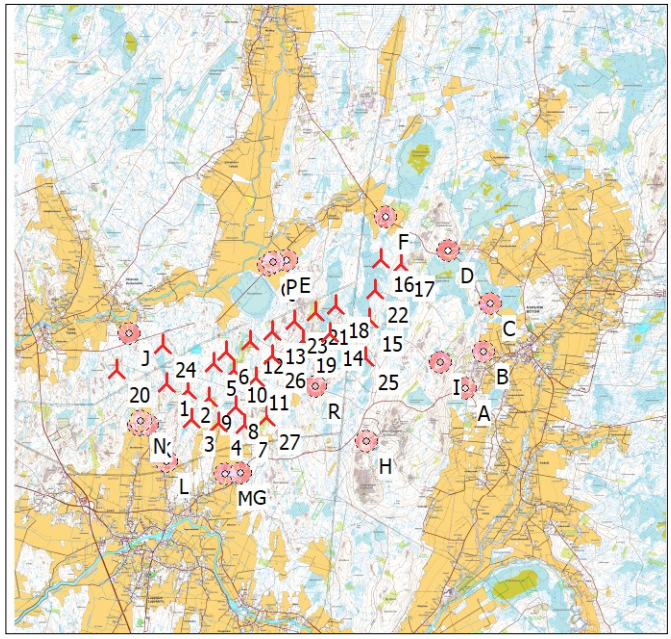
Liisa KArhu / liisa.karhu@fcg.fi
Calculated:
4.3.2021 12.12/3.4.388

DECIBEL - Main Result

Calculation: Åback_03_2020_V162_6MW

Noise calculation model:
ISO 9613-2 General
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, Ground factor: 0,4
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in NSA has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Noise reflections according to ISO 9613-2 included



Scale 1:200 000

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

New WTG Noise sensitive area

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	LwA,ref
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]
1	216 061	6 918 654	27,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
2	216 612	6 918 476	31,7	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
3	216 729	6 917 721	25,0	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
4	217 436	6 917 604	19,8	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
5	217 310	6 919 195	27,8	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
6	217 659	6 919 513	31,1	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
7	218 131	6 917 568	21,9	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
8	217 904	6 918 037	22,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
9	217 198	6 918 282	21,1	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
10	217 852	6 919 012	22,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
11	218 453	6 918 812	35,0	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
12	218 282	6 919 791	27,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
13	218 872	6 920 048	34,0	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
14	220 429	6 919 990	39,8	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
15	221 481	6 920 386	50,4	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
16	221 784	6 921 973	47,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
17	222 326	6 921 851	57,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
18	220 570	6 920 730	40,0	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
19	219 699	6 919 825	37,0	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
20	214 724	6 919 011	35,4	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
21	220 040	6 920 563	42,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
22	221 631	6 921 140	50,0	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
23	219 480	6 920 321	48,9	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
24	215 963	6 919 690	29,4	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
25	221 356	6 919 349	52,4	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
26	218 873	6 919 399	39,1	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3
27	218 737	6 917 765	22,5	VESTAS V162-6.0 6000 16...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	USER	V162 - 6.0 MW Mode 0 STE - 10-2020	8,0	104,3

Calculation Results

Sound level

Noise sensitive area

No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand
				[m]	[m]	[dB(A)]	[dB(A)]	[m]
A	Laskentakohde A (Karijoentie 918)	224 041	6 918 543	79,4	4,0	40,0	27,4	2 268
B	Laskentakohde B (Vuorenalantie 55)	224 523	6 919 504	64,4	4,0	40,0	27,2	2 538
C	Laskentakohde C (Kirkkotie 160)	224 701	6 920 777	68,5	4,0	40,0	27,5	2 069
D	Asuinrakennus D (Kirkkotie 352)	223 560	6 922 191	79,6	4,0	40,0	32,7	756
E	Asuinrakennus E (Lidenintie 733)	219 254	6 921 953	26,6	4,0	40,0	35,1	797
F	Asuinrakennus F (Kirkkotie 548)	221 916	6 923 106	40,0	4,0	40,0	34,5	571

To be continued on next page...

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4.3.2021 12.12/3.4.388

DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A Laskentakohde A (Karijoentie 918)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		7 974	7 974	5,93	104,3	0,00	89,03	-	-	0,00	0,00	-
10		6 201	6 202	9,36	104,3	0,00	86,85	-	-	0,00	0,00	-
11		5 590	5 591	10,73	104,3	0,00	85,95	-	-	0,00	0,00	-
12		5 888	5 888	10,05	104,3	0,00	86,40	-	-	0,00	0,00	-
13		5 379	5 380	11,23	104,3	0,00	85,62	-	-	0,00	0,00	-
14		3 888	3 889	15,54	104,3	0,00	82,80	-	-	0,00	0,00	-
15		3 152	3 154	18,36	104,3	0,00	80,98	-	-	0,00	0,00	-
16		4 103	4 104	14,79	104,3	0,00	83,26	-	-	0,00	0,00	-
17		3 723	3 725	16,13	104,3	0,00	82,42	-	-	0,00	0,00	-
18		4 099	4 101	14,80	104,3	0,00	83,26	-	-	0,00	0,00	-
19		4 524	4 525	13,43	104,3	0,00	84,11	-	-	0,00	0,00	-
2		7 423	7 423	6,92	104,3	0,00	88,41	-	-	0,00	0,00	-
20		9 320	9 321	3,74	104,3	0,00	90,39	-	-	0,00	0,00	-
21		4 478	4 480	13,57	104,3	0,00	84,03	-	-	0,00	0,00	-
22		3 540	3 542	16,81	104,3	0,00	81,99	-	-	0,00	0,00	-
23		4 891	4 893	12,43	104,3	0,00	84,79	-	-	0,00	0,00	-
24		8 152	8 152	5,62	104,3	0,00	89,23	-	-	0,00	0,00	-
25		2 801	2 804	19,91	104,3	0,00	79,95	-	-	0,00	0,00	-
26		5 234	5 235	11,58	104,3	0,00	85,38	-	-	0,00	0,00	-
27		5 356	5 357	11,28	104,3	0,00	85,58	-	-	0,00	0,00	-
3		7 351	7 352	7,06	104,3	0,00	88,33	-	-	0,00	0,00	-
4		6 665	6 666	8,39	104,3	0,00	87,48	-	-	0,00	0,00	-
5		6 757	6 757	8,21	104,3	0,00	87,60	-	-	0,00	0,00	-
6		6 450	6 450	8,84	104,3	0,00	87,19	-	-	0,00	0,00	-
7		5 985	5 985	9,84	104,3	0,00	86,54	-	-	0,00	0,00	-
8		6 152	6 153	9,47	104,3	0,00	86,78	-	-	0,00	0,00	-
9		6 842	6 842	8,04	104,3	0,00	87,70	-	-	0,00	0,00	-
Sum				27,42								

- Data undefined due to calculation with octave data

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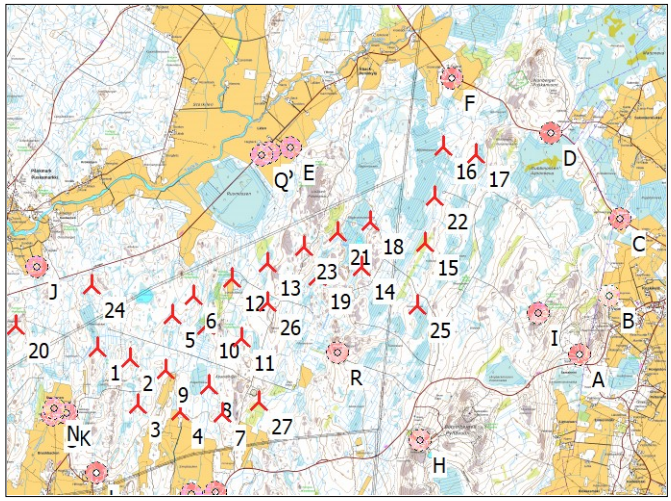
4.3.2021 12.12/3.4.388

DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:125 000

New WTG Noise sensitive area

Noise sensitive area: C Laskentakohde C (Kirkkotie 160)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		8 888	8 889	4,41	104,3	0,00	89,98	-	-	0,00	0,00	-
10		7 066	7 066	7,60	104,3	0,00	87,98	-	-	0,00	0,00	-
11		6 543	6 544	8,64	104,3	0,00	87,32	-	-	0,00	0,00	-
12		6 488	6 489	8,76	104,3	0,00	87,24	-	-	0,00	0,00	-
13		5 869	5 870	10,09	104,3	0,00	86,37	-	-	0,00	0,00	-
14		4 339	4 341	14,01	104,3	0,00	83,75	-	-	0,00	0,00	-
15		3 240	3 243	18,00	104,3	0,00	81,22	-	-	0,00	0,00	-
16		3 149	3 152	18,38	104,3	0,00	80,97	-	-	0,00	0,00	-
17		2 604	2 607	20,84	104,3	0,00	79,32	-	-	0,00	0,00	-
18		4 127	4 129	14,71	104,3	0,00	83,32	-	-	0,00	0,00	-
19		5 087	5 088	11,94	104,3	0,00	85,13	-	-	0,00	0,00	-
2		8 402	8 402	5,20	104,3	0,00	89,49	-	-	0,00	0,00	-
20		10 122	10 123	2,57	104,3	0,00	91,11	-	-	0,00	0,00	-
21		4 661	4 663	13,03	104,3	0,00	84,37	-	-	0,00	0,00	-
22		3 088	3 091	18,63	104,3	0,00	80,80	-	-	0,00	0,00	-
23		5 236	5 237	11,57	104,3	0,00	85,38	-	-	0,00	0,00	-
24		8 797	8 797	4,56	104,3	0,00	89,89	-	-	0,00	0,00	-
25		3 633	3 636	16,46	104,3	0,00	82,21	-	-	0,00	0,00	-
26		5 983	5 984	9,84	104,3	0,00	86,54	-	-	0,00	0,00	-
27		6 675	6 676	8,38	104,3	0,00	87,49	-	-	0,00	0,00	-
3		8 529	8 530	4,99	104,3	0,00	89,62	-	-	0,00	0,00	-
4		7 920	7 921	6,03	104,3	0,00	88,98	-	-	0,00	0,00	-
5		7 551	7 552	6,69	104,3	0,00	88,56	-	-	0,00	0,00	-
6		7 147	7 148	7,44	104,3	0,00	88,08	-	-	0,00	0,00	-
7		7 305	7 305	7,15	104,3	0,00	88,27	-	-	0,00	0,00	-
8		7 321	7 322	7,11	104,3	0,00	88,29	-	-	0,00	0,00	-
9		7 899	7 900	6,06	104,3	0,00	88,95	-	-	0,00	0,00	-
Sum				27,52								

- Data undefined due to calculation with octave data

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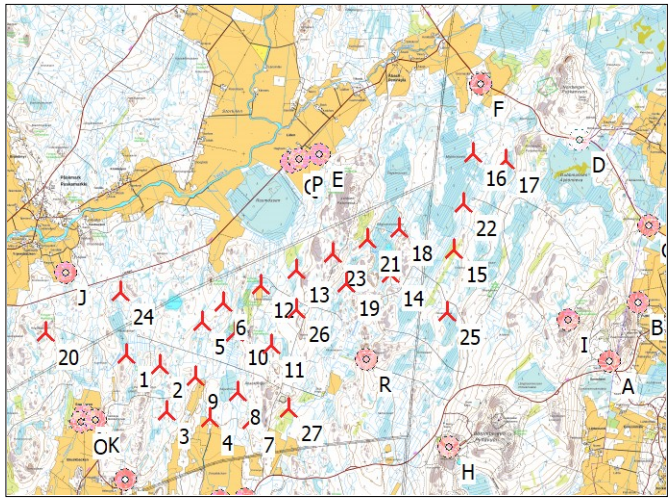
Calculated:
4.3.2021 12.12/3.4.388

DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:125 000

New WTG Noise sensitive area

Noise sensitive area: E Asuinrakennus E (Lidenintie 733)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		4 587	4 589	13,23	104,3	0,00	84,23	-	-	0,00	0,00	-
10		3 255	3 258	17,93	104,3	0,00	81,26	-	-	0,00	0,00	-
11		3 239	3 242	18,00	104,3	0,00	81,22	-	-	0,00	0,00	-
12		2 368	2 373	22,03	104,3	0,00	78,51	-	-	0,00	0,00	-
13		1 941	1 947	24,47	104,3	0,00	76,79	-	-	0,00	0,00	-
14		2 286	2 291	22,47	104,3	0,00	78,20	-	-	0,00	0,00	-
15		2 720	2 725	20,27	104,3	0,00	79,71	-	-	0,00	0,00	-
16		2 527	2 533	21,21	104,3	0,00	79,07	-	-	0,00	0,00	-
17		3 070	3 076	18,70	104,3	0,00	80,76	-	-	0,00	0,00	-
18		1 795	1 802	25,40	104,3	0,00	76,11	-	-	0,00	0,00	-
19		2 172	2 178	23,10	104,3	0,00	77,76	-	-	0,00	0,00	-
2		4 363	4 366	13,93	104,3	0,00	83,80	-	-	0,00	0,00	-
20		5 397	5 399	11,18	104,3	0,00	85,65	-	-	0,00	0,00	-
21		1 595	1 603	26,77	104,3	0,00	75,10	-	-	0,00	0,00	-
22		2 510	2 515	21,30	104,3	0,00	79,01	-	-	0,00	0,00	-
23		1 646	1 655	26,41	104,3	0,00	75,37	-	-	0,00	0,00	-
24		3 990	3 993	15,17	104,3	0,00	83,03	-	-	0,00	0,00	-
25		3 343	3 348	17,57	104,3	0,00	81,49	-	-	0,00	0,00	-
26		2 580	2 585	20,95	104,3	0,00	79,25	-	-	0,00	0,00	-
27		4 216	4 218	14,41	104,3	0,00	83,50	-	-	0,00	0,00	-
3		4 923	4 926	12,35	104,3	0,00	84,85	-	-	0,00	0,00	-
4		4 709	4 711	12,90	104,3	0,00	84,46	-	-	0,00	0,00	-
5		3 371	3 374	17,47	104,3	0,00	81,56	-	-	0,00	0,00	-
6		2 913	2 916	19,39	104,3	0,00	80,30	-	-	0,00	0,00	-
7		4 522	4 524	13,43	104,3	0,00	84,11	-	-	0,00	0,00	-
8		4 138	4 141	14,67	104,3	0,00	83,34	-	-	0,00	0,00	-
9		4 204	4 206	14,45	104,3	0,00	83,48	-	-	0,00	0,00	-
Sum				35,07								

- Data undefined due to calculation with octave data

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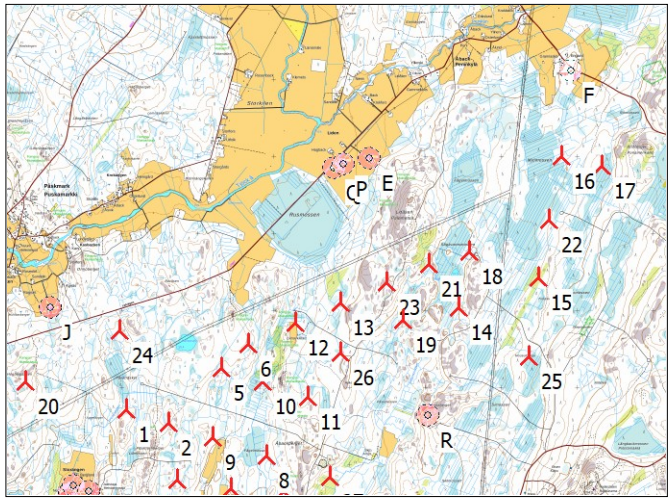
DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:100 000

New WTG Noise sensitive area

Noise sensitive area: G Asuinrakennus G (Karijoentie 203)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		3 082	3 086	18,65	104,3	0,00	80,79	-	-	0,00	0,00	-
10		2 740	2 744	20,18	104,3	0,00	79,77	-	-	0,00	0,00	-
11		2 571	2 576	20,99	104,3	0,00	79,22	-	-	0,00	0,00	-
12		3 522	3 526	16,88	104,3	0,00	81,95	-	-	0,00	0,00	-
13		3 863	3 867	15,62	104,3	0,00	82,75	-	-	0,00	0,00	-
14		4 421	4 424	13,74	104,3	0,00	83,92	-	-	0,00	0,00	-
15		5 366	5 369	11,25	104,3	0,00	85,60	-	-	0,00	0,00	-
16		6 820	6 822	8,08	104,3	0,00	87,68	-	-	0,00	0,00	-
17		7 036	7 038	7,66	104,3	0,00	87,95	-	-	0,00	0,00	-
18		5 126	5 129	11,84	104,3	0,00	85,20	-	-	0,00	0,00	-
19		3 921	3 925	15,41	104,3	0,00	82,88	-	-	0,00	0,00	-
2		2 613	2 618	20,79	104,3	0,00	79,36	-	-	0,00	0,00	-
20		4 283	4 286	14,19	104,3	0,00	83,64	-	-	0,00	0,00	-
21		4 734	4 737	12,83	104,3	0,00	84,51	-	-	0,00	0,00	-
22		6 050	6 053	9,69	104,3	0,00	86,64	-	-	0,00	0,00	-
23		4 296	4 300	14,14	104,3	0,00	83,67	-	-	0,00	0,00	-
24		3 985	3 989	15,19	104,3	0,00	83,02	-	-	0,00	0,00	-
25		4 529	4 532	13,40	104,3	0,00	84,13	-	-	0,00	0,00	-
26		3 234	3 239	18,01	104,3	0,00	81,21	-	-	0,00	0,00	-
27		1 650	1 657	26,39	104,3	0,00	75,39	-	-	0,00	0,00	-
3		1 940	1 946	24,47	104,3	0,00	76,78	-	-	0,00	0,00	-
4		1 452	1 460	27,86	104,3	0,00	74,29	-	-	0,00	0,00	-
5		3 003	3 008	18,99	104,3	0,00	80,56	-	-	0,00	0,00	-
6		3 256	3 260	17,93	104,3	0,00	81,26	-	-	0,00	0,00	-
7		1 296	1 305	29,13	104,3	0,00	73,31	-	-	0,00	0,00	-
8		1 765	1 771	25,60	104,3	0,00	75,97	-	-	0,00	0,00	-
9		2 169	2 174	23,12	104,3	0,00	77,75	-	-	0,00	0,00	-
Sum				35,64								

- Data undefined due to calculation with octave data

Project:
Dagsmark

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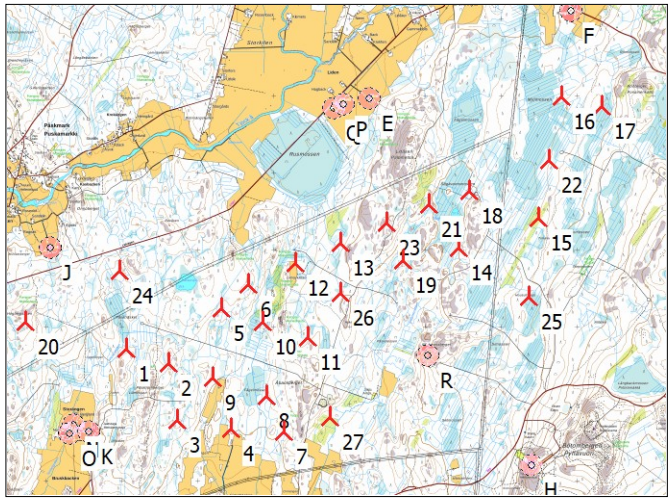
DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:100 000

New WTG Noise sensitive area

Noise sensitive area: I Näkötorni I (Susivuoren näkötorni)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		7 314	7 315	7,13	104,3	0,00	88,28	-	-	0,00	0,00	-
10		5 507	5 507	10,93	104,3	0,00	85,82	-	-	0,00	0,00	-
11		4 920	4 920	12,36	104,3	0,00	84,84	-	-	0,00	0,00	-
12		5 104	5 104	11,90	104,3	0,00	85,16	-	-	0,00	0,00	-
13		4 557	4 557	13,32	104,3	0,00	84,17	-	-	0,00	0,00	-
14		3 025	3 025	18,92	104,3	0,00	80,61	-	-	0,00	0,00	-
15		2 203	2 204	22,95	104,3	0,00	77,87	-	-	0,00	0,00	-
16		3 160	3 161	18,34	104,3	0,00	81,00	-	-	0,00	0,00	-
17		2 814	2 815	19,85	104,3	0,00	79,99	-	-	0,00	0,00	-
18		3 164	3 165	18,32	104,3	0,00	81,01	-	-	0,00	0,00	-
19		3 705	3 705	16,20	104,3	0,00	82,38	-	-	0,00	0,00	-
2		6 783	6 783	8,16	104,3	0,00	87,63	-	-	0,00	0,00	-
20		8 630	8 630	4,83	104,3	0,00	89,72	-	-	0,00	0,00	-
21		3 574	3 574	16,69	104,3	0,00	82,06	-	-	0,00	0,00	-
22		2 573	2 574	21,00	104,3	0,00	79,21	-	-	0,00	0,00	-
23		4 026	4 027	15,06	104,3	0,00	83,10	-	-	0,00	0,00	-
24		7 404	7 404	6,96	104,3	0,00	88,39	-	-	0,00	0,00	-
25		2 005	2 006	24,10	104,3	0,00	77,05	-	-	0,00	0,00	-
26		4 486	4 486	13,55	104,3	0,00	84,04	-	-	0,00	0,00	-
27		4 845	4 845	12,55	104,3	0,00	84,71	-	-	0,00	0,00	-
3		6 794	6 794	8,14	104,3	0,00	87,64	-	-	0,00	0,00	-
4		6 137	6 137	9,50	104,3	0,00	86,76	-	-	0,00	0,00	-
5		6 044	6 044	9,71	104,3	0,00	86,63	-	-	0,00	0,00	-
6		5 702	5 702	10,47	104,3	0,00	86,12	-	-	0,00	0,00	-
7		5 481	5 482	10,99	104,3	0,00	85,78	-	-	0,00	0,00	-
8		5 579	5 580	10,76	104,3	0,00	85,93	-	-	0,00	0,00	-
9		6 228	6 228	9,31	104,3	0,00	86,89	-	-	0,00	0,00	-
Sum				30,82								

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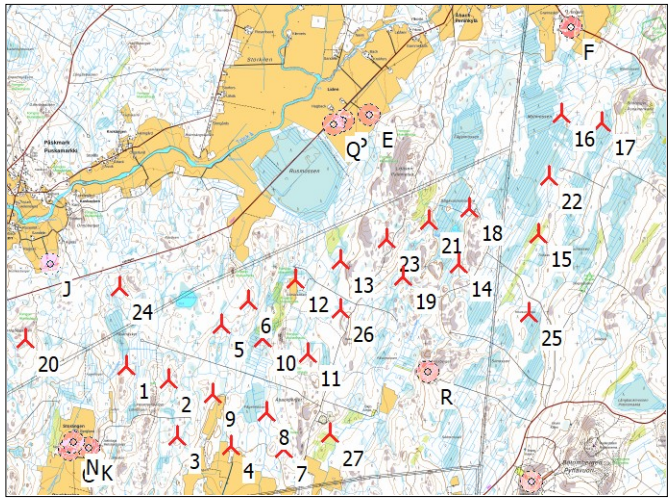
DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:100 000

New WTG Noise sensitive area

Noise sensitive area: K Asuinrakennus K (Storängintie 49)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		1 195	1 206	30,02	104,3	0,00	72,63	-	-	0,00	0,00	-
10		2 708	2 713	20,33	104,3	0,00	79,67	-	-	0,00	0,00	-
11		3 148	3 153	18,37	104,3	0,00	80,97	-	-	0,00	0,00	-
12		3 513	3 516	16,91	104,3	0,00	81,92	-	-	0,00	0,00	-
13		4 135	4 139	14,68	104,3	0,00	83,34	-	-	0,00	0,00	-
14		5 435	5 438	11,09	104,3	0,00	85,71	-	-	0,00	0,00	-
15		6 553	6 556	8,62	104,3	0,00	87,33	-	-	0,00	0,00	-
16		7 620	7 622	6,56	104,3	0,00	88,64	-	-	0,00	0,00	-
17		8 002	8 004	5,88	104,3	0,00	89,07	-	-	0,00	0,00	-
18		5 921	5 923	9,97	104,3	0,00	86,45	-	-	0,00	0,00	-
19		4 712	4 715	12,89	104,3	0,00	84,47	-	-	0,00	0,00	-
2		1 390	1 400	28,34	104,3	0,00	73,92	-	-	0,00	0,00	-
20		1 664	1 672	26,28	104,3	0,00	75,47	-	-	0,00	0,00	-
21		5 386	5 389	11,21	104,3	0,00	85,63	-	-	0,00	0,00	-
22		7 039	7 042	7,65	104,3	0,00	87,95	-	-	0,00	0,00	-
23		4 787	4 791	12,69	104,3	0,00	84,61	-	-	0,00	0,00	-
24		2 157	2 163	23,18	104,3	0,00	77,70	-	-	0,00	0,00	-
25		6 060	6 063	9,66	104,3	0,00	86,65	-	-	0,00	0,00	-
26		3 784	3 788	15,90	104,3	0,00	82,57	-	-	0,00	0,00	-
27		3 183	3 187	18,23	104,3	0,00	81,07	-	-	0,00	0,00	-
3		1 181	1 191	30,16	104,3	0,00	72,52	-	-	0,00	0,00	-
4		1 877	1 884	24,86	104,3	0,00	76,50	-	-	0,00	0,00	-
5		2 389	2 394	21,92	104,3	0,00	78,58	-	-	0,00	0,00	-
6		2 860	2 865	19,63	104,3	0,00	80,14	-	-	0,00	0,00	-
7		2 571	2 576	20,99	104,3	0,00	79,22	-	-	0,00	0,00	-
8		2 391	2 396	21,91	104,3	0,00	78,59	-	-	0,00	0,00	-
9		1 787	1 794	25,45	104,3	0,00	76,08	-	-	0,00	0,00	-
Sum				37,00								

- Data undefined due to calculation with octave data

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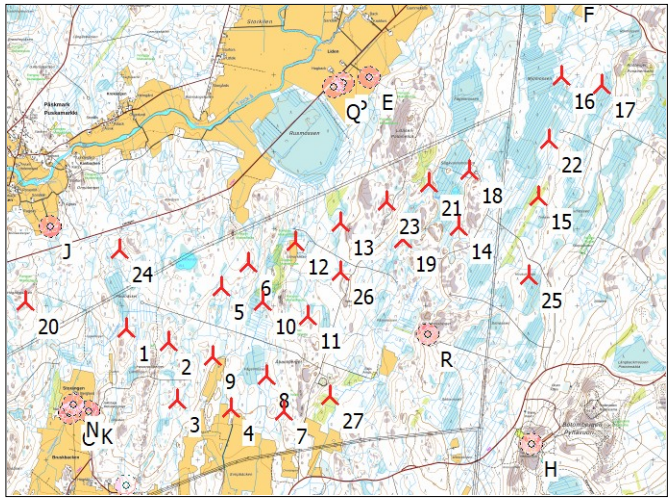
DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:100 000

New WTG Noise sensitive area

Noise sensitive area: M Asuinrakennus M (Karijoentie 144)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		2 872	2 877	19,57	104,3	0,00	80,18	-	-	0,00	0,00	-
10		2 779	2 783	20,00	104,3	0,00	79,89	-	-	0,00	0,00	-
11		2 700	2 705	20,37	104,3	0,00	79,64	-	-	0,00	0,00	-
12		3 608	3 612	16,55	104,3	0,00	82,15	-	-	0,00	0,00	-
13		4 004	4 007	15,12	104,3	0,00	83,06	-	-	0,00	0,00	-
14		4 679	4 682	12,98	104,3	0,00	84,41	-	-	0,00	0,00	-
15		5 658	5 661	10,57	104,3	0,00	86,06	-	-	0,00	0,00	-
16		7 077	7 079	7,58	104,3	0,00	88,00	-	-	0,00	0,00	-
17		7 314	7 317	7,12	104,3	0,00	88,29	-	-	0,00	0,00	-
18		5 366	5 368	11,25	104,3	0,00	85,60	-	-	0,00	0,00	-
19		4 139	4 142	14,66	104,3	0,00	83,34	-	-	0,00	0,00	-
2		2 452	2 457	21,59	104,3	0,00	78,81	-	-	0,00	0,00	-
20		4 006	4 010	15,12	104,3	0,00	83,06	-	-	0,00	0,00	-
21		4 948	4 951	12,28	104,3	0,00	84,89	-	-	0,00	0,00	-
22		6 324	6 327	9,10	104,3	0,00	87,02	-	-	0,00	0,00	-
23		4 479	4 483	13,56	104,3	0,00	84,03	-	-	0,00	0,00	-
24		3 825	3 828	15,75	104,3	0,00	82,66	-	-	0,00	0,00	-
25		4 853	4 857	12,52	104,3	0,00	84,73	-	-	0,00	0,00	-
26		3 394	3 398	17,37	104,3	0,00	81,63	-	-	0,00	0,00	-
27		1 887	1 893	24,80	104,3	0,00	76,54	-	-	0,00	0,00	-
3		1 728	1 735	25,84	104,3	0,00	75,79	-	-	0,00	0,00	-
4		1 375	1 384	28,47	104,3	0,00	73,82	-	-	0,00	0,00	-
5		2 969	2 973	19,14	104,3	0,00	80,46	-	-	0,00	0,00	-
6		3 270	3 274	17,87	104,3	0,00	81,30	-	-	0,00	0,00	-
7		1 420	1 429	28,11	104,3	0,00	74,10	-	-	0,00	0,00	-
8		1 817	1 824	25,25	104,3	0,00	76,22	-	-	0,00	0,00	-
9		2 084	2 089	23,61	104,3	0,00	77,40	-	-	0,00	0,00	-
Sum				35,49								

- Data undefined due to calculation with octave data

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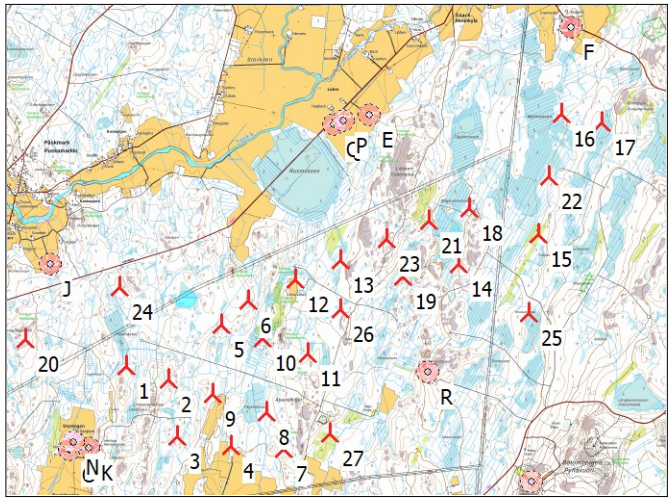
DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:100 000

New WTG Noise sensitive area

Noise sensitive area: O Asuinrakennus O (Storängsvägen 68)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		1 337	1 347	28,78	104,3	0,00	73,59	-	-	0,00	0,00	-
10		2 930	2 934	19,31	104,3	0,00	80,35	-	-	0,00	0,00	-
11		3 383	3 388	17,41	104,3	0,00	81,60	-	-	0,00	0,00	-
12		3 720	3 723	16,13	104,3	0,00	82,42	-	-	0,00	0,00	-
13		4 348	4 351	13,98	104,3	0,00	83,77	-	-	0,00	0,00	-
14		5 665	5 668	10,55	104,3	0,00	86,07	-	-	0,00	0,00	-
15		6 785	6 788	8,15	104,3	0,00	87,63	-	-	0,00	0,00	-
16		7 834	7 836	6,18	104,3	0,00	88,88	-	-	0,00	0,00	-
17		8 222	8 225	5,50	104,3	0,00	89,30	-	-	0,00	0,00	-
18		6 141	6 144	9,49	104,3	0,00	86,77	-	-	0,00	0,00	-
19		4 939	4 942	12,30	104,3	0,00	84,88	-	-	0,00	0,00	-
2		1 597	1 606	26,75	104,3	0,00	75,11	-	-	0,00	0,00	-
20		1 578	1 587	26,89	104,3	0,00	75,01	-	-	0,00	0,00	-
21		5 604	5 606	10,69	104,3	0,00	85,97	-	-	0,00	0,00	-
22		7 263	7 265	7,22	104,3	0,00	88,23	-	-	0,00	0,00	-
23		5 003	5 006	12,14	104,3	0,00	84,99	-	-	0,00	0,00	-
24		2 240	2 245	22,72	104,3	0,00	78,03	-	-	0,00	0,00	-
25		6 301	6 304	9,15	104,3	0,00	86,99	-	-	0,00	0,00	-
26		4 011	4 014	15,10	104,3	0,00	83,07	-	-	0,00	0,00	-
27		3 428	3 432	17,24	104,3	0,00	81,71	-	-	0,00	0,00	-
3		1 426	1 435	28,06	104,3	0,00	74,14	-	-	0,00	0,00	-
4		2 122	2 128	23,38	104,3	0,00	77,56	-	-	0,00	0,00	-
5		2 589	2 594	20,91	104,3	0,00	79,28	-	-	0,00	0,00	-
6		3 060	3 064	18,75	104,3	0,00	80,73	-	-	0,00	0,00	-
7		2 816	2 820	19,83	104,3	0,00	80,01	-	-	0,00	0,00	-
8		2 635	2 640	20,68	104,3	0,00	79,43	-	-	0,00	0,00	-
9		2 023	2 029	23,97	104,3	0,00	77,14	-	-	0,00	0,00	-
Sum				35,81								

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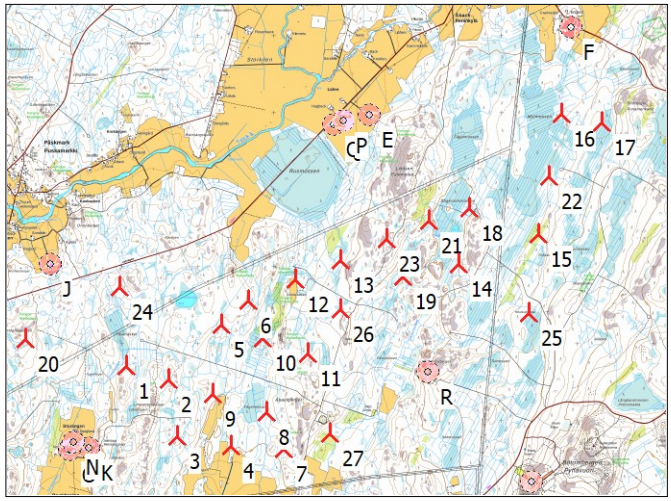
DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:100 000

New WTG Noise sensitive area

Noise sensitive area: Q Asuinrakennus Q (Lidenintie 697)

Wind speed: 8,0 m/s
WTG

No.	Reflection obstacle	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]
1		4 179	4 181	14,53	104,3	0,00	83,43	-	-	0,00	0,00	-
10		2 962	2 966	19,18	104,3	0,00	80,44	-	-	0,00	0,00	-
11		3 029	3 033	18,88	104,3	0,00	80,64	-	-	0,00	0,00	-
12		2 095	2 100	23,55	104,3	0,00	77,44	-	-	0,00	0,00	-
13		1 778	1 785	25,51	104,3	0,00	76,03	-	-	0,00	0,00	-
14		2 460	2 465	21,55	104,3	0,00	78,84	-	-	0,00	0,00	-
15		3 051	3 056	18,78	104,3	0,00	80,70	-	-	0,00	0,00	-
16		2 997	3 002	19,02	104,3	0,00	80,55	-	-	0,00	0,00	-
17		3 535	3 539	16,82	104,3	0,00	81,98	-	-	0,00	0,00	-
18		2 090	2 096	23,57	104,3	0,00	77,43	-	-	0,00	0,00	-
19		2 196	2 202	22,96	104,3	0,00	77,86	-	-	0,00	0,00	-
2		3 990	3 993	15,17	104,3	0,00	83,03	-	-	0,00	0,00	-
20		4 939	4 941	12,31	104,3	0,00	84,88	-	-	0,00	0,00	-
21		1 777	1 784	25,51	104,3	0,00	76,03	-	-	0,00	0,00	-
22		2 922	2 927	19,35	104,3	0,00	80,33	-	-	0,00	0,00	-
23		1 655	1 663	26,34	104,3	0,00	75,42	-	-	0,00	0,00	-
24		3 538	3 541	16,82	104,3	0,00	81,98	-	-	0,00	0,00	-
25		3 564	3 569	16,71	104,3	0,00	82,05	-	-	0,00	0,00	-
26		2 426	2 431	21,73	104,3	0,00	78,72	-	-	0,00	0,00	-
27		4 057	4 060	14,94	104,3	0,00	83,17	-	-	0,00	0,00	-
3		4 588	4 590	13,22	104,3	0,00	84,24	-	-	0,00	0,00	-
4		4 429	4 431	13,72	104,3	0,00	83,93	-	-	0,00	0,00	-
5		3 014	3 018	18,95	104,3	0,00	80,59	-	-	0,00	0,00	-
6		2 571	2 575	21,00	104,3	0,00	79,22	-	-	0,00	0,00	-
7		4 304	4 306	14,12	104,3	0,00	83,68	-	-	0,00	0,00	-
8		3 887	3 889	15,54	104,3	0,00	82,80	-	-	0,00	0,00	-
9		3 880	3 883	15,56	104,3	0,00	82,78	-	-	0,00	0,00	-
Sum				34,89								

- Data undefined due to calculation with octave data

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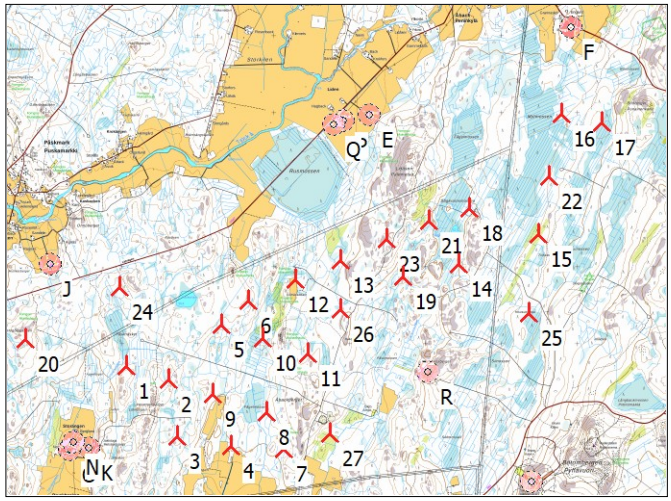
+358104095666
Liisa KArhu / liisa.karhu@fcg.fi

DECIBEL - Detailed results

Calculation: Åback_03_2020_V162_6MWNoise calculation model: ISO 9613-2 General 8,0 m/s



Scale 1:100 000

New WTG

Noise sensitive area

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Liisa KArhu / liisa.karhu@fcg.fi

DECIBEL - Assumptions for noise calculation

Calculation: Åback_03_2020_V162_6MW

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: D Asuinrakennus D (Kirkkotie 352)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: E Asuinrakennus E (Lidenintie 733)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: F Asuinrakennus F (Kirkkotie 548)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: G Asuinrakennus G (Karijoentie 203)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: H Liikerakennus H (Hiihtokeskus Pyhävuori)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: I Näkötorni I (Susivuoren näkötorni)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: J Asuinrakennus J (Lidenintie 351)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

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DECIBEL - Assumptions for noise calculation

Calculation: Åback_03_2020_V162_6MW

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

No obstacles used for reflection

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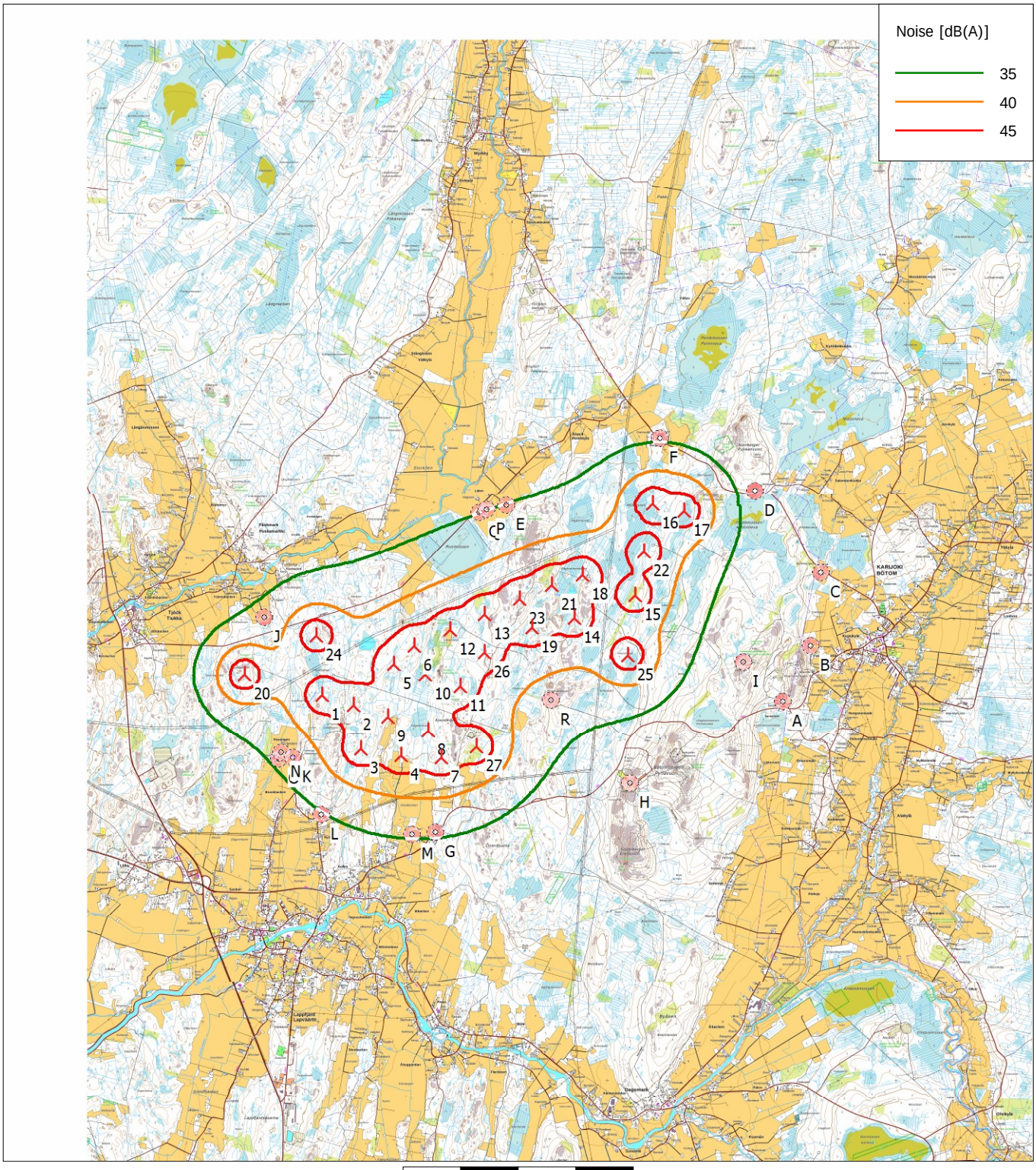
+358104095666
Liisa KArhu / liisa.karhu@fcg.fi
Calculated:
4.3.2021 12.12/3.4.388

DECIBEL - Map 8,0 m/s

Calculation: Åback_03_2020_V162_6MW

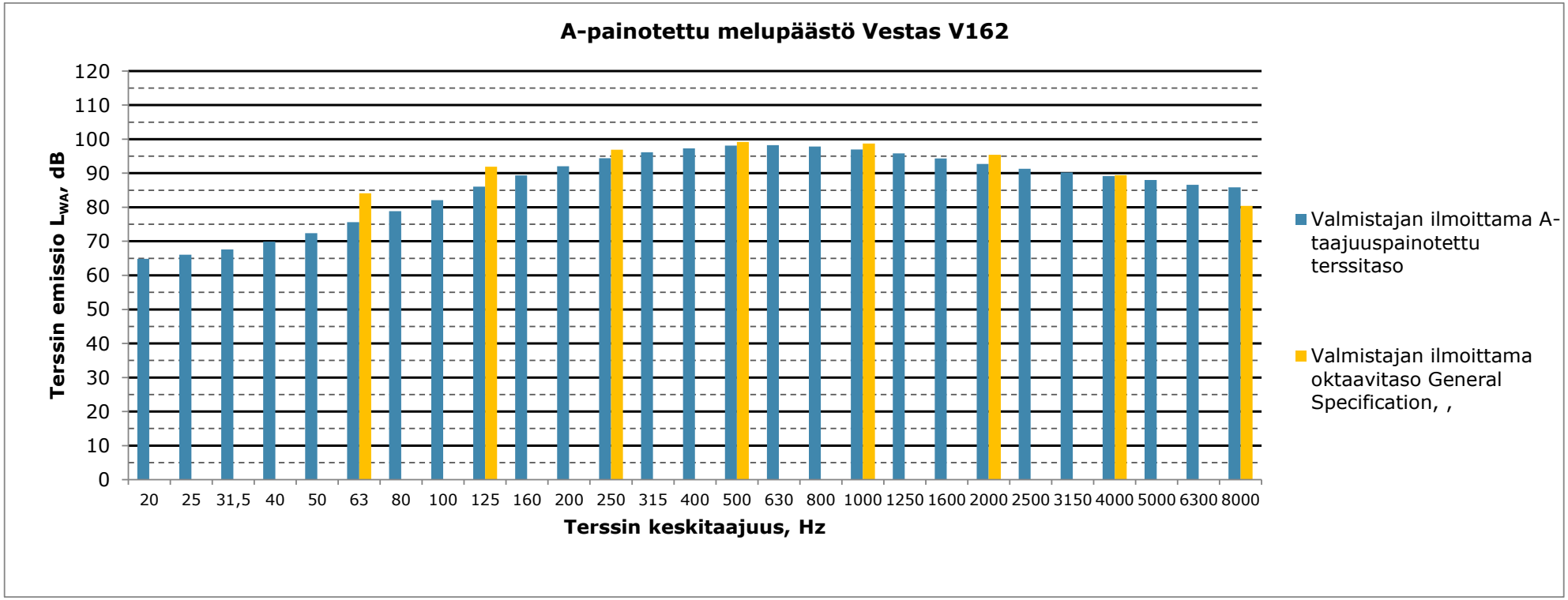


Map: Bitmap map: N3411L.png , Print scale 1:100 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 218 525 North: 6 919 770

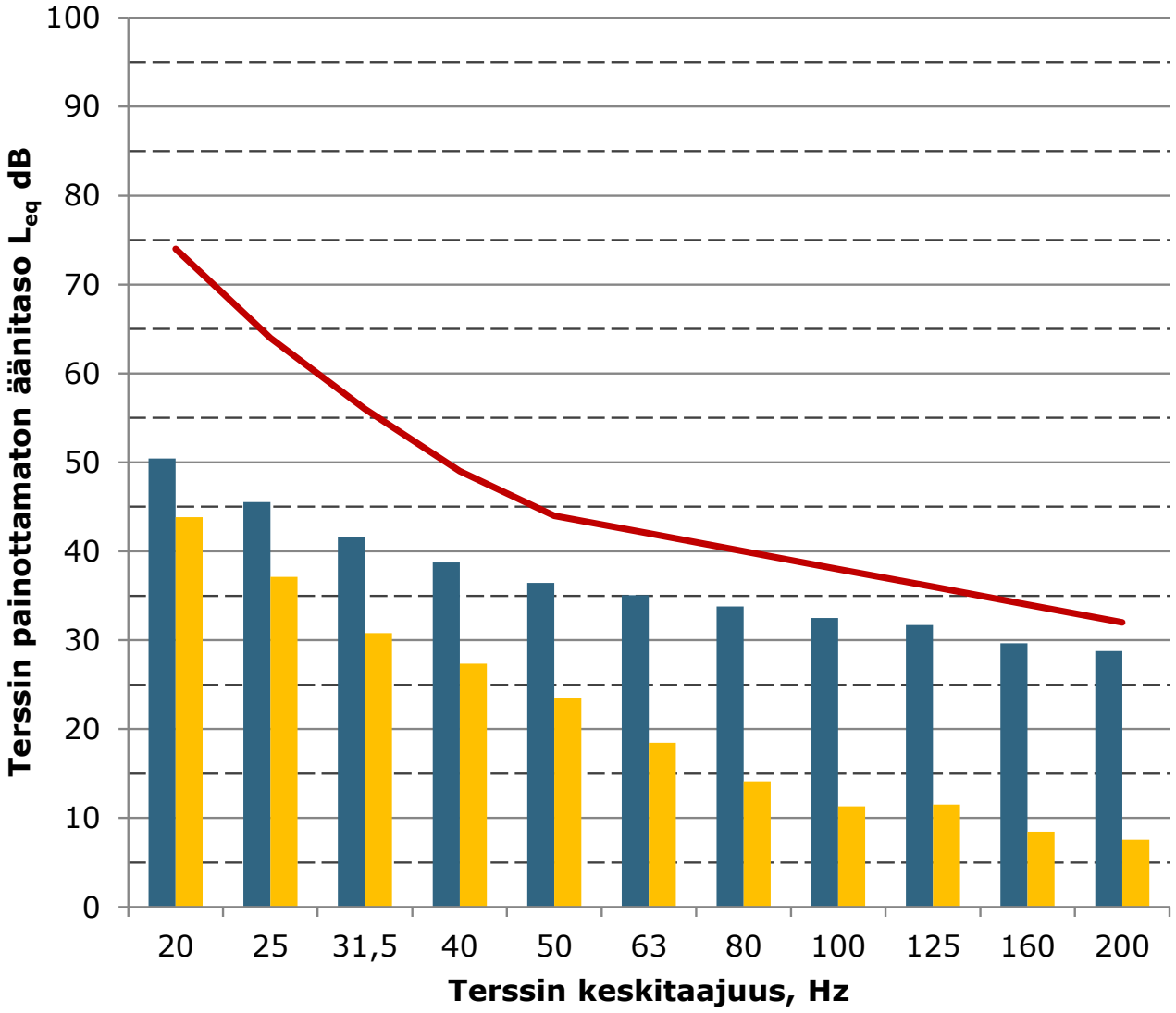
New WTG Noise sensitive area

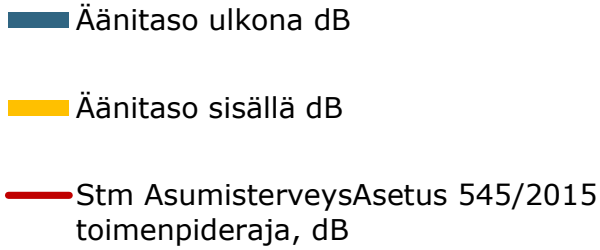
Noise calculation model: ISO 9613-2 General. Wind speed: 8,0 m/s
Height above sea level from active line object

Liite 2. Åbackin tuulivoimahanke – matalataajuisen melun rakennuskohtaiset arvot


A-painotettu melupäästö Vestas V162
Terssin emissio L_{WA}, dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso General Specification, ,

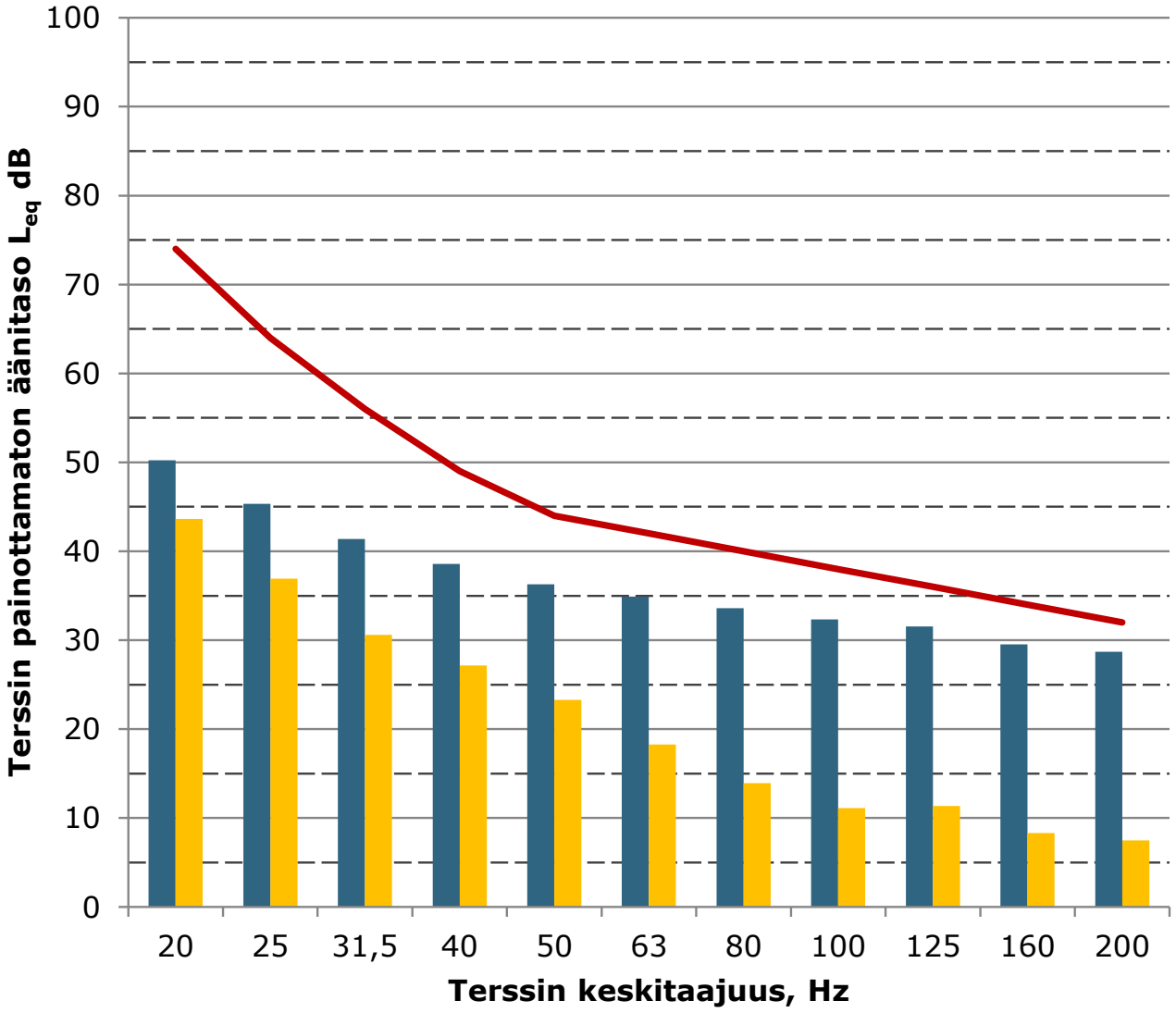
Matalien taajuuksien äänitasot ulkona ja sisällä, Laskentakohde A (Karijoentie 918), ääneneristävyys DSO1284 mukaan

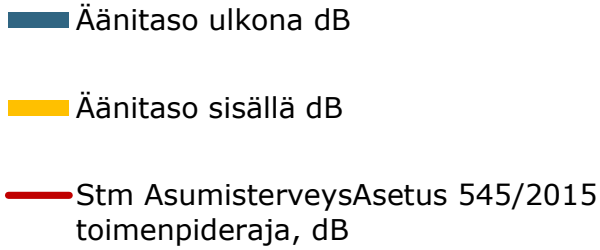




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

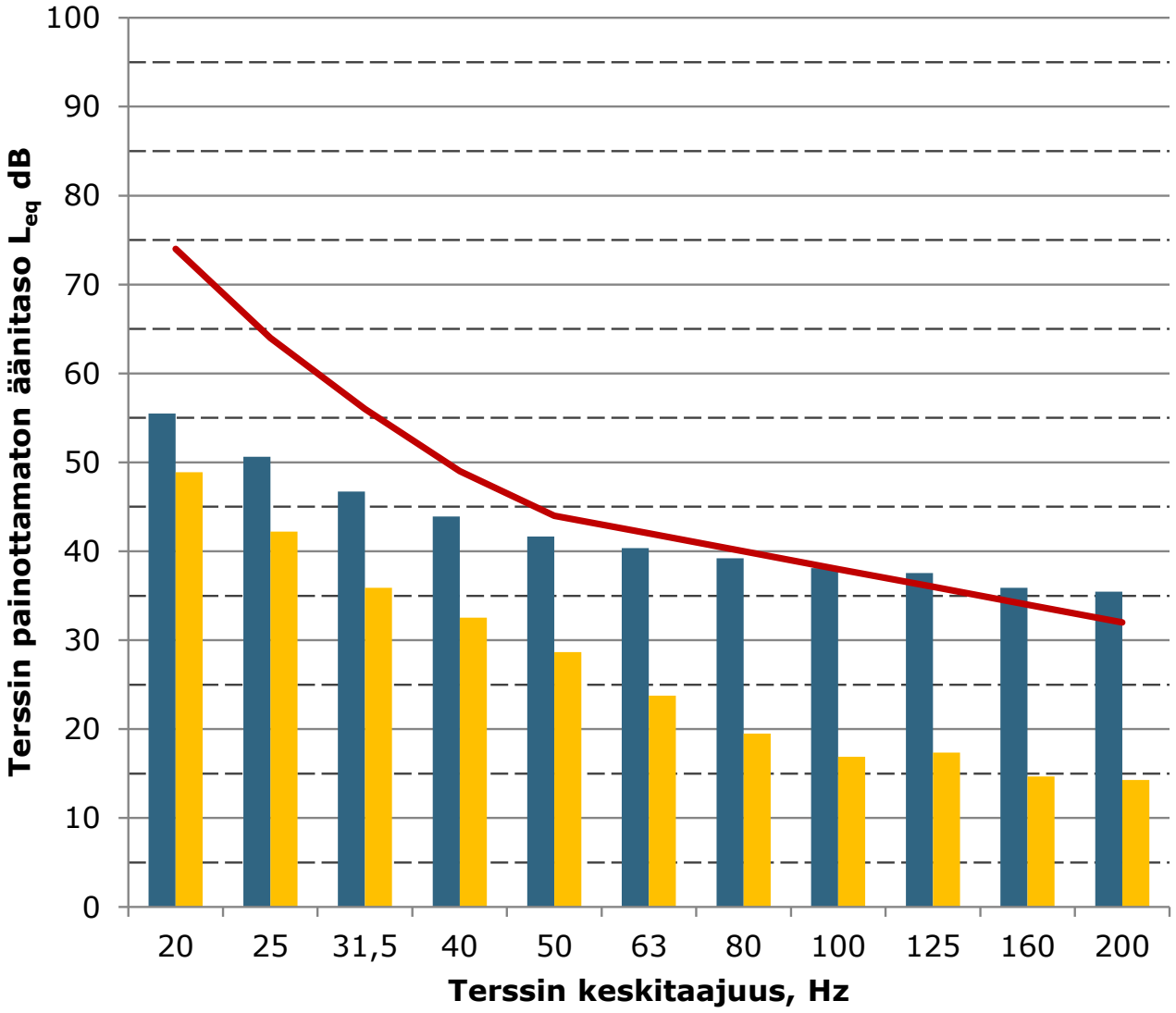
Matalien taajuuksien äänitasot ulkona ja sisällä, Laskentakohde C (Kirkkotie 160), ääneneristävyys DSO1284 mukaan

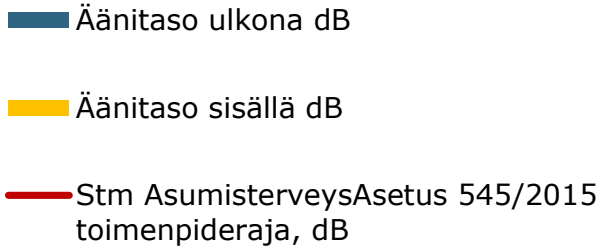




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

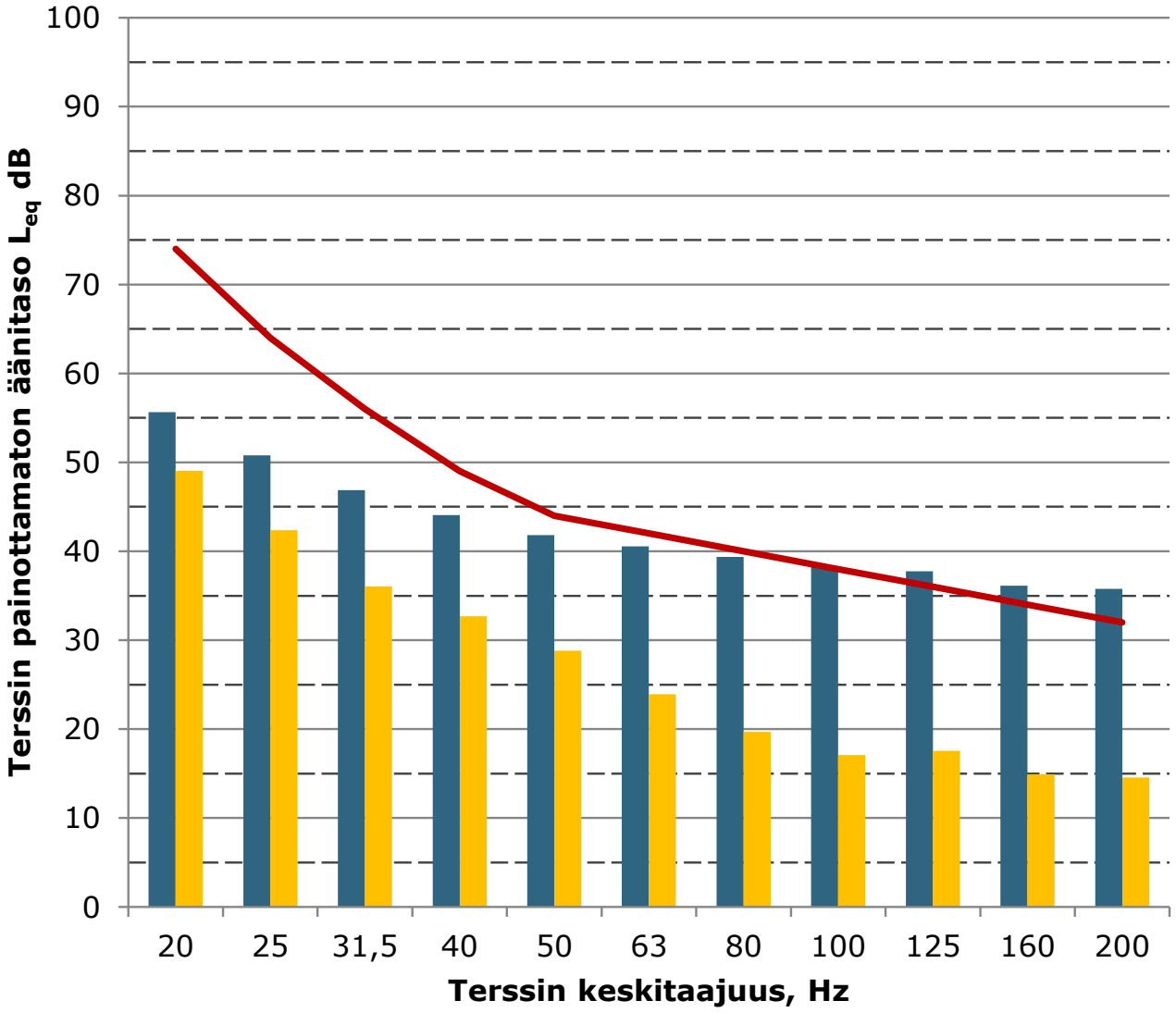
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus E (Lidenintie 733), ääneneristävyys DSO1284 mukaan

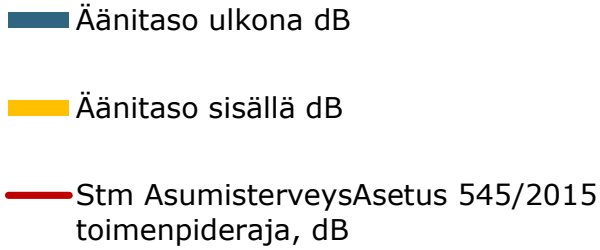




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

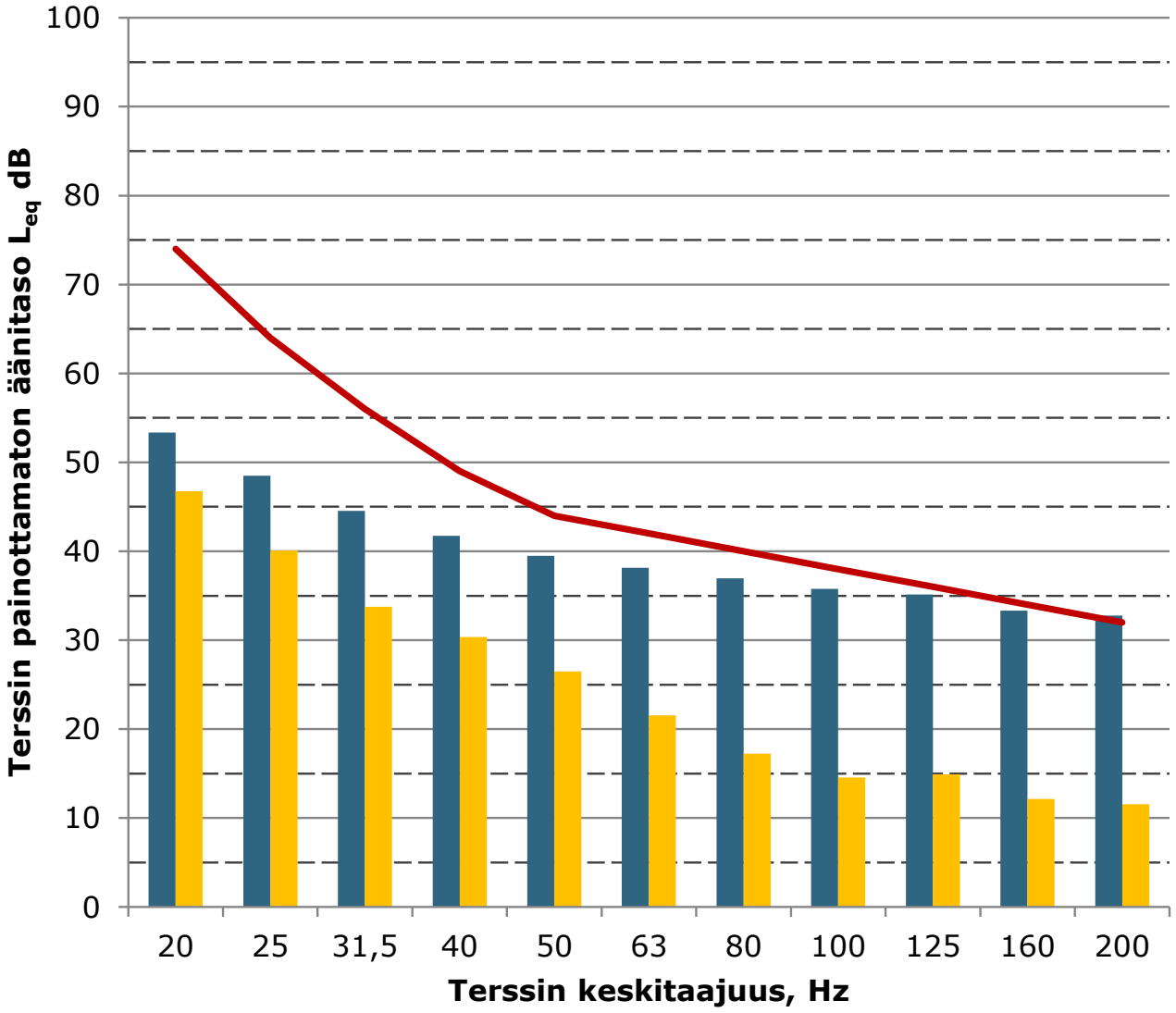
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G (Karijoentie 203), ääneneristävyys DSO1284 mukaan

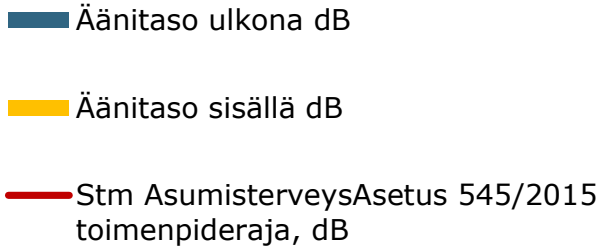




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

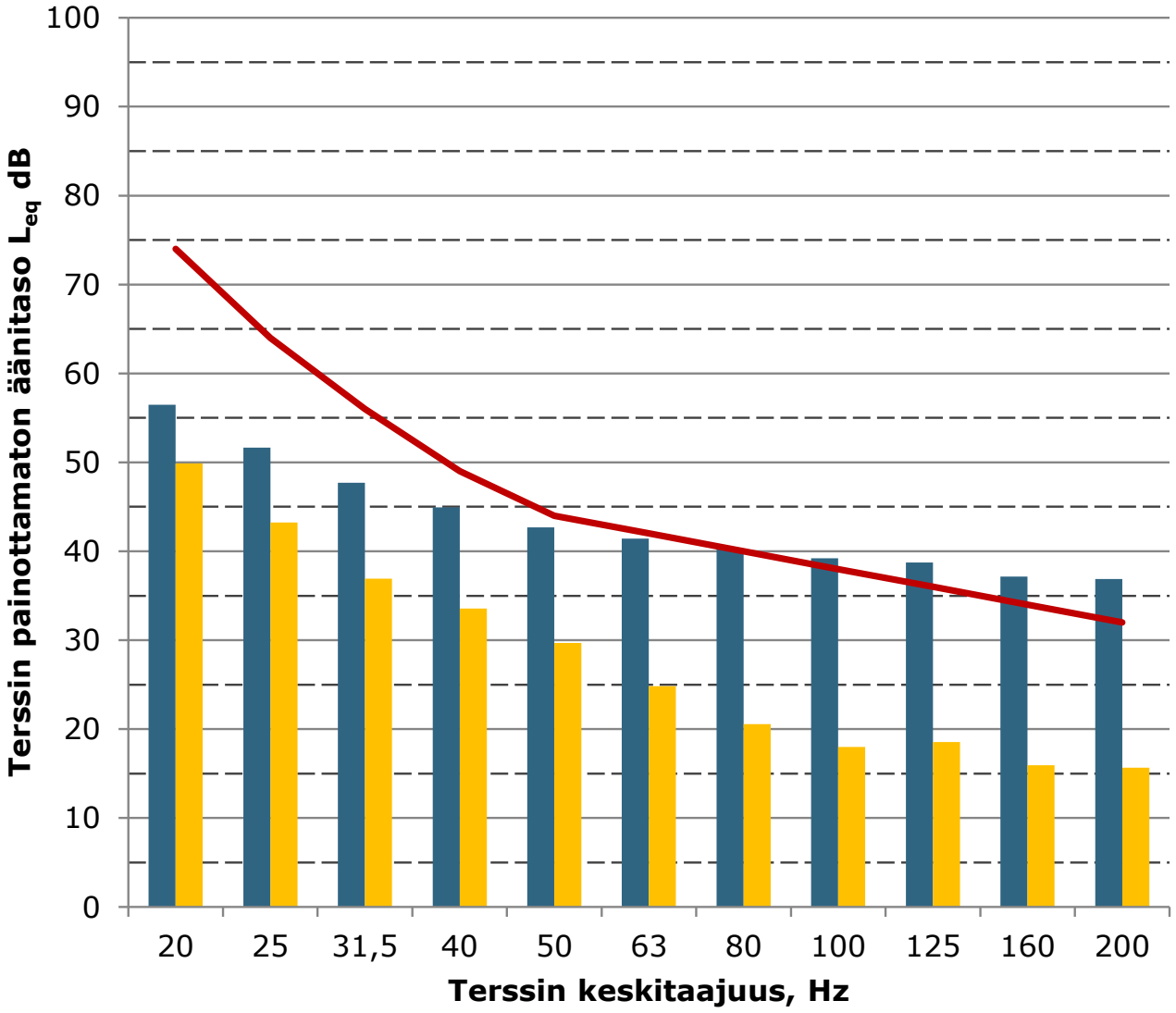
Matalien taajuuksien äänitasot ulkona ja sisällä, Susivuoren näkötorni I, ääneneristävyys DSO1284 mukaan

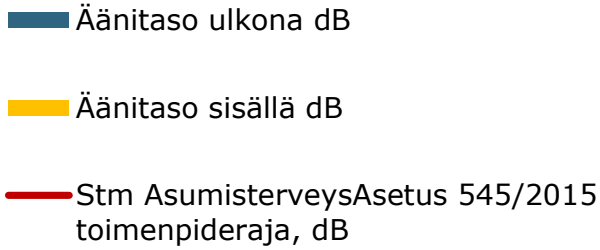




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

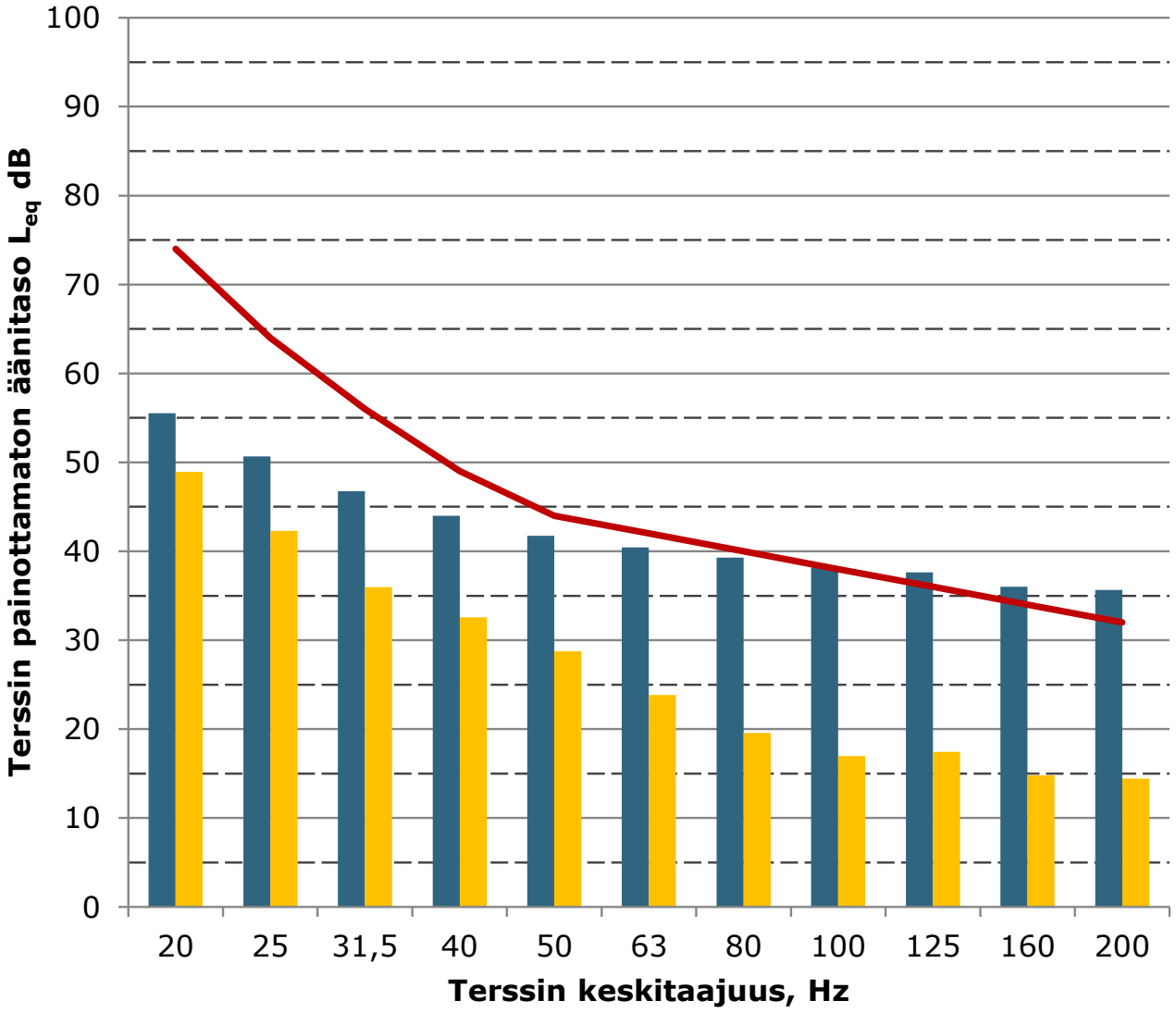
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus K (Stornngintie 49), ääneneristävyys DSO1284 mukaan

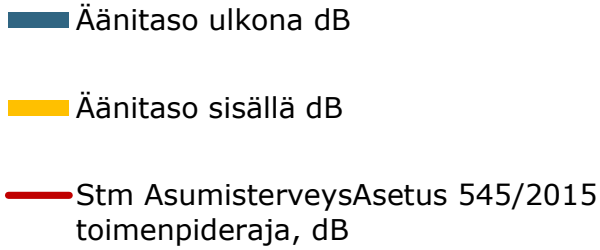




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

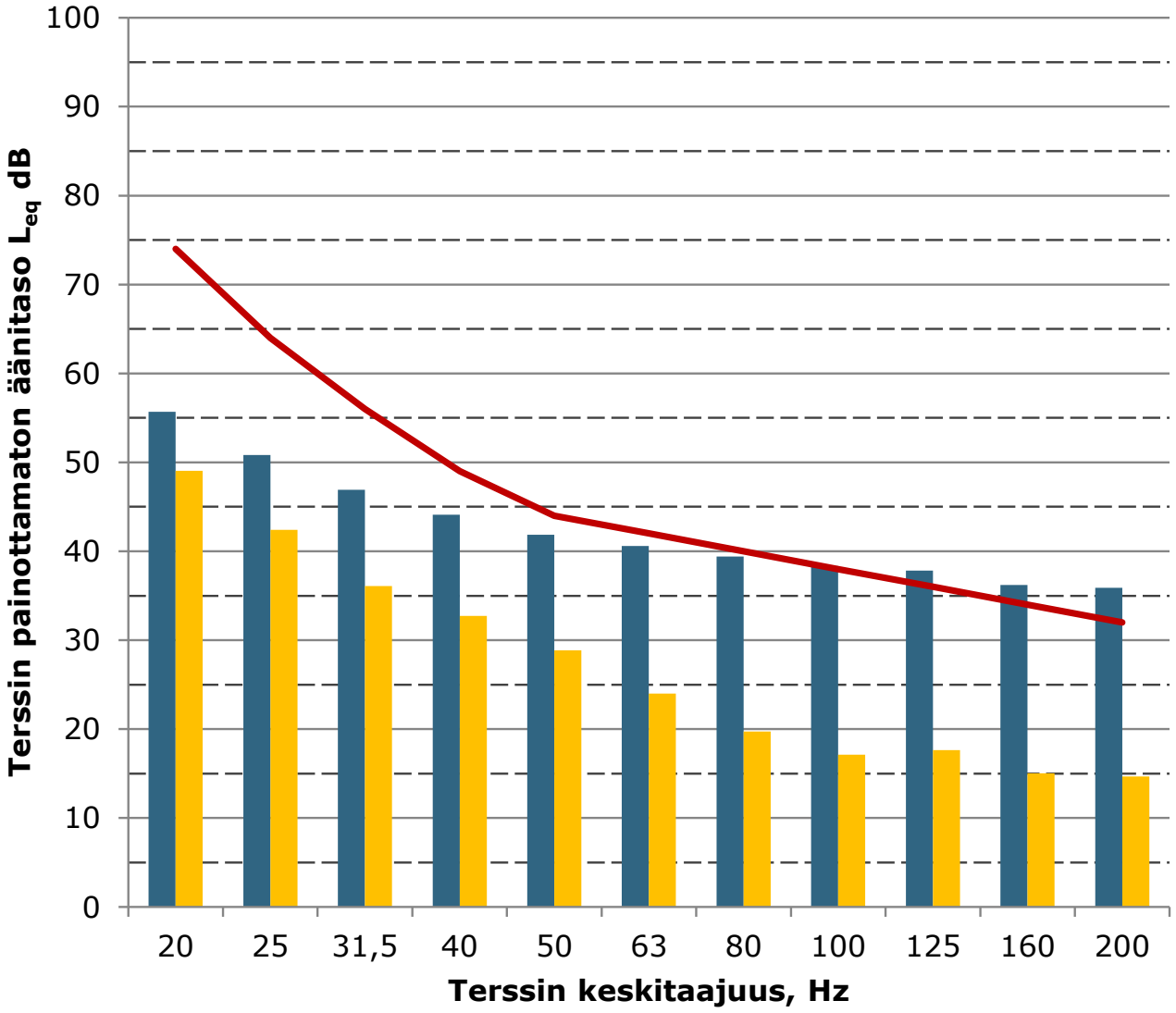
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus M (Karijoentie 144), ääneneristävyys DSO1284 mukaan

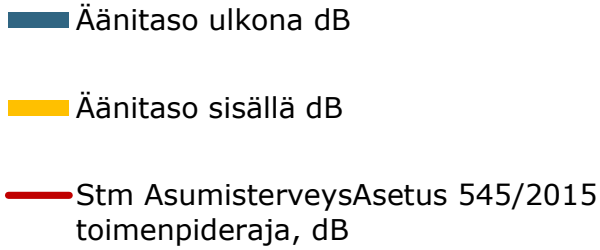




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

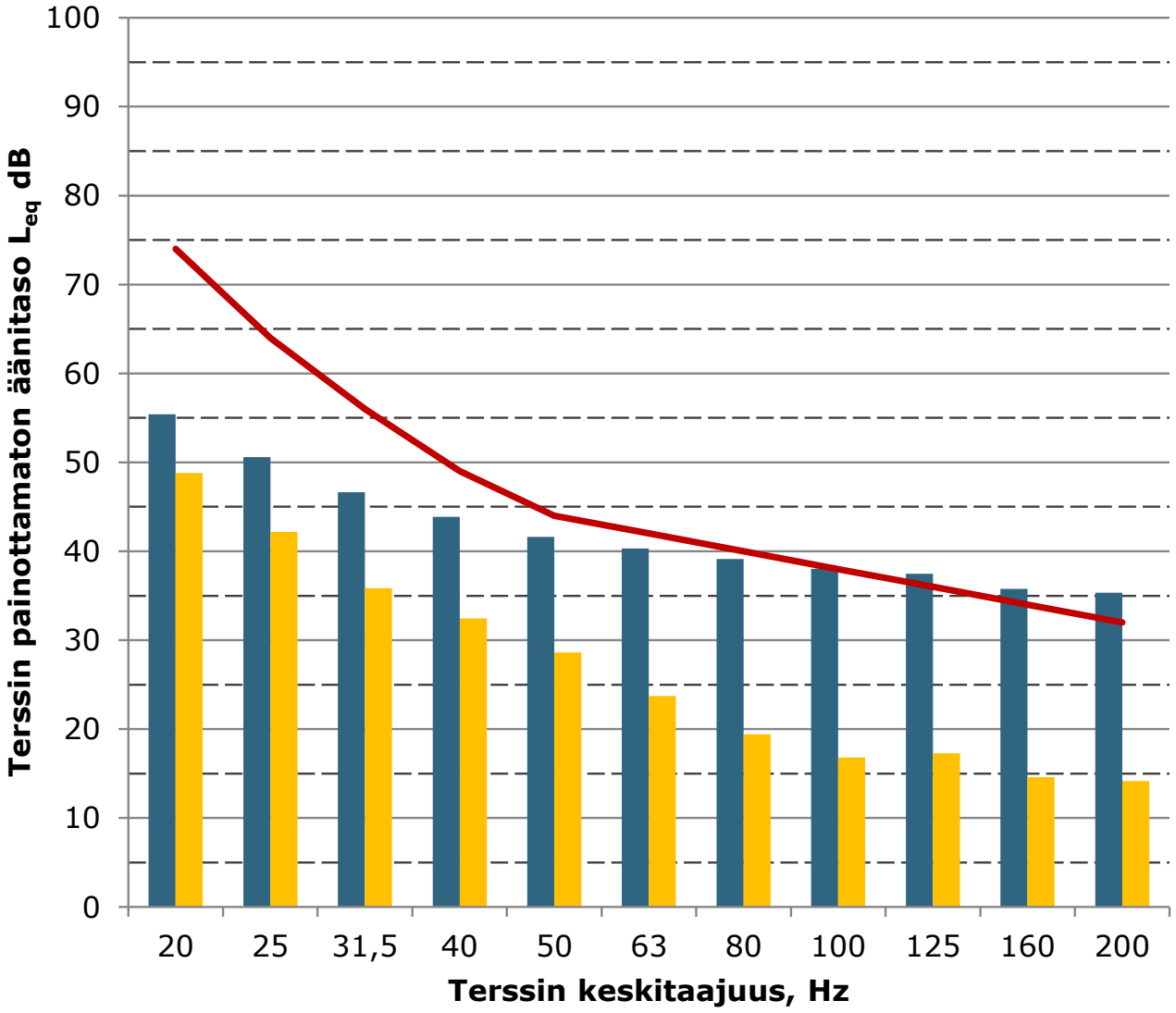
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus O (Storjngsvigen 68), ääneneristävyys DSO1284 mukaan

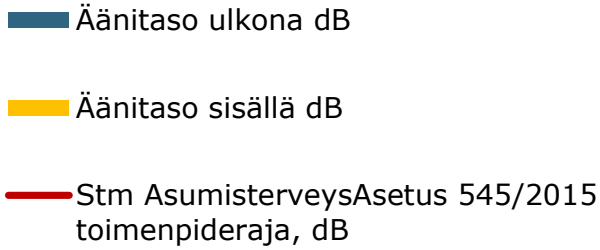




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Q (Lidenintie 697), ääneneristävyys DSO1284 mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V162 6 MW, 149 m, 28
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen": Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Liite 3. Åbackin tuulivoimahanke – varjostusmallinnuksen tulokset ”real case, no forest”

Project:
Dagsmark

Licensed user:
FCG Suunnittelu ja tekniikka Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Liisa KArhu / liisa.karhu@fcg.fi
Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Main Result

Calculation: Shadow_032021_no_forest_V162

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) [UMEA]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational hours are calculated from WTGs in calculation and wind distribution:
MERRA_basic_E21.335_N62.500 (7)

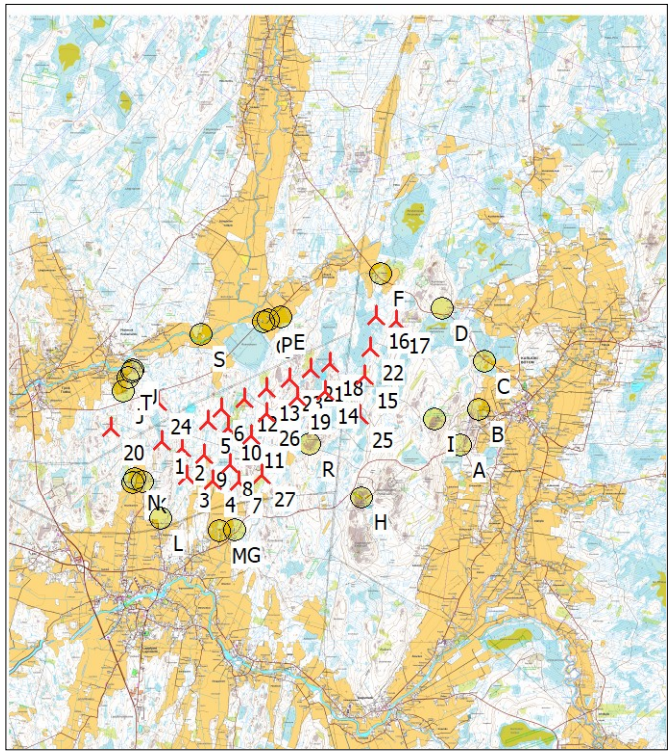
Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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: Korkeuskäyrät
Obstacles used in calculation
Eye height for map: 1,5 m
Grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	216 061	6 918 654	27,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
2	216 612	6 918 476	31,7	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
3	216 729	6 917 721	25,0	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
4	217 436	6 917 604	19,8	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
5	217 310	6 919 195	27,8	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
6	217 659	6 919 513	31,1	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
7	218 131	6 917 568	21,9	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
8	217 904	6 918 037	22,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
9	217 198	6 918 282	21,1	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
10	217 852	6 919 012	22,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
11	218 453	6 918 812	35,0	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
12	218 282	6 919 791	27,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
13	218 872	6 920 048	34,0	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
14	220 429	6 919 990	39,8	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
15	221 481	6 920 386	50,4	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
16	221 784	6 921 973	47,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
17	222 326	6 921 851	57,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
18	220 570	6 920 730	40,0	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
19	219 699	6 919 825	37,0	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
20	214 724	6 919 011	35,4	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
21	220 040	6 920 563	42,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
22	221 631	6 921 140	50,0	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
23	219 480	6 920 321	48,9	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
24	215 963	6 919 690	29,4	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
25	221 356	6 919 349	52,4	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
26	218 873	6 919 399	39,1	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4
27	218 737	6 917 765	22,5	VESTAS V162-6.0 6000 162.0 !O! h...	Yes	VESTAS	V162-6.0-6 000	6 000	162,0	149,0	2 452	10,4

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SHADOW - Main Result

Calculation: Shadow_032021_no_forest_V162

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
8	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (288)	19:31	4:58
9	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (289)	19:29	4:37
10	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (290)	2:33	0:31
11	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (291)	8:27	1:44
12	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (292)	44:42	6:21
13	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (293)	68:48	10:53
14	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (294)	9:57	1:32
15	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (295)	0:55	0:12
16	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (296)	48:18	6:45
17	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (297)	37:08	5:58
18	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (298)	17:50	3:37
19	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (300)	30:33	3:56
20	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (301)	55:41	7:43
21	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (302)	31:18	5:37
22	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (303)	19:16	2:39
23	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (304)	54:30	7:23
24	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (305)	94:44	18:14
25	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (306)	28:44	7:43
26	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (307)	30:39	6:37
27	VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (308)	9:16	1:52

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.

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Calculated:
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SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: B - Laskentakohde B (Vuorenalantie 55)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04	07.40	06.59	05.22	03.59	03.45	04.55	06.19	07.38	08.04	09.28
	15.13	16.32	17.54	20.19	21.42	23.06	23.29	22.24	20.47	19.08	16.30	15.17
2	10.00	09.01	07.37	06.55	05.18	03.57	03.46	04.57	06.22	07.41	08.07	09.30
	15.15	16.35	17.57	20.22	21.45	23.08	23.28	22.21	20.44	19.04	16.27	15.15
3	10.00	08.58	07.34	06.52	05.15	03.55	03.47	05.00	06.25	07.44	08.10	09.33
	15.17	16.38	18.00	20.24	21.48	23.10	23.27	22.18	20.40	19.01	16.24	15.13
4	09.59	08.56	07.31	06.49	05.12	03.53	03.49	05.03	06.27	07.46	08.13	09.35
	15.19	16.41	18.02	20.27	21.51	23.12	23.26	22.15	20.37	18.58	16.21	15.12
5	09.58	08.53	07.27	06.45	05.09	03.52	03.50	05.06	06.30	07.49	08.16	09.37
	15.21	16.44	18.05	20.30	21.54	23.14	23.25	22.12	20.34	18.55	16.18	15.11
6	09.57	08.50	07.24	06.42	05.06	03.50	03.52	05.08	06.33	07.52	08.19	09.39
	15.23	16.47	18.08	20.33	21.57	23.16	23.23	22.09	20.30	18.51	16.15	15.09
7	09.55	08.47	07.21	06.39	05.03	03.48	03.54	05.11	06.35	07.54	08.22	09.41
	15.25	16.50	18.11	20.35	22.00	23.18	23.22	22.06	20.27	18.48	16.12	15.08
8	09.54	08.44	07.18	06.35	05.00	03.47	03.56	05.14	06.38	07.57	08.24	09.43
	15.27	16.53	18.13	20.38	22.02	23.20	23.20	22.03	20.24	18.45	16.10	15.07
9	09.53	08.41	07.14	06.32	04.57	03.46	03.58	05.17	06.41	08.00	08.27	09.45
	15.29	16.56	18.16	20.41	22.05	23.21	23.19	22.00	20.20	18.41	16.07	15.06
10	09.51	08.39	07.11	06.29	04.54	03.44	04.00	05.19	06.43	08.03	08.30	09.47
	15.31	16.59	18.19	20.44	22.08	23.23	23.17	21.57	20.17	18.38	16.04	15.05
11	09.50	08.36	07.08	06.26	04.52	03.43	04.02	05.22	06.46	08.05	08.33	09.49
	15.34	17.02	18.22	20.46	22.11	23.24	23.15	21.54	20.14	18.35	16.01	15.04
12	09.48	08.33	07.05	06.22	04.49	03.42	04.04	05.25	06.49	08.08	08.36	09.51
	15.36	17.05	18.25	20.49	22.14	23.26	23.13	21.51	20.11	18.32	15.59	15.04
13	09.47	08.30	07.01	06.19	04.46	03.41	04.06	05.28	06.51	08.11	08.39	09.52
	15.38	17.08	18.27	20.52	22.17	23.27	23.11	21.48	20.07	18.29	15.56	15.03
14	09.45	08.27	06.58	06.16	04.43	03.40	04.08	05.31	06.54	08.13	08.42	09.54
	15.41	17.10	18.30	20.55	22.19	23.28	23.09	21.45	20.04	18.25	15.54	15.02
15	09.43	08.24	06.55	06.13	04.40	03.40	04.10	05.33	06.56	08.16	08.45	09.55
	15.44	17.13	18.33	20.57	22.22	23.29	23.07	21.42	20.01	18.22	15.51	15.02
16	09.41	08.21	06.51	06.09	04.37	03.39	04.13	05.36	06.59	08.19	08.48	09.56
	15.46	17.16	18.36	21.00	22.25	23.30	23.05	21.38	19.57	18.19	15.48	15.02
17	09.39	08.18	06.48	06.06	04.35	03.39	04.15	05.39	07.02	08.22	08.51	09.57
	15.49	17.19	18.38	21.03	22.28	23.31	23.03	21.35	19.54	18.16	15.46	15.02
18	09.37	08.15	06.45	06.03	04.32	03.38	04.18	05.42	07.04	08.24	08.53	09.58
	15.52	17.22	18.41	21.06	22.30	23.31	23.00	21.32	19.51	18.13	15.44	15.02
19	09.35	08.12	06.42	06.00	04.29	03.38	04.20	05.44	07.07	08.27	08.56	09.59
	15.54	17.25	18.44	21.09	22.33	23.32	22.58	21.29	19.47	18.09	15.41	15.02
20	09.33	08.08	06.38	05.56	04.27	03.38	04.23	05.47	07.09	08.30	08.59	10.00
	15.57	17.28	18.46	21.11	22.36	23.32	22.56	21.26	19.44	18.06	15.39	15.02
21	09.31	08.05	06.35	05.53	04.24	03.38	04.25	05.50	07.12	08.33	09.02	10.01
	16.00	17.31	18.49	21.14	22.39	23.33	22.53	21.23	19.41	18.03	15.36	15.02
22	09.29	08.02	06.32	05.50	04.21	03.38	04.28	05.53	07.15	08.36	09.05	10.01
	16.03	17.34	18.52	21.17	22.41	23.33	22.51	21.19	19.37	18.00	15.34	15.03
23	09.26	07.59	06.28	05.47	04.19	03.38	04.30	05.55	07.17	08.38	09.07	10.02
	16.05	17.37	18.55	21.20	22.44	23.33	22.48	21.16	19.34	17.57	15.32	15.03
24	09.24	07.56	06.25	05.44	04.17	03.39	04.33	05.58	07.20	08.41	09.10	10.02
	16.08	17.40	18.57	21.23	22.46	23.33	22.46	21.13	19.31	17.54	15.30	15.04
25	09.22	07.53	06.22	05.40	04.14	03.39	04.36	06.01	07.23	07.44	09.13	10.02
	16.11	17.42	19.00	21.25	22.49	23.33	22.43	21.10	19.27	16.51	15.28	15.05
26	09.19	07.50	06.18	05.37	04.12	03.40	04.38	06.03	07.25	07.47	09.15	10.03
	16.14	17.45	19.03	21.28	22.52	23.33	22.40	21.06	19.24	16.48	15.26	15.05
27	09.17	07.47	06.15	05.34	04.09	03.41	04.41	06.06	07.28	07.50	09.18	10.03
	16.17	17.48	19.05	21.31	22.54	23.32	22.38	21.03	19.21	16.45	15.24	15.06
28	09.14	07.43	06.12	05.31	04.07	03.41	04.44	06.09	07.30	07.53	09.21	10.03
	16.20	17.51	19.08	21.34	22.56	23.32	22.35	21.00	19.17	16.42	15.22	15.08
29	09.12		07.08	05.28	04.05	03.42	04.46	06.11	07.33	07.55	09.23	10.02
	16.23		20.11	21.37	22.59	23.31	22.32	20.57	19.14	16.39	15.20	15.09
30	09.09		07.05	05.25	04.03	03.44	04.49	06.14	07.36	07.58	09.26	10.02
	16.26		20.14	21.40	23.01	23.30	22.29	20.53	19.11	16.36	15.18	15.10
31	09.06		07.02		04.01		04.52	06.17		08.01		10.02
	16.29		20.16		23.04		22.27	20.50		16.33		15.11
Potential sun hours	191	246	364	444	551	591	583	497	391	310	213	162
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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

Day in month	Sun rise (hh:mm) 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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Calculated:
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SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: D - Asuinrakennus D (Kirkkotie 352)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04	07.40	17.17 (17)	06.59	05.21	03.59	03.44	04.54	06.19	07.39	17.46 (17)	08.04	09.28
	15.13	16.32	17.54	2 17.19 (17)	20.19	21.43	23.06	23.30	22.24	20.47	19.08	37 18.32 (16)	16.30	15.16
2	10.01	09.01	07.37	17.15 (17)	06.55	05.18	03.57	03.46	04.57	06.22	07.41	17.46 (17)	08.07	09.31
	15.15	16.35	17.57	7 17.22 (17)	20.22	21.46	23.08	23.29	22.21	20.44	19.04	33 18.28 (16)	16.27	15.15
3	10.00	08.59	07.34	17.12 (17)	06.52	05.15	03.55	03.47	05.00	06.25	07.44	17.45 (17)	08.10	09.33
	15.17	16.38	18.00	12 17.24 (17)	20.25	21.48	23.11	23.28	22.18	20.40	19.01	30 18.15 (17)	16.24	15.13
4	09.59	08.56	07.31	17.11 (17)	06.49	05.12	03.53	03.49	05.03	06.27	07.47	17.45 (17)	08.13	09.35
	15.18	16.41	18.02	17 17.28 (17)	20.27	21.51	23.13	23.26	22.15	20.37	18.58	30 18.15 (17)	16.21	15.12
5	09.58	08.53	07.27	17.11 (17)	06.45	05.09	03.51	03.50	05.05	06.30	07.49	17.45 (17)	08.16	09.38
	15.20	16.44	18.05	20 17.31 (17)	20.30	21.54	23.15	23.25	22.12	20.34	18.55	30 18.15 (17)	16.18	15.10
6	09.57	08.50	07.24	17.09 (17)	06.42	05.06	03.50	03.52	05.08	06.33	07.52	17.45 (17)	08.19	09.40
	15.22	16.47	18.08	24 17.33 (17)	20.33	21.57	23.16	23.24	22.09	20.31	18.51	29 18.14 (17)	16.15	15.09
7	09.56	08.47	07.21	17.09 (17)	06.39	05.03	03.48	03.54	05.11	06.35	07.55	17.45 (17)	08.22	09.42
	15.24	16.50	18.11	28 17.37 (17)	20.36	22.00	23.18	23.22	22.06	20.27	18.48	27 18.12 (17)	16.12	15.08
8	09.55	08.45	07.18	17.08 (17)	06.35	05.00	03.47	03.55	05.14	06.38	07.57	17.45 (17)	08.25	09.44
	15.27	16.53	18.14	30 17.38 (17)	20.38	22.03	23.20	23.21	22.03	20.24	18.45	22 18.07 (17)	16.10	15.07
9	09.53	08.42	07.14	17.07 (17)	06.32	04.57	03.45	03.57	05.17	06.41	08.00	17.45 (17)	08.28	09.46
	15.29	16.56	18.16	30 17.37 (17)	20.41	22.06	23.22	23.19	22.00	20.21	18.42	19 18.04 (17)	16.07	15.06
10	09.52	08.39	07.11	17.07 (17)	06.29	04.54	03.44	03.59	05.19	06.43	08.03	17.46 (17)	08.31	09.48
	15.31	16.59	18.19	30 17.37 (17)	20.44	22.08	23.23	23.17	21.57	20.17	18.38	15 18.01 (17)	16.04	15.05
11	09.50	08.36	07.08	17.07 (17)	06.26	04.51	03.43	04.01	05.22	06.46	08.05	17.48 (17)	08.33	09.49
	15.33	17.02	18.22	31 17.48 (16)	20.47	22.11	23.25	23.15	21.54	20.14	18.35	10 17.58 (17)	16.01	15.04
12	09.49	08.33	07.05	17.07 (17)	06.22	04.49	03.42	04.04	05.25	06.49	08.08	17.49 (17)	08.36	09.51
	15.36	17.05	18.25	35 17.51 (16)	20.49	22.14	23.26	23.14	21.51	20.11	18.32	5 17.54 (17)	15.59	15.03
13	09.47	08.30	07.01	17.08 (17)	06.19	04.46	03.41	04.06	05.28	06.51	08.11		08.39	09.52
	15.38	17.08	18.27	37 17.54 (16)	20.52	22.17	23.27	23.12	21.48	20.07	18.29		15.56	15.03
14	09.45	08.27	06.58	17.07 (17)	06.16	04.43	03.40	04.08	05.30	06.54	08.14		08.42	09.54
	15.41	17.10	18.30	40 17.56 (16)	20.55	22.20	23.28	23.10	21.45	20.04	18.25		15.53	15.02
15	09.43	08.24	16.33 (22) 06.55	17.08 (17)	06.13	04.40	03.39	04.10	05.33	06.56	08.16		08.45	09.55
	15.43	17.13	1 16.34 (22) 18.33	42 18.00 (16)	20.58	22.22	23.30	23.07	21.42	20.01	18.22		15.51	15.02
16	09.41	08.21	16.33 (22) 06.51	17.10 (17)	06.09	04.37	03.39	04.13	05.36	06.59	08.19		08.48	09.57
	15.46	17.16	5 16.38 (22) 18.36	41 18.03 (16)	21.00	22.25	23.30	23.05	21.39	19.57	18.19		15.48	15.02
17	09.40	08.18	16.32 (22) 06.48	17.11 (17)	06.06	04.35	03.38	04.15	05.39	07.02	08.22		08.51	09.58
	15.49	17.19	9 16.41 (22) 18.38	40 18.04 (16)	21.03	22.28	23.31	23.03	21.35	19.54	18.16		15.46	15.01
18	09.38	08.15	16.32 (22) 06.45	17.13 (17)	06.03	04.32	03.38	04.17	05.42	07.04	08.25		08.54	09.59
	15.51	17.22	12 16.44 (22) 18.41	33 18.03 (16)	21.06	22.31	23.32	23.01	21.32	19.51	18.13		15.43	15.01
19	09.35	08.12	16.33 (22) 06.42	17.18 (17)	06.00	04.29	03.38	04.20	05.44	07.07	08.27	17.09 (22)	08.56	10.00
	15.54	17.25	15 16.48 (22) 18.44	22 18.02 (16)	21.09	22.34	23.32	22.58	21.29	19.47	18.09	7 17.16 (22)	15.41	15.01
20	09.33	08.09	16.33 (22) 06.38	17.45 (16)	05.56	04.26	03.38	04.22	05.47	07.10	08.30	17.07 (22)	08.59	10.00
	15.57	17.28	15 16.48 (22) 18.47	15 18.00 (16)	21.12	22.36	23.33	22.56	21.26	19.44	18.06	11 17.18 (22)	15.39	15.02
21	09.31	08.06	16.34 (22) 06.35	17.48 (16)	05.53	04.24	03.38	04.25	05.50	07.12	08.33	17.05 (22)	09.02	10.01
	16.00	17.31	14 16.48 (22) 18.49	9 17.57 (16)	21.14	22.39	23.33	22.54	21.23	19.41	18.03	14 17.19 (22)	15.36	15.02
22	09.29	08.02	16.36 (22) 06.32		05.50	04.21	03.38	04.28	05.52	07.15	18.34 (16)	08.36	17.04 (22)	09.05	10.02
	16.02	17.34	10 16.46 (22) 18.52		21.17	22.42	23.33	22.51	21.20	19.37	7 18.41 (16)	18.00	16 17.20 (22)	15.34	15.02
23	09.27	07.59	16.39 (22) 06.28		05.47	04.19	03.38	04.30	05.55	07.17	18.31 (16)	08.39	17.03 (22)	09.08	10.02
	16.05	17.37	3 16.42 (22) 18.55		21.20	22.44	23.34	22.49	21.16	19.34	13 18.44 (16)	17.57	14 17.17 (22)	15.32	15.03
24	09.24	07.56	06.25		05.43	04.16	03.38	04.33	05.58	07.20	18.28 (16)	08.41	17.02 (22)	09.10	10.03
	16.08	17.40	18.57		21.23	22.47	23.33	22.46	21.13	19.31	17 18.45 (16)	17.54	11 17.13 (22)	15.30	15.04
25	09.22	07.53	06.22		05.40	04.14	03.39	04.35	06.01	07.23	17.57 (17)	07.44	16.02 (22)	09.13	10.03
	16.11	17.42	19.00		21.26	22.49	23.33	22.43	21.10	19.27	31 18.46 (16)	16.51	8 16.10 (22)	15.28	15.04
26	09.19	07.50	06.18		05.37	04.12	03.40	04.38	06.03	07.25	17.54 (17)	07.47	16.02 (22)	09.16	10.03
	16.14	17.45	19.03		21.28	22.52	23.33	22.41	21.07	19.24	38 18.46 (16)	16.48	4 16.06 (22)	15.26	15.05
27	09.17	07.47	06.15		05.34	04.09	03.40	04.41	06.06	07.28	17.51 (17)	07.50	16.03 (22)	09.18	10.03
	16.17	17.48	19.06		21.31	22.54	23.33	22.38	21.03	19.21	42 18.45 (16)	16.45	1 16.04 (22)	15.24	15.06
28	09.14	07.43	06.12		05.31	04.07	03.41	04.43	06.09	07.31	17.50 (17)	07.53		09.21	10.03
	16.20	17.51	19.08		21.34	22.57	23.32	22.35	21.00	19.18	41 18.42 (16)	16.42		15.22	15.07
29	09.12		07.09		05.28	04.05	03.42	04.46	06.11	07.33	17.49 (17)	07.56		09.23	10.03
	16.23		20.11		21.37	22.59	23.31	22.32	20.57	19.14	40 18.39 (16)	16.39		15.20	15.09
30	09.09		07.05		05.25	04.03	03.43	04.49	06.14	07.36	17.47 (17)	07.59		09.26	10.02
	16.26		20.14		21.40	23.02	23.31	22.30	20.54	19.11	39 18.35 (16)	16.36		15.18	15.10
31	09.07		07.02			04.01		04.52	06.17			08.01			10.02
	16.29		20.16			23.04		22.27	20.50			16.33			15.11
Potential sun hours	191	246	364	444	551	591	583	497	391		310		213	162
Total, worst case		84	545						268		373			
Sun reduction		0,32	0,32						0,33		0,34			
Oper. time red.		0,99	0,99						0,99		0,99			
Wind dir. red.		0,61	0,57						0,56		0,58			
Total reduction		0,19	0,18						0,18		0,20			
Total, real		16	98						49		73			

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

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: E - Asuinrakennus E (Lidenintie 733)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	July	August	September	October			November			December		
1	03.45	04.55	06.20	07.39			08.05		08.46 (18)	09.29		11.02 (19)
	23.30	22.24	20.47	19.08			16.30	15	10.00 (21)	15.17	75	13.56 (12)
2	03.46	04.58	06.23	07.42			08.08		09.45 (21)	09.31		11.02 (19)
	23.29	22.21	20.44	19.05			16.27	17	10.02 (21)	15.15	76	13.56 (12)
3	03.48	05.00	06.25	07.44			08.10		09.45 (21)	09.33		11.02 (19)
	23.28	22.19	20.41	19.01			16.24	19	10.04 (21)	15.14	79	13.57 (12)
4	03.49	05.03	06.28	07.47			08.13		09.43 (21)	09.36		11.03 (19)
	23.27	22.16	20.37	18.58			16.21	21	10.04 (21)	15.12	79	13.58 (12)
5	03.51	05.06	06.30	07.50			08.16		09.43 (21)	09.38		11.04 (19)
	23.25	22.13	20.34	18.55			16.18	23	10.06 (21)	15.11	77	13.58 (12)
6	03.52	05.09	06.33	07.52			08.19		09.43 (21)	09.40		11.04 (19)
	23.24	22.10	20.31	18.52			16.16	23	10.06 (21)	15.09	77	13.58 (12)
7	03.54	05.11	06.36	07.55			08.22		09.42 (21)	09.42		11.04 (19)
	23.23	22.07	20.28	18.48			16.13	24	10.06 (21)	15.08	78	13.59 (12)
8	03.56	05.14	06.38	07.58			08.25		09.42 (14)	09.44		11.05 (19)
	23.21	22.04	20.24	18.45			16.10	25	10.07 (21)	15.07	75	13.57 (12)
9	03.58	05.17	06.41	08.00			08.28		09.40 (14)	09.46		11.05 (19)
	23.19	22.01	20.21	18.42			16.07	27	10.07 (21)	15.06	71	13.55 (12)
10	04.00	05.20	06.44	08.03			08.31		09.40 (14)	09.48		11.05 (19)
	23.18	21.58	20.18	18.39			16.04	27	10.07 (21)	15.05	69	13.52 (12)
11	04.02	05.23	06.46	08.06			08.34		09.38 (14)	09.50		11.06 (19)
	23.16	21.55	20.14	18.35			16.02	29	10.07 (21)	15.04	67	13.51 (12)
12	04.04	05.25	06.49	08.08			08.37		09.39 (14)	09.51		11.07 (19)
	23.14	21.51	20.11	18.32			15.59	28	10.07 (21)	15.04	65	13.50 (12)
13	04.06	05.28	06.52	08.11			08.40		09.38 (14)	09.53		11.07 (19)
	23.12	21.48	20.08	18.29			15.56	29	10.07 (21)	15.03	62	13.48 (12)
14	04.08	05.31	06.54	08.14			08.42		09.38 (14)	09.54		11.08 (19)
	23.10	21.45	20.04	18.26			15.54	29	10.07 (21)	15.03	59	13.47 (12)
15	04.11	05.34	06.57	08.17			08.45		09.38 (14)	09.56		11.10 (19)
	23.08	21.42	20.01	18.23			15.51	37	11.29 (23)	15.02	57	13.46 (12)
16	04.13	05.36	06.59	08.19			08.48		09.39 (14)	09.57		11.12 (19)
	23.06	21.39	19.58	18.19			15.49	40	11.32 (23)	15.02	54	13.09 (13)
17	04.15	05.39	07.02	08.22			08.51		09.41 (14)	09.58		11.13 (19)
	23.03	21.36	19.54	18.16			15.46	40	11.33 (23)	15.02	51	13.09 (13)
18	04.18	05.42	07.05	08.25		09.40 (18)	08.54		09.45 (14)	09.59		11.15 (19)
	23.01	21.33	19.51	18.13	11	09.51 (18)	15.44	39	11.35 (23)	15.02	49	13.10 (13)
19	04.20	05.45	07.07	08.28		09.38 (18)	08.57		09.49 (14)	10.00		11.16 (19)
	22.59	21.29	19.48	18.10	15	09.53 (18)	15.41	36	11.37 (23)	15.02	49	13.10 (13)
20	04.23	05.47	07.10	08.30		09.37 (18)	09.00		09.52 (14)	10.01		11.17 (19)
	22.56	21.26	19.44	18.07	17	09.54 (18)	15.39	32	11.37 (23)	15.02	48	13.11 (13)
21	04.25	05.50	07.13	08.33		09.35 (18)	09.02		09.56 (21)	10.01		11.18 (19)
	22.54	21.23	19.41	18.04	20	09.55 (18)	15.37	28	11.38 (23)	15.02	49	13.12 (13)
22	04.28	05.53	07.15	08.36		09.35 (18)	09.05		11.15 (23)	10.02		11.18 (19)
	22.51	21.20	19.38	18.00	20	09.55 (18)	15.34	23	11.38 (23)	15.03	49	13.12 (13)
23	04.31	05.56	07.18	08.39		09.34 (18)	09.08		11.05 (19)	10.03		11.18 (19)
	22.49	21.17	19.34	17.57	21	09.55 (18)	15.32	32	11.39 (23)	15.03	49	13.12 (13)
24	04.33	05.58	07.20	08.42		09.33 (18)	09.11		11.03 (19)	10.03		11.19 (19)
	22.46	21.13	19.31	17.54	22	09.55 (18)	15.30	44	13.48 (12)	15.04	48	13.13 (13)
25	04.36	06.01	07.23	07.45		08.33 (18)	09.13		11.03 (19)	10.03		11.18 (19)
	22.44	21.10	19.28	16.51	22	08.55 (18)	15.28	56	13.51 (12)	15.05	50	13.13 (13)
26	04.38	06.04	07.26	07.47		08.34 (18)	09.16		11.03 (19)	10.03		11.18 (19)
	22.41	21.07	19.25	16.48	22	08.56 (18)	15.26	61	13.52 (12)	15.06	52	13.14 (13)
27	04.41	06.06	07.28	07.50		08.34 (18)	09.19		11.02 (19)	10.03		11.17 (19)
	22.38	21.04	19.21	16.45	21	08.55 (18)	15.24	66	13.53 (12)	15.07	53	13.14 (13)
28	04.44	06.09	07.31	07.53		08.34 (18)	09.21		11.03 (19)	10.03		11.17 (19)
	22.36	21.00	19.18	16.42	20	08.54 (18)	15.22	68	13.54 (12)	15.08	55	13.15 (13)
29	04.47	06.12	07.34	07.56		08.36 (18)	09.24		11.02 (19)	10.03		11.16 (19)
	22.33	20.57	19.15	16.39	17	08.53 (18)	15.20	72	13.55 (12)	15.09	59	13.54 (12)
30	04.49	06.14	07.36	07.59		08.40 (18)	09.26		11.02 (19)	10.03		11.15 (19)
	22.30	20.54	19.11	16.36	13	08.53 (18)	15.18	74	13.55 (12)	15.10	60	13.55 (12)
31	04.52	06.17		08.02		08.43 (18)				10.02		11.16 (19)
	22.27	20.51		16.33	12	09.56 (21)				15.12	62	13.58 (12)
Potential sun hours	583	497	391	310			213			162		
Total, worst case					253			1084			1903	
Sun reduction					0,34			0,22			0,18	
Oper. time red.					0,99			0,99			0,99	
Wind dir. red.					0,63			0,69			0,70	
Total reduction					0,22			0,15			0,13	
Total, real					55			165			243	

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: G - Asuinrakennus G (Karijoentie 203)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04	07.41	06.59	05.22	04.00	21.53 (3)	03.46	21.58 (3)	04.55	06.20	07.39	08.04	09.28
	15.14	16.32	17.54	20.19	21.43	23.06 19	22.12 (3)	23.29 21	22.19 (3)	22.24	20.47	19.08	16.30	15.17
2	10.00	09.01	07.37	06.56	05.19	03.58	21.53 (3)	03.47	21.58 (3)	04.58	06.23	07.42	08.07	09.31
	15.16	16.35	17.57	20.22	21.46	23.08 20	22.13 (3)	23.28 22	22.20 (3)	22.21	20.44	19.05	16.27	15.16
3	10.00	08.59	07.34	06.52	05.16	03.56	21.53 (3)	03.48	21.58 (3)	05.01	06.25	07.44	08.10	09.33
	15.18	16.38	18.00	20.25	21.48	23.10 21	22.14 (3)	23.27 22	22.20 (3)	22.18	20.41	19.02	16.25	15.14
4	09.59	08.56	07.31	06.49	05.13	03.54	21.53 (3)	03.50	21.59 (3)	05.04	06.28	07.47	08.13	09.35
	15.20	16.41	18.03	20.28	21.51	23.12 21	22.14 (3)	23.26 22	22.21 (3)	22.15	20.37	18.58	16.22	15.13
5	09.58	08.53	07.28	06.46	05.10	03.52	21.53 (3)	03.51	21.59 (3)	05.06	06.31	07.50	08.16	09.37
	15.21	16.44	18.06	20.30	21.54	23.14 22	22.15 (3)	23.25 22	22.21 (3)	22.12	20.34	18.55	16.19	15.11
6	09.57	08.50	07.24	06.43	05.07	03.51	21.53 (3)	03.53	21.59 (3)	05.09	06.33	07.52	08.19	09.39
	15.23	16.47	18.08	20.33	21.57	23.16 22	22.15 (3)	23.23 21	22.20 (3)	22.09	20.31	18.52	16.16	15.10
7	09.56	08.47	07.21	06.39	05.04	03.49	21.54 (3)	03.55	22.00 (3)	05.12	06.36	07.55	08.22	09.42
	15.25	16.50	18.11	20.36	22.00	23.18 21	22.15 (3)	23.22 21	22.21 (3)	22.06	20.27	18.49	16.13	15.09
8	09.54	08.45	07.18	06.36	05.01	03.48	21.54 (3)	03.57	22.00 (3)	05.15	06.39	07.58	08.25	09.43
	15.28	16.53	18.14	20.39	22.03	23.20 21	22.15 (3)	23.20 21	22.21 (3)	22.03	20.24	18.45	16.10	15.08
9	09.53	08.42	07.15	06.33	04.58	03.47	21.54 (3)	03.59	22.00 (3)	05.17	06.41	08.00	08.28	09.45
	15.30	16.56	18.17	20.41	22.05	23.21 21	22.15 (3)	23.19 21	22.21 (3)	22.00	20.21	18.42	16.08	15.07
10	09.52	08.39	07.11	06.29	04.55	03.45	21.54 (3)	04.01	22.00 (3)	05.20	06.44	08.03	08.31	09.47
	15.32	16.59	18.20	20.44	22.08	23.23 21	22.15 (3)	23.17 21	22.21 (3)	21.57	20.18	18.39	16.05	15.06
11	09.50	08.36	07.08	06.26	04.52	03.44	21.54 (3)	04.03	22.01 (3)	05.23	06.46	08.06	08.33	09.49
	15.34	17.02	18.22	20.47	22.11	23.24 21	22.15 (3)	23.15 20	22.21 (3)	21.54	20.14	18.36	16.02	15.05
12	09.48	08.33	07.05	06.23	04.49	03.43	21.54 (3)	04.05	22.02 (3)	05.26	06.49	08.08	08.36	09.51
	15.37	17.05	18.25	20.50	22.14	23.26 22	22.16 (3)	23.13 18	22.20 (3)	21.51	20.11	18.32	15.59	15.04
13	09.47	08.30	07.02	06.20	04.47	03.42	21.54 (3)	04.07	22.01 (3)	05.28	06.52	08.11	08.39	09.52
	15.39	17.08	18.28	20.52	22.17	23.27 22	22.16 (3)	23.11 16	22.17 (3)	21.48	20.08	18.29	15.57	15.04
14	09.45	08.27	06.58	06.16	04.44	03.41	21.55 (3)	04.09	22.02 (3)	05.31	06.54	08.14	08.42	09.54
	15.42	17.11	18.31	20.55	22.20	23.28 21	22.16 (3)	23.09 14	22.16 (3)	21.45	20.04	18.26	15.54	15.03
15	09.43	08.24	06.55	06.13	04.41	03.41	21.54 (3)	04.11	22.03 (3)	05.34	06.57	08.17	08.45	09.55
	15.44	17.14	18.33	20.58	22.22	23.29 22	22.16 (3)	23.07 12	22.15 (3)	21.42	20.01	18.23	15.52	15.03
16	09.41	08.21	06.52	06.10	04.38	03.40	21.55 (3)	04.14	22.03 (3)	05.37	07.00	08.19	08.48	09.56
	15.47	17.17	18.36	21.01	22.25	23.30 21	22.16 (3)	23.05 10	22.13 (3)	21.39	19.58	18.20	15.49	15.03
17	09.39	08.18	06.49	06.07	04.35	03.40	21.55 (3)	04.16	22.04 (3)	05.39	07.02	08.22	08.51	09.57
	15.50	17.20	18.39	21.03	22.28	23.31 22	22.17 (3)	23.03 8	22.12 (3)	21.36	19.54	18.16	15.47	15.03
18	09.37	08.15	06.45	06.03	04.33	03.39	21.56 (3)	04.18	22.05 (3)	05.42	07.05	08.25	08.54	09.58
	15.52	17.23	18.41	21.06	22.31	23.31 21	22.17 (3)	23.00 5	22.10 (3)	21.32	19.51	18.13	15.44	15.02
19	09.35	08.12	06.42	06.00	04.30	03.39	21.56 (3)	04.21	22.06 (3)	05.45	07.07	08.28	08.56	09.59
	15.55	17.26	18.44	21.09	22.33	23.32 21	22.17 (3)	22.58 2	22.08 (3)	21.29	19.48	18.10	15.42	15.03
20	09.33	08.09	06.39	05.57	04.27	03.39	21.56 (3)	04.23		05.48	07.10	08.30	08.59	10.00
	15.58	17.29	18.47	21.12	22.36	23.32 21	22.17 (3)	22.56		21.26	19.44	18.07	15.40	15.03
21	09.31	08.06	06.35	05.54	04.25	03.39	21.56 (3)	04.26		05.50	07.13	08.33	09.02	10.01
	16.01	17.32	18.50	21.15	22.39	23.33 21	22.17 (3)	22.53		21.23	19.41	18.04	15.37	15.03
22	09.29	08.03	06.32	05.51	04.22	03.39	21.56 (3)	04.29		05.53	07.15	08.36	09.05	10.01
	16.03	17.34	18.52	21.17	22.41	23.33 21	22.17 (3)	22.51		21.20	19.38	18.01	15.35	15.03
23	09.27	07.59	06.29	05.47	04.20	03.39	21.57 (3)	04.31		05.56	07.18	08.39	09.07	10.02
	16.06	17.37	18.55	21.20	22.44	23.33 21	22.18 (3)	22.48		21.16	19.34	17.58	15.33	15.04
24	09.24	07.56	06.25	05.44	04.17	03.40	21.57 (3)	04.34		05.59	07.20	08.42	09.10	10.02
	16.09	17.40	18.58	21.23	22.47	23.33 21	22.18 (3)	22.46		21.13	19.31	17.54	15.31	15.05
25	09.22	07.53	06.22	05.41	04.15 21.55 (3)	03.40	21.58 (3)	04.36		06.01	07.23	07.44	09.13	10.03
	16.12	17.43	19.00	21.26	22.49 4 21.59 (3)	23.33 21	22.19 (3)	22.43		21.10	19.28	16.51	15.29	15.05
26	09.19	07.50	06.19	05.38	04.13 21.54 (3)	03.41	21.57 (3)	04.39		06.04	07.26	07.47	09.16	10.03
	16.15	17.46	19.03	21.29	22.52 7 22.01 (3)	23.32 21	22.18 (3)	22.41		21.07	19.25	16.48	15.27	15.06
27	09.17	07.47	06.16	05.35	04.10 21.55 (3)	03.42	21.58 (3)	04.42		06.07	07.28	07.50	09.18	10.03
	16.18	17.49	19.06	21.31	22.54 8 22.03 (3)	23.32 21	22.19 (3)	22.38		21.04	19.21	16.45	15.25	15.07
28	09.14	07.44	06.12	05.32	04.08 21.54 (3)	03.42	21.58 (3)	04.44		06.09	07.31	07.53	09.21	10.03
	16.21	17.52	19.09	21.34	22.57 11 22.05 (3)	23.32 21	22.19 (3)	22.35		21.00	19.18	16.42	15.23	15.08
29	09.12		07.09	05.28	04.06 21.53 (3)	03.43	21.57 (3)	04.47		06.12	07.34	07.56	09.23	10.02
	16.24		20.11	21.37	22.59 14 22.07 (3)	23.31 22	22.19 (3)	22.32		20.57	19.15	16.39	15.21	15.10
30	09.09		07.06	05.25	04.04 21.54 (3)	03.45	21.58 (3)	04.50		06.15	07.36	07.59	09.26	10.02
	16.27		20.14	21.40	23.01 15 22.09 (3)	23.30 21	22.19 (3)	22.30		20.54	19.11	16.36	15.19	15.11
31	09.07		07.02		04.02 21.53 (3)			04.53		06.17		08.02		10.02
	16.30		20.17		23.04 17 22.10 (3)			22.27		20.50		16.33		15.12
Potential sun hours	191	246	364	444	550	590		582		497	391	310	213	163
Total, worst case					76	634		319						
Sun reduction					0,49	0,51		0,40						
Oper. time red.					0,99	0,99		0,99						
Wind dir. red.					0,64	0,64		0,64						
Total reduction					0,31	0,32		0,25						
Total, real					23	202		79						

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: I - Näkötorni I (Susivuoren näkötorni)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March		April		May		June
1	10.01	09.04	07.40		06.59		05.22		20.56 (15)	03.59
	15.14	16.32	17.54		20.19		21.43	6	21.02 (15)	23.06
2	10.00	09.01	07.37		06.55		05.19		20.58 (15)	03.57
	15.15	16.35	17.57		20.22		21.45	8	21.06 (15)	23.08
3	10.00	08.58	07.34		06.52		05.15		21.00 (15)	03.55
	15.17	16.38	18.00		20.25		21.48	7	21.07 (15)	23.10
4	09.59	08.56	07.31		06.49		05.12			03.53
	15.19	16.41	18.02		20.27		21.51			23.12
5	09.58	08.53	07.27		06.45		05.09			03.52
	15.21	16.44	18.05		20.30		21.54			23.14
6	09.57	08.50	07.24		06.42		05.06			03.50
	15.23	16.47	18.08		20.33		21.57			23.16
7	09.55	08.47	07.21		06.39		05.03			03.49
	15.25	16.50	18.11		20.36		22.00			23.18
8	09.54	08.44	07.18		06.36		05.00			03.47
	15.27	16.53	18.14		20.38		22.02			23.20
9	09.53	08.42	07.14		06.32		04.57			03.46
	15.29	16.56	18.16		20.41		22.05			23.21
10	09.51	08.39	07.11		06.29		04.55			03.45
	15.31	16.59	18.19		20.44		22.08			23.23
11	09.50	08.36	07.08		06.26		04.52			03.43
	15.34	17.02	18.22		20.46		22.11			23.24
12	09.48	08.33	07.05		06.22		04.49			03.42
	15.36	17.05	18.25		20.49		22.14			23.26
13	09.47	08.30	07.01		06.19		04.46			03.41
	15.39	17.08	18.27		20.52		22.17			23.27
14	09.45	08.27	06.58		06.16		04.43			03.41
	15.41	17.11	18.30		20.55		22.19			23.28
15	09.43	08.24	06.55		06.13		04.40			03.40
	15.44	17.14	18.33		20.58		22.22			23.29
16	09.41	08.21	06.51		06.09		04.37			03.39
	15.46	17.16	18.36		21.00		22.25			23.30
17	09.39	08.18	06.48		06.06		04.35			03.39
	15.49	17.19	18.38		21.03		22.28			23.31
18	09.37	08.15	06.45		06.03		04.32			03.38
	15.52	17.22	18.41		21.06		22.31			23.31
19	09.35	08.12	06.42		06.00		04.29			03.38
	15.54	17.25	18.44		21.09		22.33			23.32
20	09.33	08.09	06.38		05.56		04.27			03.38
	15.57	17.28	18.47		21.11		22.36			23.32
21	09.31	08.05	06.35		05.53		04.24			03.38
	16.00	17.31	18.49		21.14		22.39			23.33
22	09.29	08.02	06.32		05.50		04.22			03.38
	16.03	17.34	18.52		21.17		22.41			23.33
23	09.26	07.59	06.28		05.47		04.19			03.39
	16.06	17.37	18.55		21.20		22.44			23.33
24	09.24	07.56	06.25		18.22 (25)		05.44		04.17	03.39
	16.08	17.40	18.57	2	18.24 (25)		21.23		22.47	23.33
25	09.22	07.53	06.22		18.22 (25)		05.40		04.14	03.39
	16.11	17.43	19.00	5	18.27 (25)		21.26		22.49	23.33
26	09.19	07.50	06.18		18.22 (25)		05.37		04.12	03.40
	16.14	17.45	19.03	7	18.29 (25)		21.28		22.52	23.33
27	09.17	07.47	06.15		18.23 (25)		05.34		04.10	03.41
	16.17	17.48	19.06	9	18.32 (25)		21.31		22.54	23.32
28	09.14	07.43	06.12		18.25 (25)		05.31		04.07	03.42
	16.20	17.51	19.08	10	18.35 (25)		21.34		22.57	23.32
29	09.12		07.09		19.27 (25)		05.28	20.55 (15)	04.05	03.43
	16.23		20.11	5	19.32 (25)		21.37	3	20.58 (15)	22.59	23.31
30	09.09		07.05				05.25	20.56 (15)	04.03	03.44
	16.26		20.14				21.40	4	21.00 (15)	23.01	23.30
31	09.07		07.02							04.01	
	16.29		20.16							23.04	
Potential sun hours	191	246	364		444				551		591
Total, worst case				38		7				21	
Sun reduction				0,32		0,41				0,49	
Oper. time red.				0,99		0,99				0,99	
Wind dir. red.				0,57		0,60				0,60	
Total reduction				0,18		0,25				0,29	
Total, real				7		2				6	

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: J - Asuinrakennus J (Lidenintie 351)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January			February			March			April			May	June
1	10.02			09.04		09.46 (1)	07.41			06.59		08.27 (24)	05.22	04.00
	15.14			16.33	54	14.03 (20)	17.55			20.20	32	08.59 (24)	21.43	23.06
2	10.01			09.02		09.42 (1)	07.38			06.56		08.28 (24)	05.19	03.58
	15.16			16.36	58	14.03 (20)	17.57			20.22	30	08.58 (24)	21.46	23.09
3	10.00			08.59		09.42 (1)	07.34			06.53		08.29 (24)	05.16	03.56
	15.18			16.39	57	14.02 (20)	18.00			20.25	28	08.57 (24)	21.49	23.11
4	09.59		13.34 (20)	08.56		09.42 (1)	07.31			06.49		08.29 (24)	05.13	03.54
	15.19	1	13.35 (20)	16.41	57	14.02 (20)	18.03			20.28	25	08.54 (24)	21.52	23.13
5	09.58		13.31 (20)	08.54		09.42 (1)	07.28			06.46		08.32 (24)	05.10	03.52
	15.21	9	13.40 (20)	16.44	57	14.02 (20)	18.06			20.31	19	08.51 (24)	21.55	23.15
6	09.57		13.30 (20)	08.51		09.42 (1)	07.25			06.43		08.35 (24)	05.07	03.51
	15.23	12	13.42 (20)	16.47	55	14.01 (20)	18.09			20.33	12	08.47 (24)	21.57	23.17
7	09.56		13.29 (20)	08.48		09.42 (1)	07.22			06.39			05.04	03.49
	15.25	16	13.45 (20)	16.50	54	14.00 (20)	18.11			20.36			22.00	23.19
8	09.55		13.28 (20)	08.45		09.23 (2)	07.18		07.49 (5)	06.36			05.01	03.48
	15.28	18	13.46 (20)	16.53	53	13.59 (20)	18.14	1	07.50 (5)	20.39			22.03	23.20
9	09.54		13.27 (20)	08.42		09.20 (2)	07.15		07.46 (5)	06.33			04.58	03.46
	15.30	21	13.48 (20)	16.56	53	13.58 (20)	18.17	5	07.51 (5)	20.42			22.06	23.22
10	09.52		13.26 (20)	08.39		09.16 (2)	07.12		07.42 (5)	06.30			04.55	03.45
	15.32	23	13.49 (20)	16.59	53	13.56 (20)	18.20	9	07.51 (5)	20.44			22.09	23.23
11	09.51		13.27 (20)	08.36		09.13 (2)	07.09		07.39 (5)	06.26			04.52	03.44
	15.34	23	13.50 (20)	17.02	50	13.53 (20)	18.23	12	07.51 (5)	20.47			22.12	23.25
12	09.49		13.26 (20)	08.33		09.10 (2)	07.05		07.36 (5)	06.23			04.49	03.43
	15.37	25	13.51 (20)	17.05	37	10.04 (1)	18.25	15	07.51 (5)	20.50			22.14	23.26
13	09.47		13.26 (20)	08.30		09.09 (2)	07.02		07.35 (5)	06.20			04.47	03.42
	15.39	27	13.53 (20)	17.08	34	10.02 (1)	18.28	20	07.55 (24)	20.53			22.17	23.28
14	09.46		13.25 (20)	08.27		09.10 (2)	06.59		07.35 (5)	06.17			04.44	03.41
	15.42	29	13.54 (20)	17.11	31	10.01 (1)	18.31	24	07.59 (24)	20.55			22.20	23.29
15	09.44		13.25 (20)	08.24		09.10 (2)	06.55		07.37 (24)	06.13			04.41	03.41
	15.44	30	13.55 (20)	17.14	24	09.57 (1)	18.34	24	08.01 (24)	20.58			22.23	23.30
16	09.42		13.25 (20)	08.21		09.10 (2)	06.52		07.34 (24)	06.10			04.38	03.40
	15.47	31	13.56 (20)	17.17	16	09.26 (2)	18.36	28	08.02 (24)	21.01			22.26	23.31
17	09.40		13.24 (20)	08.18		09.11 (2)	06.49		07.33 (24)	06.07			04.35	03.39
	15.50	33	13.57 (20)	17.20	15	09.26 (2)	18.39	31	08.04 (24)	21.04			22.28	23.31
18	09.38		13.24 (20)	08.15		09.13 (2)	06.46		07.32 (24)	06.04			04.33	03.39
	15.52	33	13.57 (20)	17.23	11	09.24 (2)	18.42	33	08.05 (24)	21.07			22.31	23.32
19	09.36		13.24 (20)	08.12		09.15 (2)	06.42		07.30 (24)	06.00			04.30	03.39
	15.55	34	13.58 (20)	17.26	6	09.21 (2)	18.44	35	08.05 (24)	21.09			22.34	23.33
20	09.34		13.24 (20)	08.09			06.39		07.29 (24)	05.57			04.27	03.39
	15.58	35	13.59 (20)	17.29			18.47	36	08.05 (24)	21.12			22.37	23.33
21	09.32		13.24 (20)	08.06			06.36		07.28 (24)	05.54			04.25	03.39
	16.01	36	14.00 (20)	17.32			18.50	38	08.06 (24)	21.15			22.39	23.33
22	09.29		13.24 (20)	08.03			06.32		07.27 (24)	05.51			04.22	03.39
	16.03	36	14.00 (20)	17.35			18.53	39	08.06 (24)	21.18			22.42	23.34
23	09.27		13.24 (20)	08.00			06.29		07.27 (24)	05.47			04.20	03.39
	16.06	37	14.01 (20)	17.37			18.55	39	08.06 (24)	21.21			22.45	23.34
24	09.25		13.24 (20)	07.57			06.26		07.26 (24)	05.44			04.17	03.40
	16.09	38	14.02 (20)	17.40			18.58	40	08.06 (24)	21.23			22.47	23.34
25	09.22		13.24 (20)	07.54			06.22		07.25 (24)	05.41			04.15	03.40
	16.12	38	14.02 (20)	17.43			19.01	40	08.05 (24)	21.26			22.50	23.34
26	09.20		13.24 (20)	07.50			06.19		07.25 (24)	05.38			04.13	03.41
	16.15	39	14.03 (20)	17.46			19.03	40	08.05 (24)	21.29			22.52	23.33
27	09.17		13.25 (20)	07.47			06.16		07.26 (24)	05.35			04.10	03.41
	16.18	38	14.03 (20)	17.49			19.06	39	08.05 (24)	21.32			22.55	23.33
28	09.15		13.25 (20)	07.44			06.13		07.25 (24)	05.32			04.08	03.42
	16.21	38	14.03 (20)	17.52			19.09	39	08.04 (24)	21.35			22.57	23.32
29	09.12		09.55 (1)				07.09		08.25 (24)	05.28			04.06	03.43
	16.24	42	14.03 (20)				20.12	38	09.03 (24)	21.38			23.00	23.32
30	09.10		09.52 (1)				07.06		08.26 (24)	05.25			04.04	03.44
	16.27	46	14.03 (20)				20.14	36	09.02 (24)	21.40			23.02	23.31
31	09.07		09.49 (1)				07.03		08.26 (24)				04.02	
	16.30	51	14.03 (20)				20.17	35	09.01 (24)				23.04	
Potential sun hours	191			246			364			444			551	591
Total, worst case		839			775			696			146			
Sun reduction		0,17			0,32			0,32			0,41			
Oper. time red.		0,99			0,99			0,99			0,99			
Wind dir. red.		0,69			0,66			0,55			0,55			
Total reduction		0,11			0,22			0,18			0,23			
Total, real		96			167			125			34			

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: K - Asuinrakennus K (Storängintie 49)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March		April		May		June			
1	10.01		09.04		07.41		06.59		05.22		05.57 (9)	04.00		
	15.14		16.33		17.55		20.20		21.43	31	07.13 (3)	23.06		
2	10.01		09.02		07.38		06.56		07.26 (4)	05.19	05.54 (9)	03.58		
	15.16		16.36		17.57		20.22	5	07.31 (4)	21.46	34	07.12 (3)	23.08	
3	10.00		08.59		07.34		06.53		07.23 (4)	05.16	05.52 (9)	03.56		
	15.18		16.39		18.00		20.25	10	07.33 (4)	21.49	35	07.11 (3)	23.10	
4	09.59		08.56		07.31		06.49		07.19 (4)	05.13	05.49 (9)	03.54		04.45 (5)
	15.20		16.42		18.03		20.28	14	07.33 (4)	21.52	35	07.09 (3)	23.13	3	04.53 (2)
5	09.58		08.53		07.28		06.46		07.16 (4)	05.10	05.46 (9)	03.53		04.44 (5)
	15.22		16.45		18.06		20.31	17	07.33 (4)	21.54	34	07.06 (3)	23.14	10	04.57 (2)
6	09.57		08.51		07.25		06.43		07.13 (4)	05.07	05.45 (9)	03.51		04.43 (5)
	15.23		16.48		18.09		20.33	21	07.34 (4)	21.57	29	07.03 (3)	23.16	14	04.58 (2)
7	09.56		08.48		07.21		06.39		07.13 (4)	05.04	05.44 (9)	03.49		04.42 (5)
	15.26		16.51		18.11		20.36	21	07.34 (4)	22.00	23	06.07 (9)	23.18	17	04.59 (2)
8	09.55		08.45		07.18		06.36		07.13 (4)	05.01	05.44 (9)	03.48		04.41 (5)
	15.28		16.53		18.14		20.39	21	07.34 (4)	22.03	22	06.06 (9)	23.20	19	05.00 (2)
9	09.53		08.42		07.15		06.33		07.12 (4)	04.58	05.44 (9)	03.47		04.40 (5)
	15.30		16.56		18.17		20.42	20	07.32 (4)	22.06	23	06.07 (9)	23.22	21	05.01 (2)
10	09.52		08.39		07.12		06.30		07.13 (4)	04.55	05.44 (9)	03.45		04.39 (5)
	15.32		16.59		18.20		20.44	19	07.32 (4)	22.09	22	06.06 (9)	23.23	22	05.01 (2)
11	09.50		08.36		07.08		06.26		07.13 (4)	04.52	05.44 (9)	03.44		04.38 (5)
	15.35		17.02		18.23		20.47	18	07.31 (4)	22.11	23	06.07 (9)	23.25	24	05.02 (2)
12	09.49		08.33		07.05		06.23		07.01 (3)	04.49	05.44 (9)	03.43		04.38 (5)
	15.37		17.05		18.25		20.50	24	07.30 (4)	22.14	22	06.06 (9)	23.26	25	05.03 (2)
13	09.47		08.30		07.02		06.20		06.57 (3)	04.47	05.45 (9)	03.42		04.37 (5)
	15.39		17.08		18.28		20.53	28	07.28 (4)	22.17	21	06.06 (9)	23.27	26	05.03 (2)
14	09.45		08.27		06.59		06.17		06.48 (8)	04.44	05.45 (9)	03.42		04.37 (5)
	15.42		17.11		18.31		20.55	28	07.25 (4)	22.20	20	06.05 (9)	23.28	27	05.04 (2)
15	09.43		08.24		06.55		06.13		06.44 (8)	04.41	05.46 (9)	03.41		04.37 (5)
	15.44		17.14		18.33		20.58	29	07.15 (3)	22.23	18	06.04 (9)	23.29	28	05.05 (2)
16	09.42		08.21		06.52		06.10		06.41 (8)	04.38	05.47 (9)	03.40		04.36 (5)
	15.47		17.17		18.36		21.01	35	07.16 (3)	22.25	17	06.04 (9)	23.30	28	05.04 (2)
17	09.40		08.18		06.49		06.07		06.38 (8)	04.36	05.48 (9)	03.40		04.36 (5)
	15.50		17.20		18.39		21.04	39	07.17 (3)	22.28	15	06.03 (9)	23.31	29	05.05 (2)
18	09.38		08.15		06.45		06.04		06.35 (8)	04.33	05.48 (9)	03.39		04.36 (5)
	15.52		17.23		18.42		21.06	42	07.17 (3)	22.31	13	06.01 (9)	23.32	29	05.05 (2)
19	09.36		08.12		06.42		06.00		06.33 (8)	04.30	05.50 (9)	03.39		04.36 (5)
	15.55		17.26		18.44		21.09	45	07.18 (3)	22.34	10	06.00 (9)	23.32	30	05.06 (2)
20	09.33		08.09		06.39		05.57		06.33 (8)	04.28	05.53 (9)	03.39		04.36 (5)
	15.58		17.29		18.47		21.12	45	07.18 (3)	22.36	4	05.57 (9)	23.33	30	05.06 (2)
21	09.31		08.06		06.36		05.54		06.34 (8)	04.25			03.39		04.36 (5)
	16.01		17.32		18.50		21.15	44	07.18 (3)	22.39			23.33	30	05.06 (2)
22	09.29		08.03		06.32		05.51		06.35 (8)	04.22			03.39		04.36 (5)
	16.03		17.35		18.53		21.18	43	07.18 (3)	22.42			23.33	30	05.06 (2)
23	09.27		08.00		06.29		05.47		06.36 (8)	04.20			03.39		04.37 (5)
	16.06		17.37		18.55		21.20	42	07.18 (3)	22.44			23.33	30	05.07 (2)
24	09.24		07.57		06.26		05.44		06.44 (3)	04.17			03.40		04.37 (5)
	16.09		17.40		18.58		21.23	34	07.18 (3)	22.47			23.33	30	05.07 (2)
25	09.22		07.53		06.22		05.41		06.44 (3)	04.15			03.40		04.38 (5)
	16.12		17.43		19.01		21.26	33	07.17 (3)	22.49			23.33	29	05.07 (2)
26	09.20		07.50		06.19		05.38		06.44 (3)	04.13			03.41		04.38 (5)
	16.15		17.46		19.03		21.29	33	07.17 (3)	22.52			23.33	29	05.07 (2)
27	09.17		07.47		06.16		05.35		06.45 (3)	04.10			03.42		04.39 (5)
	16.18		17.49		19.06		21.32	32	07.17 (3)	22.54			23.32	28	05.07 (2)
28	09.15		07.44		06.12		05.32		06.46 (3)	04.08			03.43		04.40 (5)
	16.21		17.52		19.09		21.34	30	07.16 (3)	22.57			23.32	27	05.07 (2)
29	09.12				07.09		05.29		06.46 (3)	04.06			03.44		04.40 (5)
	16.24				20.12		21.37	30	07.16 (3)	22.59			23.31	26	05.06 (2)
30	09.10				07.06		05.25		06.46 (3)	04.04			03.45		04.41 (5)
	16.27				20.14		21.40	28	07.14 (3)	23.02			23.30	25	05.06 (2)
31	09.07				07.03					04.02					
	16.30				20.17					23.04					
Potential sun hours	191		246		364		444			550		590		
Total, worst case								830			451			666
Sun reduction								0,42			0,49			0,51
Oper. time red.								0,99			0,99			0,99
Wind dir. red.								0,55			0,59			0,63
Total reduction								0,23			0,28			0,31
Total, real								187			126			208

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)

Project:
Dagsmark

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: L - Asuinrakennus L (Nyskiftanintie 1493)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04	07.41	06.59	05.22	04.00	04.50 (8)	03.46	04.57 (8)	04.55	05.50 (7)	06.20	07.39	08.05	09.28
	15.14	16.33	17.55	20.20	21.43	23.06 30	05.20 (4)	23.29 28	05.25 (4)	22.24 16	06.06 (7)	20.47	19.08	16.30	15.18
2	10.01	09.02	07.37	06.56	05.19	03.58	04.51 (8)	03.47	04.57 (8)	04.58	05.50 (7)	06.23	07.42	08.08	09.31
	15.16	16.36	17.57	20.22	21.46	23.08 29	05.20 (4)	23.28 29	05.26 (4)	22.21 16	06.06 (7)	20.44	19.05	16.28	15.16
3	10.00	08.59	07.34	06.53	05.16	05.52 (7) 03.56	04.50 (8)	03.49	04.58 (8)	05.01	05.49 (7)	06.26	07.44	08.10	09.33
	15.18	16.39	18.00	20.25	21.49 3	05.55 (7) 23.10 30	05.20 (4)	23.27 29	05.27 (4)	22.18 17	06.06 (7)	20.41	19.02	16.25	15.14
4	09.59	08.56	07.31	06.49	05.13	05.49 (7) 03.54	04.51 (8)	03.50	04.58 (8)	05.04	05.49 (7)	06.28	07.47	08.13	09.35
	15.20	16.42	18.03	20.28	21.51 6	05.55 (7) 23.12 29	05.20 (4)	23.26 29	05.27 (4)	22.15 17	06.06 (7)	20.37	18.58	16.22	15.13
5	09.58	08.53	07.28	06.46	05.10	05.46 (7) 03.53	04.51 (8)	03.52	04.58 (8)	05.06	05.49 (7)	06.31	07.50	08.16	09.38
	15.22	16.45	18.06	20.31	21.54 10	05.56 (7) 23.14 30	05.21 (4)	23.25 29	05.27 (4)	22.12 17	06.06 (7)	20.34	18.55	16.19	15.12
6	09.57	08.50	07.25	06.43	05.07	05.44 (7) 03.51	04.52 (8)	03.53	04.57 (8)	05.09	05.52 (7)	06.33	07.52	08.19	09.40
	15.24	16.48	18.09	20.33	21.57 13	05.57 (7) 23.16 29	05.21 (4)	23.24 30	05.27 (4)	22.10 14	06.06 (7)	20.31	18.52	16.16	15.10
7	09.56	08.48	07.21	06.39	05.04	05.41 (7) 03.50	04.52 (8)	03.55	04.58 (8)	05.12	05.54 (7)	06.36	07.55	08.22	09.42
	15.26	16.51	18.11	20.36	22.00 15	05.56 (7) 23.18 29	05.21 (4)	23.22 29	05.27 (4)	22.07 12	06.06 (7)	20.28	18.49	16.13	15.09
8	09.54	08.45	07.18	06.36	05.01	05.38 (7) 03.48	04.52 (8)	03.57	04.57 (8)	05.15	05.57 (7)	06.39	07.58	08.25	09.44
	15.28	16.53	18.14	20.39	22.03 18	05.56 (7) 23.20 29	05.21 (4)	23.20 30	05.27 (4)	22.04 9	06.06 (7)	20.24	18.45	16.10	15.08
9	09.53	08.42	07.15	06.33	04.58	05.39 (7) 03.47	04.52 (8)	03.59	04.58 (8)	05.18	05.59 (7)	06.41	08.00	08.28	09.46
	15.30	16.56	18.17	20.41	22.06 17	05.56 (7) 23.21 29	05.21 (4)	23.19 30	05.28 (4)	22.00 5	06.04 (7)	20.21	18.42	16.08	15.07
10	09.52	08.39	07.12	06.30	04.55	05.39 (7) 03.46	04.53 (8)	04.01	04.57 (8)	05.20	06.01 (7)	06.44	08.03	08.31	09.47
	15.32	16.59	18.20	20.44	22.08 17	05.56 (7) 23.23 28	05.21 (4)	23.17 30	05.27 (4)	21.57 2	06.03 (7)	20.18	18.39	16.05	15.06
11	09.50	08.36	07.08	06.26	04.52	05.40 (7) 03.44	04.53 (8)	04.03	04.58 (8)	05.23		06.47	08.06	08.34	09.49
	15.35	17.02	18.22	20.47	22.11 16	05.56 (7) 23.24 28	05.21 (4)	23.15 30	05.28 (4)	21.54		20.14	18.36	16.02	15.05
12	09.49	08.33	07.05	06.23	04.50	05.40 (7) 03.43	04.54 (8)	04.05	04.58 (8)	05.26		06.49	08.09	08.37	09.51
	15.37	17.05	18.25	20.50	22.14 14	05.54 (7) 23.26 28	05.22 (4)	23.13 30	05.28 (4)	21.51		20.11	18.32	16.00	15.05
13	09.47	08.30	07.02	06.20	04.47	05.41 (7) 03.42	04.54 (8)	04.07	04.59 (8)	05.29		06.52	08.11	08.39	09.52
	15.39	17.08	18.28	20.52	22.17 13	05.54 (7) 23.27 27	05.21 (4)	23.11 28	05.27 (4)	21.48		20.08	18.29	15.57	15.04
14	09.45	08.27	06.59	06.17	04.44	05.42 (7) 03.42	04.54 (8)	04.09	05.01 (8)	05.31		06.54	08.14	08.42	09.54
	15.42	17.11	18.31	20.55	22.20 11	05.53 (7) 23.28 28	05.22 (4)	23.09 26	05.27 (4)	21.45		20.04	18.26	15.54	15.03
15	09.43	08.24	06.55	06.13	04.41	05.43 (7) 03.41	04.55 (8)	04.12	05.03 (8)	05.34		06.57	08.17	08.45	09.55
	15.45	17.14	18.33	20.58	22.23 8	05.51 (7) 23.29 28	05.23 (4)	23.07 24	05.27 (4)	21.42		20.01	18.23	15.52	15.03
16	09.41	08.21	06.52	06.10	04.38	05.46 (7) 03.40	04.55 (8)	04.14	05.05 (4)	05.37		07.00	08.19	08.48	09.56
	15.47	17.17	18.36	21.01	22.25 2	05.48 (7) 23.30 27	05.22 (4)	23.05 22	05.27 (4)	21.39		19.58	18.20	15.49	15.03
17	09.40	08.18	06.49	06.07	04.36	03.40	04.55 (8)	04.16	05.07 (4)	05.40		07.02	08.22	08.51	09.58
	15.50	17.20	18.39	21.04	22.28	23.31 27	05.22 (4)	23.03 20	05.27 (4)	21.36		19.55	18.17	15.47	15.03
18	09.38	08.15	06.45	06.04	04.33	03.39	04.56 (8)	04.19	05.09 (4)	05.42		07.05	08.25	08.54	09.59
	15.52	17.23	18.42	21.06	22.31	23.32 27	05.23 (4)	23.01 18	05.27 (4)	21.33		19.51	18.13	15.44	15.03
19	09.35	08.12	06.42	06.00	04.30	03.39	04.56 (8)	04.21	05.11 (4)	05.45		07.08	08.28	08.57	09.59
	15.55	17.26	18.44	21.09	22.34	23.32 27	05.23 (4)	22.58 15	05.26 (4)	21.29		19.48	18.10	15.42	15.03
20	09.33	08.09	06.39	05.57	04.28	05.10 (4) 03.39	04.56 (8)	04.24	05.13 (4)	05.48		07.10	08.31	08.59	10.00
	15.58	17.29	18.47	21.12	22.36 1	05.11 (4) 23.33 27	05.23 (4)	22.56 13	05.26 (4)	21.26		19.45	18.07	15.40	15.03
21	09.31	08.06	06.36	05.54	04.25	05.08 (4) 03.39	04.56 (8)	04.26	05.15 (4)	05.51		07.13	08.33	09.02	10.01
	16.01	17.32	18.50	21.15	22.39 5	05.13 (4) 23.33 27	05.23 (4)	22.53 10	05.25 (4)	21.23		19.41	18.04	15.37	15.03
22	09.29	08.03	06.32	05.51	04.22	05.06 (4) 03.39	04.56 (8)	04.29	05.17 (4)	05.53		07.15	08.36	09.05	10.02
	16.04	17.35	18.53	21.17	22.42 8	05.14 (4) 23.33 27	05.23 (4)	22.51 7	05.24 (4)	21.20		19.38	18.01	15.35	15.04
23	09.27	08.00	06.29	05.47	04.20	05.04 (4) 03.40	04.57 (8)	04.31	05.19 (4)	05.56		07.18	08.39	09.08	10.02
	16.06	17.37	18.55	21.20	22.44 11	05.15 (4) 23.33 27	05.24 (4)	22.48 3	05.22 (4)	21.17		19.35	17.58	15.33	15.04
24	09.24	07.57	06.26	05.44	04.18	05.02 (4) 03.40	04.57 (8)	04.34		05.59		07.21	08.42	09.10	10.02
	16.09	17.40	18.58	21.23	22.47 14	05.16 (4) 23.33 27	05.24 (4)	22.46		21.13		19.31	17.55	15.31	15.05
25	09.22	07.53	06.22	05.41	04.15	05.00 (4) 03.40	04.57 (8)	04.36		06.01		07.23	07.45	09.13	10.03
	16.12	17.43	19.01	21.26	22.49 17	05.17 (4) 23.33 28	05.25 (4)	22.43		21.10		19.28	16.52	15.29	15.06
26	09.20	07.50	06.19	05.38	04.13	04.58 (4) 03.41	04.57 (8)	04.39		06.04		07.26	07.47	09.16	10.03
	16.15	17.46	19.03	21.29	22.52 19	05.17 (4) 23.33 27	05.24 (4)	22.41		21.07		19.25	16.48	15.27	15.06
27	09.17	07.47	06.16	05.35	04.10	04.57 (4) 03.42	04.57 (8)	04.42		06.07		07.28	07.50	09.18	10.03
	16.18	17.49	19.06	21.32	22.54 21	05.18 (4) 23.32 28	05.25 (4)	22.38		21.04		19.21	16.45	15.25	15.07
28	09.15	07.44	06.12	05.32	04.08	04.55 (8) 03.43	04.58 (8)	04.45	05.55 (7)	06.10		07.31	07.53	09.21	10.03
	16.21	17.52	19.09	21.34	22.57 23	05.18 (4) 23.32 27	05.25 (4)	22.35 5	06.00 (7)	21.00		19.18	16.42	15.23	15.09
29	09.12		07.09	05.29	04.06	04.53 (8) 03.44	04.58 (8)	04.47	05.53 (7)	06.12		07.34	07.56	09.23	10.03
	16.24		20.11	21.37	22.59 25	05.18 (4) 23.31 28	05.26 (4)	22.33 10	06.03 (7)	20.57		19.15	16.39	15.21	15.10
30	09.09		07.06	05.25	04.04	04.52 (8) 03.45	04.57 (8)	04.50	05.52 (7)	06.15		07.36	07.59	09.26	10.02
	16.27		20.14	21.40	23.01 27	05.19 (4) 23.30 28	05.25 (4)	22.30 12	06.04 (7)	20.54		19.12	16.36	15.19	15.11
31	09.07		07.03		04.02	04.50 (8)		04.53	05.50 (7)	06.18			08.02		10.02
	16.30		20.17		23.04 29	05.19 (4)		22.27 14	06.04 (7)	20.51			16.33		15.12
Potential sun hours	191	246	364	444	550	590	582	497		391	310	213	163		
Total, worst case					363	840	580	125							
Sun reduction					0,49	0,51	0,40	0,32							
Oper. time red.					0,99	0,99	0,99	0,99							
Wind dir. red.					0,61	0,62	0,62	0,60							
Total reduction					0,29	0,31	0,24	0,19							
Total, real					106	259	140	24							

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

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: N - Asuinrakennus N (Storängsvägen 78)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March			April			May			June		
1	10.01		09.04		07.41			06.59		07.29 (4)	05.22		06.03 (9)	04.00		05.09 (2)
	15.14		16.33		17.55			20.20	13	07.42 (4)	21.43	21	06.24 (9)	23.06	27	05.36 (2)
2	10.01		09.02		07.38			06.56		07.26 (4)	05.19		06.03 (9)	03.58		05.08 (2)
	15.16		16.36		17.57			20.22	16	07.42 (4)	21.46	20	06.23 (9)	23.08	28	05.36 (2)
3	10.00		08.59		07.34			06.53		07.24 (4)	05.16		06.04 (9)	03.56		05.09 (2)
	15.18		16.39		18.00			20.25	18	07.42 (4)	21.49	19	06.23 (9)	23.10	27	05.36 (2)
4	09.59		08.56		07.31			06.49		07.23 (4)	05.13		06.04 (9)	03.54		05.09 (2)
	15.20		16.42		18.03			20.28	18	07.41 (4)	21.52	19	06.23 (9)	23.13	28	05.37 (2)
5	09.58		08.53		07.28			06.46		07.17 (3)	05.10		06.05 (9)	03.53		05.09 (2)
	15.22		16.45		18.06			20.31	24	07.41 (4)	21.54	16	06.21 (9)	23.15	28	05.37 (2)
6	09.57		08.51		07.25			06.43		07.14 (3)	05.07		06.06 (9)	03.51		05.10 (2)
	15.24		16.48		18.09			20.33	26	07.40 (4)	21.57	15	06.21 (9)	23.16	27	05.37 (2)
7	09.56		08.48		07.21			06.39		07.12 (3)	05.04		06.07 (9)	03.49		05.10 (2)
	15.26		16.51		18.11			20.36	27	07.39 (4)	22.00	12	06.19 (9)	23.18	27	05.37 (2)
8	09.55		08.45		07.18			06.36		07.10 (3)	05.01		06.08 (9)	03.48		05.10 (2)
	15.28		16.54		18.14			20.39	27	07.37 (4)	22.03	9	06.17 (9)	23.20	28	05.38 (2)
9	09.53		08.42		07.15			06.33		07.08 (3)	04.58			03.47		05.10 (2)
	15.30		16.56		18.17			20.42	25	07.33 (4)	22.06			23.22	28	05.38 (2)
10	09.52		08.39		07.12			06.30		07.07 (3)	04.55			03.45		05.10 (2)
	15.32		16.59		18.20			20.44	26	07.33 (3)	22.09			23.23	27	05.37 (2)
11	09.50		08.36		07.08			06.26		07.06 (3)	04.52			03.44		05.10 (2)
	15.35		17.02		18.23			20.47	27	07.33 (3)	22.11			23.25	27	05.37 (2)
12	09.49		08.33		07.05			06.23		07.06 (3)	04.50			03.43		05.11 (2)
	15.37		17.05		18.25			20.50	28	07.34 (3)	22.14			23.26	27	05.38 (2)
13	09.47		08.30		07.02			06.20		07.06 (3)	04.47			03.42		05.11 (2)
	15.39		17.08		18.28			20.53	28	07.34 (3)	22.17			23.27	27	05.38 (2)
14	09.45		08.27		06.59			06.17		07.05 (3)	04.44			03.42		05.12 (2)
	15.42		17.11		18.31			20.55	29	07.34 (3)	22.20			23.28	26	05.38 (2)
15	09.44		08.24		06.55			06.13		07.05 (3)	04.41			03.41		05.12 (2)
	15.44		17.14		18.34			20.58	28	07.33 (3)	22.23			23.29	27	05.39 (2)
16	09.42		08.21		06.52			06.10		07.04 (3)	04.38			03.40		05.12 (2)
	15.47		17.17		18.36			21.01	28	07.32 (3)	22.25			23.30	26	05.38 (2)
17	09.40		08.18		06.49			06.07		07.05 (3)	04.36		05.19 (2)	03.40		05.12 (2)
	15.50		17.20		18.39			21.04	26	07.31 (3)	22.28	6	05.25 (2)	23.31	27	05.39 (2)
18	09.38		08.15		06.45			06.04		07.05 (3)	04.33		05.15 (2)	03.39		05.12 (2)
	15.52		17.23		18.42			21.06	26	07.31 (3)	22.31	12	05.27 (2)	23.32	27	05.39 (2)
19	09.36		08.12		06.42			06.00		07.06 (3)	04.30		05.14 (2)	03.39		05.13 (2)
	15.55		17.26		18.44			21.09	24	07.30 (3)	22.34	14	05.28 (2)	23.32	26	05.39 (2)
20	09.34		08.09		06.39			05.57		07.06 (3)	04.28		05.12 (2)	03.39		05.13 (2)
	15.58		17.29		18.47			21.12	22	07.28 (3)	22.36	18	05.30 (2)	23.33	26	05.39 (2)
21	09.31		08.06		06.36			05.54		07.07 (3)	04.25		05.12 (2)	03.39		05.13 (2)
	16.01		17.32		18.50			21.15	20	07.27 (3)	22.39	19	05.31 (2)	23.33	26	05.39 (2)
22	09.29		08.03		06.32			05.51		07.09 (3)	04.22		05.11 (2)	03.39		05.13 (2)
	16.03		17.35		18.53			21.18	16	07.25 (3)	22.42	21	05.32 (2)	23.33	26	05.39 (2)
23	09.27		08.00		06.29			05.48		07.11 (3)	04.20		05.10 (2)	03.39		05.14 (2)
	16.06		17.38		18.55			21.20	11	07.22 (3)	22.44	22	05.32 (2)	23.33	26	05.40 (2)
24	09.24		07.57		06.26			05.44		06.17 (9)	04.17		05.10 (2)	03.40		05.14 (2)
	16.09		17.40		18.58			21.23	4	06.21 (9)	22.47	23	05.33 (2)	23.33	26	05.40 (2)
25	09.22		07.53		06.22			05.41		06.14 (9)	04.15		05.09 (2)	03.40		05.14 (2)
	16.12		17.43		19.01			21.26	8	06.22 (9)	22.49	24	05.33 (2)	23.33	27	05.41 (2)
26	09.20		07.50		06.19			05.38		06.11 (9)	04.13		05.09 (2)	03.41		05.14 (2)
	16.15		17.46		19.03			21.29	12	06.23 (9)	22.52	25	05.34 (2)	23.33	26	05.40 (2)
27	09.17		07.47		06.16			05.35		06.09 (9)	04.10		05.09 (2)	03.42		05.14 (2)
	16.18		17.49		19.06			21.32	15	06.24 (9)	22.54	26	05.35 (2)	23.32	27	05.41 (2)
28	09.15		07.44		06.12			05.32		06.06 (9)	04.08		05.09 (2)	03.43		05.15 (2)
	16.21		17.52		19.09			21.35	18	06.24 (9)	22.57	26	05.35 (2)	23.32	26	05.41 (2)
29	09.12				07.09			05.29		06.04 (9)	04.06		05.08 (2)	03.44		05.15 (2)
	16.24				20.12			21.37	20	06.24 (9)	22.59	27	05.35 (2)	23.31	27	05.42 (2)
30	09.10				07.06		07.36 (4)	05.25		06.04 (9)	04.04		05.09 (2)	03.45		05.14 (2)
	16.27				20.14	5	07.41 (4)	21.40	20	06.24 (9)	23.02	27	05.36 (2)	23.31	27	05.41 (2)
31	09.07				07.03		07.32 (4)				04.02		05.08 (2)			
	16.30				20.17	9	07.41 (4)				23.04	28	05.36 (2)			
Potential sun hours	191		246		364			444			550			590		
Total, worst case						14			630			449			805	
Sun reduction						0,32			0,41			0,49			0,51	
Oper. time red.						0,99			0,99			0,99			0,99	
Wind dir. red.						0,57			0,56			0,61			0,62	
Total reduction						0,18			0,23			0,29			0,31	
Total, real						3			145			130			246	

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: O - Asuinrakennus O(Storängsvägen 68)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April		May		June	
1	10.01	09.04	07.41	06.59		05.22		05.57 (9)	04.00		05.00 (2)
	15.14	16.33	17.55	20.20		21.43	16	06.13 (9)	23.06	24	05.24 (2)
2	10.01	09.02	07.38	06.56	07.26 (4)	05.19		05.54 (9)	03.58		04.59 (2)
	15.16	16.36	17.57	20.22	2 07.28 (4)	21.46	19	06.13 (9)	23.08	25	05.24 (2)
3	10.00	08.59	07.34	06.53	07.23 (4)	05.16		05.54 (9)	03.56		05.00 (2)
	15.18	16.39	18.00	20.25	7 07.30 (4)	21.49	20	06.14 (9)	23.10	25	05.25 (2)
4	09.59	08.56	07.31	06.49	07.19 (4)	05.13		05.54 (9)	03.54		05.00 (2)
	15.20	16.42	18.03	20.28	10 07.29 (4)	21.52	20	06.14 (9)	23.13	25	05.25 (2)
5	09.58	08.53	07.28	06.46	07.16 (4)	05.10		05.54 (9)	03.53		05.00 (2)
	15.22	16.45	18.06	20.31	14 07.30 (4)	21.54	19	06.13 (9)	23.14	26	05.26 (2)
6	09.57	08.51	07.25	06.43	07.13 (4)	05.07		05.54 (9)	03.51		05.00 (2)
	15.24	16.48	18.09	20.33	17 07.30 (4)	21.57	19	06.13 (9)	23.16	26	05.26 (2)
7	09.56	08.48	07.21	06.39	07.12 (4)	05.04		05.54 (9)	03.49		05.00 (2)
	15.26	16.51	18.11	20.36	18 07.30 (4)	22.00	18	06.12 (9)	23.18	26	05.26 (2)
8	09.55	08.45	07.18	06.36	07.12 (4)	05.01		05.55 (9)	03.48		05.00 (2)
	15.28	16.54	18.14	20.39	18 07.30 (4)	22.03	16	06.11 (9)	23.20	27	05.27 (2)
9	09.53	08.42	07.15	06.33	07.11 (4)	04.58		05.56 (9)	03.47		05.01 (2)
	15.30	16.56	18.17	20.42	17 07.28 (4)	22.06	15	06.11 (9)	23.22	26	05.27 (2)
10	09.52	08.39	07.12	06.30	07.01 (3)	04.55		05.56 (9)	03.45		05.00 (2)
	15.32	16.59	18.20	20.44	22 07.27 (4)	22.09	13	06.09 (9)	23.23	27	05.27 (2)
11	09.50	08.36	07.08	06.26	06.57 (3)	04.52		05.58 (9)	03.44		05.00 (2)
	15.35	17.02	18.23	20.47	27 07.26 (4)	22.11	10	06.08 (9)	23.25	26	05.26 (2)
12	09.49	08.33	07.05	06.23	06.55 (3)	04.50		06.00 (9)	03.43		05.01 (2)
	15.37	17.05	18.25	20.50	27 07.24 (4)	22.14	5	06.05 (9)	23.26	26	05.27 (2)
13	09.47	08.30	07.02	06.20	06.53 (3)	04.47			03.42		05.01 (2)
	15.39	17.08	18.28	20.53	21 07.14 (3)	22.17			23.27	26	05.27 (2)
14	09.45	08.27	06.59	06.17	06.52 (3)	04.44			03.42		05.02 (2)
	15.42	17.11	18.31	20.55	23 07.15 (3)	22.20			23.28	26	05.28 (2)
15	09.44	08.24	06.55	06.13	06.51 (3)	04.41			03.41		05.02 (2)
	15.44	17.14	18.34	20.58	25 07.16 (3)	22.23			23.29	26	05.28 (2)
16	09.42	08.21	06.52	06.10	06.49 (3)	04.38			03.40		05.02 (2)
	15.47	17.17	18.36	21.01	26 07.15 (3)	22.25			23.30	26	05.28 (2)
17	09.40	08.18	06.49	06.07	06.49 (3)	04.36			03.40		05.02 (2)
	15.50	17.20	18.39	21.04	27 07.16 (3)	22.28			23.31	26	05.28 (2)
18	09.38	08.15	06.46	06.04	06.48 (3)	04.33			03.39		05.02 (2)
	15.52	17.23	18.42	21.06	28 07.16 (3)	22.31			23.32	26	05.28 (2)
19	09.36	08.12	06.42	06.00	06.48 (3)	04.30			03.39		05.03 (2)
	15.55	17.26	18.44	21.09	28 07.16 (3)	22.34			23.32	26	05.29 (2)
20	09.34	08.09	06.39	05.57	06.48 (3)	04.28			03.39		05.03 (2)
	15.58	17.29	18.47	21.12	27 07.15 (3)	22.36			23.33	26	05.29 (2)
21	09.31	08.06	06.36	05.54	06.48 (3)	04.25		05.08 (2)	03.39		05.03 (2)
	16.01	17.32	18.50	21.15	27 07.15 (3)	22.39	6	05.14 (2)	23.33	26	05.29 (2)
22	09.29	08.03	06.32	05.51	06.48 (3)	04.22		05.06 (2)	03.39		05.03 (2)
	16.04	17.35	18.53	21.18	26 07.14 (3)	22.42	11	05.17 (2)	23.33	26	05.29 (2)
23	09.27	08.00	06.29	05.48	06.48 (3)	04.20		05.04 (2)	03.39		05.04 (2)
	16.06	17.38	18.55	21.20	26 07.14 (3)	22.44	14	05.18 (2)	23.33	26	05.30 (2)
24	09.24	07.57	06.26	05.44	06.49 (3)	04.17		05.03 (2)	03.40		05.03 (2)
	16.09	17.40	18.58	21.23	24 07.13 (3)	22.47	16	05.19 (2)	23.33	26	05.29 (2)
25	09.22	07.53	06.22	05.41	06.49 (3)	04.15		05.02 (2)	03.40		05.04 (2)
	16.12	17.43	19.01	21.26	22 07.11 (3)	22.49	18	05.20 (2)	23.33	26	05.30 (2)
26	09.20	07.50	06.19	05.38	06.50 (3)	04.13		05.01 (2)	03.41		05.04 (2)
	16.15	17.46	19.03	21.29	20 07.10 (3)	22.52	20	05.21 (2)	23.33	26	05.30 (2)
27	09.17	07.47	06.16	05.35	06.09 (9)	04.10		05.01 (2)	03.42		05.04 (2)
	16.18	17.49	19.06	21.32	18 07.09 (3)	22.54	21	05.22 (2)	23.32	26	05.30 (2)
28	09.15	07.44	06.12	05.32	06.06 (9)	04.08		05.01 (2)	03.43		05.05 (2)
	16.21	17.52	19.09	21.35	19 07.07 (3)	22.57	21	05.22 (2)	23.32	26	05.31 (2)
29	09.12		07.09	05.29	06.03 (9)	04.06		05.00 (2)	03.44		05.05 (2)
	16.24		20.12	21.37	15 07.03 (3)	22.59	23	05.23 (2)	23.31	26	05.31 (2)
30	09.10		07.06	05.25	06.00 (9)	04.04		05.00 (2)	03.45		05.04 (2)
	16.27		20.14	21.40	13 06.13 (9)	23.02	24	05.24 (2)	23.30	27	05.31 (2)
31	09.07		07.03			04.02		05.00 (2)			
	16.30		20.17			23.04	24	05.24 (2)			
Potential sun hours	191	246	364	444		550		590			
Total, worst case					594		388			778	
Sun reduction					0,42		0,49			0,51	
Oper. time red.					0,99		0,99			0,99	
Wind dir. red.					0,56		0,61			0,62	
Total reduction					0,23		0,29			0,31	
Total, real					135		112			239	

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: P - Asuinrakennus P (Lidenintie 709)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January			February			March			April	May	June
1	10.02		12.09 (13)	09.04		09.46 (14)	07.41		08.34 (18)	06.59	05.22	03.59
	15.14	42	13.38 (12)	16.32	22	11.10 (23)	17.54	14	08.48 (18)	20.20	21.43	23.06
2	10.01		12.09 (13)	09.02		09.42 (14)	07.37		08.36 (18)	06.56	05.19	03.57
	15.15	42	13.38 (12)	16.35	23	11.08 (23)	17.57	10	08.46 (18)	20.22	21.46	23.09
3	10.00		12.10 (13)	08.59		09.39 (14)	07.34			06.52	05.16	03.55
	15.17	41	13.38 (12)	16.38	21	11.05 (23)	18.00			20.25	21.49	23.11
4	09.59		12.11 (13)	08.56		09.36 (14)	07.31			06.49	05.13	03.53
	15.19	41	13.39 (12)	16.41	16	09.52 (14)	18.03			20.28	21.52	23.13
5	09.58		12.11 (13)	08.53		09.33 (21)	07.28			06.46	05.10	03.52
	15.21	41	13.39 (12)	16.44	20	09.53 (14)	18.06			20.30	21.54	23.15
6	09.57		12.11 (13)	08.51		09.30 (21)	07.25			06.42	05.07	03.50
	15.23	41	13.39 (12)	16.47	22	09.52 (14)	18.08			20.33	21.57	23.17
7	09.56		12.12 (13)	08.48		09.29 (21)	07.21			06.39	05.04	03.49
	15.25	40	13.40 (12)	16.50	23	09.52 (14)	18.11			20.36	22.00	23.19
8	09.55		12.13 (13)	08.45		09.29 (21)	07.18			06.36	05.01	03.47
	15.27	39	13.40 (12)	16.53	23	09.52 (14)	18.14			20.39	22.03	23.20
9	09.53		10.54 (19)	08.42		09.28 (21)	07.15			06.33	04.58	03.46
	15.29	41	13.40 (12)	16.56	22	09.50 (14)	18.17			20.41	22.06	23.22
10	09.52		10.52 (19)	08.39		09.28 (21)	07.12			06.29	04.55	03.45
	15.32	45	13.40 (12)	16.59	23	09.51 (21)	18.19			20.44	22.09	23.24
11	09.51		10.49 (19)	08.36		09.28 (21)	07.08			06.26	04.52	03.43
	15.34	48	13.40 (12)	17.02	23	09.51 (21)	18.22			20.47	22.12	23.25
12	09.49		10.46 (19)	08.33		09.28 (21)	07.05			06.23	04.49	03.42
	15.36	50	13.39 (12)	17.05	23	09.51 (21)	18.25			20.50	22.14	23.26
13	09.47		10.44 (19)	08.30		09.28 (21)	07.02			06.19	04.46	03.41
	15.39	53	13.40 (12)	17.08	23	09.51 (21)	18.28			20.52	22.17	23.28
14	09.45		10.42 (19)	08.27		09.29 (21)	06.58			06.16	04.43	03.41
	15.41	53	13.39 (12)	17.11	22	09.51 (21)	18.31			20.55	22.20	23.29
15	09.44		10.42 (19)	08.24		09.29 (21)	06.55			06.13	04.40	03.40
	15.44	48	13.37 (12)	17.14	20	09.49 (21)	18.33			20.58	22.23	23.30
16	09.42		10.42 (19)	08.21		09.30 (21)	06.52			06.10	04.38	03.39
	15.46	41	12.35 (13)	17.17	19	09.49 (21)	18.36			21.01	22.26	23.31
17	09.40		10.42 (19)	08.18		09.32 (21)	06.49			06.06	04.35	03.39
	15.49	40	12.34 (13)	17.20	16	09.48 (21)	18.39			21.04	22.28	23.31
18	09.38		10.43 (19)	08.15		09.33 (21)	06.45			06.03	04.32	03.39
	15.52	37	12.33 (13)	17.23	12	09.45 (21)	18.41			21.06	22.31	23.32
19	09.36		10.43 (19)	08.12		08.46 (18)	06.42			06.00	04.30	03.38
	15.55	33	12.31 (13)	17.26	6	09.41 (21)	18.44			21.09	22.34	23.33
20	09.34		10.44 (19)	08.09		08.43 (18)	06.39			05.57	04.27	03.38
	15.57	26	11.10 (23)	17.28	7	08.50 (18)	18.47			21.12	22.37	23.33
21	09.31		10.44 (19)	08.06		08.39 (18)	06.35			05.53	04.24	03.38
	16.00	26	11.10 (23)	17.31	11	08.50 (18)	18.50			21.15	22.39	23.34
22	09.29		10.45 (19)	08.03		08.36 (18)	06.32			05.50	04.22	03.38
	16.03	26	11.11 (23)	17.34	15	08.51 (18)	18.52			21.18	22.42	23.34
23	09.27		10.46 (19)	08.00		08.34 (18)	06.29			05.47	04.19	03.39
	16.06	25	11.11 (23)	17.37	18	08.52 (18)	18.55			21.20	22.44	23.34
24	09.25		10.47 (19)	07.56		08.33 (18)	06.25			05.44	04.17	03.39
	16.09	25	11.12 (23)	17.40	19	08.52 (18)	18.58			21.23	22.47	23.34
25	09.22		10.48 (23)	07.53		08.33 (18)	06.22			05.41	04.14	03.39
	16.12	24	11.12 (23)	17.43	19	08.52 (18)	19.00			21.26	22.50	23.34
26	09.20		10.48 (23)	07.50		08.33 (18)	06.19			05.38	04.12	03.40
	16.14	24	11.12 (23)	17.46	19	08.52 (18)	19.03			21.29	22.52	23.33
27	09.17		10.49 (23)	07.47		08.33 (18)	06.16			05.34	04.10	03.41
	16.17	23	11.12 (23)	17.49	18	08.51 (18)	19.06			21.32	22.55	23.33
28	09.15		10.49 (23)	07.44		08.34 (18)	06.12			05.31	04.07	03.42
	16.20	22	11.11 (23)	17.51	16	08.50 (18)	19.09			21.34	22.57	23.32
29	09.12		10.50 (23)				07.09			05.28	04.05	03.43
	16.23	21	11.11 (23)				20.11			21.37	23.00	23.32
30	09.10		10.51 (23)				07.06			05.25	04.03	03.44
	16.26	20	11.11 (23)				20.14			21.40	23.02	23.31
31	09.07		09.49 (14)				07.02				04.01	
	16.29	20	11.11 (23)				20.17				23.04	
Potential sun hours	191			246			364			444	551	591
Total, worst case		1098			521			24				
Sun reduction		0,17			0,32			0,32				
Oper. time red.		0,99			0,99			0,99				
Wind dir. red.		0,70			0,64			0,61				
Total reduction		0,12			0,21			0,20				
Total, real		127			107			5				

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: Q - Asuinrakennus Q (Lidenintie 697)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March		April	May	June
1	10.02	11.52 (13)	09.04	10.31 (23)	07.41	08.20 (18)	06.59	05.22	03.59
	15.14 43	13.26 (12)	16.32 23	10.54 (23)	17.54 19	08.39 (18)	20.20	21.43	23.06
2	10.01	11.52 (13)	09.02	10.31 (23)	07.37	08.21 (18)	06.56	05.19	03.57
	15.15 43	13.26 (12)	16.35 22	10.53 (23)	17.57 17	08.38 (18)	20.22	21.46	23.09
3	10.00	11.52 (13)	08.59	10.32 (23)	07.34	08.22 (18)	06.52	05.16	03.55
	15.17 43	13.26 (12)	16.38 20	10.52 (23)	18.00 16	08.38 (18)	20.25	21.49	23.11
4	09.59	11.54 (13)	08.56	10.34 (23)	07.31	08.23 (18)	06.49	05.13	03.53
	15.19 42	13.27 (12)	16.41 18	10.52 (23)	18.03 12	08.35 (18)	20.28	21.52	23.13
5	09.58	11.53 (13)	08.53	10.35 (23)	07.28	08.25 (18)	06.46	05.10	03.52
	15.21 43	13.27 (12)	16.44 16	10.51 (23)	18.06 8	08.33 (18)	20.30	21.54	23.15
6	09.57	11.54 (13)	08.51	10.37 (23)	07.25		06.42	05.07	03.50
	15.23 42	13.27 (12)	16.47 11	10.48 (23)	18.08		20.33	21.57	23.17
7	09.56	11.55 (13)	08.48	10.42 (23)	07.21		06.39	05.04	03.49
	15.25 42	13.28 (12)	16.50 1	10.43 (23)	18.11		20.36	22.00	23.19
8	09.55	11.56 (13)	08.45	09.23 (21)	07.18		06.36	05.01	03.47
	15.27 41	13.28 (12)	16.53 6	09.29 (21)	18.14		20.39	22.03	23.20
9	09.53	11.55 (13)	08.42	09.19 (21)	07.15		06.33	04.58	03.46
	15.29 41	13.28 (12)	16.56 11	09.30 (21)	18.17		20.41	22.06	23.22
10	09.52	11.57 (13)	08.39	09.16 (21)	07.12		06.29	04.55	03.45
	15.32 38	13.28 (12)	16.59 16	09.32 (21)	18.19		20.44	22.09	23.24
11	09.51	11.57 (13)	08.36	09.14 (21)	07.08		06.26	04.52	03.43
	15.34 38	13.28 (12)	17.02 19	09.33 (21)	18.22		20.47	22.12	23.25
12	09.49	11.57 (13)	08.33	09.13 (21)	07.05		06.23	04.49	03.42
	15.36 36	13.27 (12)	17.05 20	09.33 (21)	18.25		20.50	22.14	23.26
13	09.47	11.58 (13)	08.30	09.13 (21)	07.02		06.19	04.46	03.41
	15.39 35	13.28 (12)	17.08 21	09.34 (21)	18.28		20.52	22.17	23.28
14	09.45	10.41 (19)	08.27	09.13 (21)	06.58		06.16	04.43	03.41
	15.41 35	13.27 (12)	17.11 22	09.35 (21)	18.31		20.55	22.20	23.29
15	09.44	10.38 (19)	08.24	09.12 (21)	06.55		06.13	04.40	03.40
	15.44 35	13.25 (12)	17.14 22	09.34 (21)	18.33		20.58	22.23	23.30
16	09.42	10.35 (19)	08.21	09.12 (21)	06.52		06.10	04.38	03.39
	15.46 29	12.19 (13)	17.17 22	09.34 (21)	18.36		21.01	22.26	23.31
17	09.40	10.32 (19)	08.18	09.13 (21)	06.49		06.06	04.35	03.39
	15.49 32	12.19 (13)	17.20 21	09.34 (21)	18.39		21.04	22.28	23.31
18	09.38	10.29 (19)	08.15	09.13 (21)	06.45		06.03	04.32	03.39
	15.52 33	12.18 (13)	17.23 20	09.33 (21)	18.41		21.06	22.31	23.32
19	09.36	10.29 (19)	08.12	09.14 (21)	06.42		06.00	04.30	03.38
	15.55 33	12.18 (13)	17.26 19	09.33 (21)	18.44		21.09	22.34	23.33
20	09.34	10.29 (19)	08.09	09.15 (21)	06.39		05.57	04.27	03.38
	15.57 30	12.16 (13)	17.28 17	09.32 (21)	18.47		21.12	22.37	23.33
21	09.31	10.29 (19)	08.06	09.16 (21)	06.35		05.53	04.24	03.38
	16.00 26	12.14 (13)	17.31 14	09.30 (21)	18.50		21.15	22.39	23.34
22	09.29	10.29 (23)	08.03	09.18 (21)	06.32		05.50	04.22	03.38
	16.03 21	10.50 (23)	17.34 9	09.27 (21)	18.52		21.18	22.42	23.34
23	09.27	10.29 (23)	08.00	08.33 (18)	06.29		05.47	04.19	03.39
	16.06 22	10.51 (23)	17.37 4	08.37 (18)	18.55		21.20	22.45	23.34
24	09.25	10.29 (23)	07.56	08.29 (18)	06.25		05.44	04.17	03.39
	16.09 23	10.52 (23)	17.40 9	08.38 (18)	18.58		21.23	22.47	23.34
25	09.22	10.29 (23)	07.53	08.26 (18)	06.22		05.41	04.14	03.39
	16.12 23	10.52 (23)	17.43 13	08.39 (18)	19.00		21.26	22.50	23.34
26	09.20	10.29 (23)	07.50	08.23 (18)	06.19		05.38	04.12	03.40
	16.14 24	10.53 (23)	17.46 17	08.40 (18)	19.03		21.29	22.52	23.33
27	09.17	10.29 (23)	07.47	08.21 (18)	06.16		05.34	04.10	03.41
	16.17 25	10.54 (23)	17.49 18	08.39 (18)	19.06		21.32	22.55	23.33
28	09.15	10.29 (23)	07.44	08.21 (18)	06.12		05.31	04.07	03.42
	16.20 24	10.53 (23)	17.51 19	08.40 (18)	19.09		21.34	22.57	23.32
29	09.12	10.29 (23)			07.09		05.28	04.05	03.43
	16.23 25	10.54 (23)			20.11		21.37	23.00	23.32
30	09.10	10.30 (23)			07.06		05.25	04.03	03.44
	16.26 24	10.54 (23)			20.14		21.40	23.02	23.31
31	09.07	10.31 (23)			07.02			04.01	
	16.29 23	10.54 (23)			20.17			23.04	
Potential sun hours	191		246		364		444	551	591
Total, worst case		1014		450		72			
Sun reduction		0,17		0,32		0,32			
Oper. time red.		0,99		0,99		0,99			
Wind dir. red.		0,70		0,64		0,60			
Total reduction		0,12		0,21		0,19			
Total, real		118		94		14			

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: R - Lomarakennus R (Påskmossberget)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March			April			May			June		
1	10.01		09.04		07.40			06.59		19.32 (11)	05.22			03.59		05.20 (25)
	15.14		16.32		17.54			20.19	14	19.46 (11)	21.43			23.06	25	22.12 (13)
2	10.00		09.01		07.37			06.56		19.31 (11)	05.19			03.57		05.21 (25)
	15.16		16.35		17.57			20.22	18	19.49 (10)	21.46			23.08	27	22.14 (13)
3	10.00		08.59		07.34		17.25 (8)	06.52		19.30 (11)	05.16		21.04 (12)	03.56		05.22 (25)
	15.17		16.38		18.00	1	17.26 (8)	20.25	21	19.51 (10)	21.48	4	21.08 (12)	23.10	28	22.16 (13)
4	09.59		08.56		07.31		17.24 (8)	06.49		19.29 (11)	05.13		21.03 (26)	03.54		05.21 (25)
	15.19		16.41		18.03	4	17.28 (8)	20.28	24	19.53 (10)	21.51	8	21.11 (12)	23.12	29	22.16 (13)
5	09.58		08.53		07.28		17.24 (8)	06.46		19.29 (11)	05.10		21.02 (26)	03.52		05.22 (25)
	15.21		16.44		18.05	7	17.31 (8)	20.30	27	19.56 (10)	21.54	11	21.13 (12)	23.14	30	22.18 (13)
6	09.57		08.50		07.24		17.23 (8)	06.42		19.29 (11)	05.07		21.00 (26)	03.50		05.23 (25)
	15.23		16.47		18.08	11	17.34 (8)	20.33	30	19.59 (10)	21.57	15	21.15 (12)	23.16	31	22.20 (13)
7	09.56		08.47		07.21		17.23 (8)	06.39		19.28 (11)	05.04		21.00 (26)	03.49		05.23 (25)
	15.25		16.50		18.11	14	17.37 (8)	20.36	33	20.01 (10)	22.00	18	21.18 (12)	23.18	31	22.21 (13)
8	09.54		08.45		07.18		17.24 (8)	06.36		19.29 (11)	05.01		20.59 (26)	03.47		05.24 (25)
	15.27		16.53		18.14	16	17.40 (8)	20.38	30	19.59 (10)	22.03	21	21.20 (12)	23.20	31	22.22 (13)
9	09.53		08.42		07.15		17.24 (8)	06.33		19.30 (11)	04.58		20.58 (26)	03.46		05.24 (25)
	15.29		16.56		18.17	14	17.38 (8)	20.41	28	19.58 (10)	22.06	24	21.22 (26)	23.21	32	22.23 (13)
10	09.52		08.39	16.17 (27)	07.11		17.26 (8)	06.29		19.31 (11)	04.55		05.33 (25)	03.45		05.26 (25)
	15.32		16.59	1 16.18 (27)	18.19	10	17.36 (8)	20.44	18	19.49 (11)	22.08	30	21.25 (26)	23.23	31	22.25 (13)
11	09.50		08.36	16.16 (27)	07.08		17.31 (8)	06.26		19.32 (11)	04.52		05.30 (25)	03.44		05.26 (25)
	15.34		17.02	5 16.21 (27)	18.22	1	17.32 (8)	20.47	15	19.47 (11)	22.11	34	21.24 (26)	23.24	31	22.26 (13)
12	09.49		08.33	16.15 (27)	07.05			06.23		19.35 (11)	04.49		05.28 (25)	03.43		05.26 (25)
	15.36		17.05	10 16.25 (27)	18.25			20.49	10	19.45 (11)	22.14	39	21.25 (26)	23.26	32	22.27 (13)
13	09.47		08.30	16.15 (27)	07.02			06.19			04.46		05.25 (25)	03.42		05.27 (25)
	15.39		17.08	14 16.29 (27)	18.28			20.52			22.17	44	21.25 (26)	23.27	32	22.28 (13)
14	09.45		08.27	16.15 (27)	06.58			06.16			04.43		05.23 (25)	03.41		05.27 (25)
	15.41		17.11	17 16.32 (27)	18.30			20.55			22.20	47	21.25 (26)	23.28	31	22.28 (13)
15	09.43		08.24	16.13 (27)	06.55			06.13			04.41		05.21 (25)	03.40		05.28 (25)
	15.44		17.14	22 16.35 (27)	18.33			20.58			22.22	49	21.25 (26)	23.29	31	22.30 (13)
16	09.41		08.21	16.14 (27)	06.52			06.10			04.38		05.19 (25)	03.40		05.29 (25)
	15.47		17.17	24 16.38 (27)	18.36			21.01			22.25	52	21.25 (26)	23.30	32	22.31 (13)
17	09.39		08.18	16.14 (27)	06.48			06.06			04.35		05.18 (25)	03.39		05.30 (25)
	15.49		17.20	28 16.42 (7)	18.39			21.03			22.28	53	21.25 (26)	23.31	31	22.31 (13)
18	09.37		08.15	16.13 (27)	06.45			06.03			04.32		05.18 (25)	03.39		05.30 (25)
	15.52		17.23	32 16.45 (7)	18.41			21.06			22.31	53	21.25 (26)	23.32	31	22.32 (13)
19	09.35		08.12	16.14 (27)	06.42			06.00			04.30		05.18 (25)	03.39		05.31 (25)
	15.55		17.26	34 16.48 (7)	18.44			21.09			22.33	53	21.25 (26)	23.32	30	22.32 (13)
20	09.33		08.09	16.14 (27)	06.39			05.57			04.27		05.18 (25)	03.39		05.31 (25)
	15.57		17.28	37 16.51 (7)	18.47			21.12			22.36	52	21.24 (26)	23.33	31	22.33 (13)
21	09.31		08.06	16.15 (27)	06.35			05.54			04.24		05.18 (25)	03.39		05.31 (25)
	16.00		17.31	36 16.51 (7)	18.50			21.14			22.39	52	21.24 (26)	23.33	31	22.33 (13)
22	09.29		08.03	16.16 (27)	06.32			05.50			04.22		05.18 (25)	03.39		05.31 (25)
	16.03		17.34	34 16.51 (7)	18.52			21.17			22.41	52	21.24 (26)	23.33	31	22.33 (13)
23	09.27		07.59	16.16 (27)	06.29			05.47			04.19		05.18 (25)	03.39		05.31 (25)
	16.06		17.37	28 16.48 (7)	18.55			21.20			22.44	50	21.23 (26)	23.33	31	22.33 (13)
24	09.24		07.56	16.19 (27)	06.25			05.44			04.17		05.18 (25)	03.39		05.31 (25)
	16.09		17.40	17 16.45 (7)	18.58			21.23			22.47	50	21.23 (26)	23.33	31	22.33 (13)
25	09.22		07.53	16.22 (27)	06.22			05.41			04.15		05.18 (25)	03.40		05.31 (25)
	16.12		17.43	8 16.30 (27)	19.00			21.26			22.49	48	21.22 (26)	23.33	32	22.33 (13)
26	09.19		07.50		06.19			05.38			04.12		05.18 (25)	03.40		05.31 (25)
	16.15		17.46		19.03			21.29			22.52	46	21.21 (26)	23.33	32	22.33 (13)
27	09.17		07.47		06.15			05.34			04.10		05.18 (25)	03.41		05.31 (25)
	16.17		17.49		19.06			21.31			22.54	43	21.20 (26)	23.32	31	22.32 (13)
28	09.14		07.44		06.12			05.31			04.08		05.19 (25)	03.42		05.31 (25)
	16.20		17.51		19.08			21.34			22.57	42	21.20 (26)	23.32	31	22.32 (13)
29	09.12				07.09		19.37 (11)	05.28			04.05		05.19 (25)	03.43		05.31 (25)
	16.23				20.11	1	19.38 (11)	21.37			22.59	39	21.19 (26)	23.31	31	22.32 (13)
30	09.09				07.06		19.34 (11)	05.25			04.03		05.19 (25)	03.44		05.31 (25)
	16.26				20.14	6	19.40 (11)	21.40			23.01	36	21.17 (26)	23.30	31	22.31 (13)
31	09.07				07.02		19.33 (11)				04.01		05.20 (25)			
	16.29				20.17	10	19.43 (11)				23.04	31	21.16 (26)			
Potential sun hours	191		246		364			444			550			591		
Total, worst case				347		95			268			1096			919	
Sun reduction				0,32		0,32			0,41			0,49			0,50	
Oper. time red.				0,99		0,99			0,99			0,99			0,99	
Wind dir. red.				0,61		0,57			0,57			0,62			0,63	
Total reduction				0,20		0,18			0,23			0,29			0,31	
Total, real				68		17			62			322			288	

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: S - Lomarakennus S (Brannängskullen)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March	April	May	June
1	10.02	11.11 (6)	09.04		09.53 (12)	07.41	06.59	05.22	03.59
	15.14	26	12.04 (5)	16.32	19	10.12 (12)	17.54	20.20	21.43	23.07
2	10.01	11.09 (6)	09.02		09.52 (12)	07.38	06.56	05.19	03.57
	15.16	27	12.04 (5)	16.35	19	10.11 (12)	17.57	20.22	21.46	23.09
3	10.00	11.08 (6)	08.59		09.53 (12)	07.34	06.52	05.16	03.55
	15.17	30	12.05 (5)	16.38	19	10.12 (12)	18.00	20.25	21.49	23.11
4	09.59	11.06 (6)	08.56		09.54 (12)	07.31	06.49	05.13	03.54
	15.19	31	12.05 (5)	16.41	17	10.11 (12)	18.03	20.28	21.52	23.13
5	09.58	11.03 (6)	08.54		09.55 (12)	07.28	06.46	05.10	03.52
	15.21	34	12.04 (5)	16.44	16	10.11 (12)	18.06	20.31	21.55	23.15
6	09.57	11.03 (6)	08.51		09.55 (12)	07.25	06.43	05.07	03.50
	15.23	35	12.05 (5)	16.47	14	10.09 (12)	18.08	20.33	21.57	23.17
7	09.56	11.03 (6)	08.48		09.57 (12)	07.21	06.39	05.04	03.49
	15.25	35	12.05 (5)	16.50	11	10.08 (12)	18.11	20.36	22.00	23.19
8	09.55	11.04 (6)	08.45		10.01 (12)	07.18	06.36	05.01	03.47
	15.27	33	12.05 (5)	16.53	4	10.05 (12)	18.14	20.39	22.03	23.20
9	09.54	11.04 (6)	08.42			07.15	06.33	04.58	03.46
	15.29	33	12.05 (5)	16.56			18.17	20.42	22.06	23.22
10	09.52	11.05 (6)	08.39			07.12	06.29	04.55	03.45
	15.32	31	12.05 (5)	16.59			18.20	20.44	22.09	23.24
11	09.51	11.05 (6)	08.36			07.08	06.26	04.52	03.44
	15.34	29	12.04 (5)	17.02			18.22	20.47	22.12	23.25
12	09.49	11.05 (6)	08.33			07.05	06.23	04.49	03.43
	15.36	29	14.35 (24)	17.05			18.25	20.50	22.14	23.26
13	09.47	11.06 (6)	08.30			07.02	06.20	04.46	03.42
	15.39	26	14.39 (24)	17.08			18.28	20.53	22.17	23.28
14	09.46	11.06 (6)	08.27		09.03 (13)	06.59	06.16	04.43	03.41
	15.41	30	14.42 (24)	17.11	5	09.08 (13)	18.31	20.55	22.20	23.29
15	09.44	11.06 (6)	08.24		09.00 (13)	06.55	06.13	04.41	03.40
	15.44	33	14.45 (24)	17.14	9	09.09 (13)	18.33	20.58	22.23	23.30
16	09.42	11.07 (6)	08.21		08.56 (13)	06.52	06.10	04.38	03.40
	15.47	36	14.49 (24)	17.17	13	09.09 (13)	18.36	21.01	22.26	23.31
17	09.40	11.07 (6)	08.18		08.53 (13)	06.49	06.07	04.35	03.39
	15.49	38	14.51 (24)	17.20	16	09.09 (13)	18.39	21.04	22.28	23.32
18	09.38	11.08 (6)	08.15		08.52 (13)	06.45	06.03	04.32	03.39
	15.52	36	14.51 (24)	17.23	17	09.09 (13)	18.42	21.06	22.31	23.32
19	09.36	11.09 (6)	08.12		08.52 (13)	06.42	06.00	04.30	03.38
	15.55	35	14.52 (24)	17.26	16	09.08 (13)	18.44	21.09	22.34	23.33
20	09.34	11.10 (6)	08.09		08.53 (13)	06.39	05.57	04.27	03.38
	15.57	34	14.52 (24)	17.29	15	09.08 (13)	18.47	21.12	22.37	23.33
21	09.32	11.11 (6)	08.06		08.54 (13)	06.35	05.54	04.24	03.38
	16.00	31	14.52 (24)	17.31	14	09.08 (13)	18.50	21.15	22.39	23.34
22	09.29	11.13 (6)	08.03		08.54 (13)	06.32	05.50	04.22	03.39
	16.03	28	14.52 (24)	17.34	11	09.05 (13)	18.52	21.18	22.42	23.34
23	09.27	11.17 (6)	08.00		08.57 (13)	06.29	05.47	04.19	03.39
	16.06	19	14.52 (24)	17.37	6	09.03 (13)	18.55	21.20	22.45	23.34
24	09.25	14.36 (24)	07.57			06.26	05.44	04.17	03.39
	16.09	16	14.52 (24)	17.40			18.58	21.23	22.47	23.34
25	09.22	14.37 (24)	07.53			06.22	05.41	04.15	03.40
	16.12	15	14.52 (24)	17.43			19.01	21.26	22.50	23.34
26	09.20	10.05 (12)	07.50			06.19	05.38	04.12	03.40
	16.15	17	14.51 (24)	17.46			19.03	21.29	22.52	23.33
27	09.17	10.02 (12)	07.47			06.16	05.35	04.10	03.41
	16.18	18	14.50 (24)	17.49			19.06	21.32	22.55	23.33
28	09.15	09.59 (12)	07.44			06.12	05.31	04.08	03.42
	16.20	16	14.48 (24)	17.52			19.09	21.35	22.57	23.32
29	09.12	09.55 (12)				07.09	05.28	04.05	03.43
	16.23	16	10.11 (12)				20.11	21.37	23.00	23.32
30	09.10	09.52 (12)				07.06	05.25	04.03	03.44
	16.26	19	10.11 (12)				20.14	21.40	23.02	23.31
31	09.07	09.52 (12)				07.02		04.01	
	16.29	20	10.12 (12)				20.17		23.04	
Potential sun hours	191		246			364	444	551	591
Total, worst case		856		241					
Sun reduction		0,17		0,32					
Oper. time red.		0,99		0,99					
Wind dir. red.		0,69		0,65					
Total reduction		0,11		0,21					
Total, real		98		50					

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

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: T - Asuinrakennus T (Kaasbackantie 85)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March		April	May	June
1	10.02	13.26 (20)	09.05	09.46 (2)	07.41	08.13 (5)	06.59	05.22	04.00
	15.14	19 13.45 (20)	16.33	31 13.49 (20)	17.55	50 09.25 (24)	20.20	21.43	23.07
2	10.01	13.25 (20)	09.02	09.42 (2)	07.38	08.09 (5)	06.56	05.19	03.58
	15.16	21 13.46 (20)	16.35	28 10.35 (1)	17.57	52 09.24 (24)	20.22	21.46	23.09
3	10.00	13.25 (20)	08.59	09.40 (2)	07.34	08.08 (5)	06.53	05.16	03.56
	15.18	21 13.46 (20)	16.38	28 10.34 (1)	18.00	53 09.24 (24)	20.25	21.49	23.11
4	09.59	13.25 (20)	08.56	09.40 (2)	07.31	08.09 (5)	06.49	05.13	03.54
	15.19	22 13.47 (20)	16.41	21 10.31 (1)	18.03	51 09.24 (24)	20.28	21.52	23.13
5	09.58	13.25 (20)	08.54	09.41 (2)	07.28	08.09 (5)	06.46	05.10	03.52
	15.21	23 13.48 (20)	16.44	16 09.57 (2)	18.06	48 09.23 (24)	20.31	21.55	23.15
6	09.57	13.26 (20)	08.51	09.41 (2)	07.25	08.11 (5)	06.43	05.07	03.51
	15.23	23 13.49 (20)	16.47	15 09.56 (2)	18.09	42 09.22 (24)	20.33	21.57	23.17
7	09.56	13.26 (20)	08.48	09.42 (2)	07.22	08.48 (24)	06.39	05.04	03.49
	15.25	24 13.50 (20)	16.50	14 09.56 (2)	18.11	33 09.21 (24)	20.36	22.00	23.19
8	09.55	13.26 (20)	08.45	09.43 (2)	07.18	08.49 (24)	06.36	05.01	03.48
	15.27	25 13.51 (20)	16.53	12 09.55 (2)	18.14	31 09.20 (24)	20.39	22.03	23.20
9	09.54	13.26 (20)	08.42	09.45 (2)	07.15	08.50 (24)	06.33	04.58	03.46
	15.30	26 13.52 (20)	16.56	8 09.53 (2)	18.17	28 09.18 (24)	20.42	22.06	23.22
10	09.52	13.27 (20)	08.39		07.12	08.51 (24)	06.30	04.55	03.45
	15.32	26 13.53 (20)	16.59		18.20	25 09.16 (24)	20.44	22.09	23.24
11	09.51	13.26 (20)	08.36		07.09	08.53 (24)	06.26	04.52	03.44
	15.34	27 13.53 (20)	17.02		18.23	21 09.14 (24)	20.47	22.12	23.25
12	09.49	13.26 (20)	08.33		07.05	08.55 (24)	06.23	04.49	03.43
	15.37	27 13.53 (20)	17.05		18.25	16 09.11 (24)	20.50	22.14	23.26
13	09.47	13.27 (20)	08.30		07.02	09.00 (24)	06.20	04.46	03.42
	15.39	28 13.55 (20)	17.08		18.28	4 09.04 (24)	20.53	22.17	23.28
14	09.46	13.27 (20)	08.27		06.59		06.17	04.44	03.41
	15.42	28 13.55 (20)	17.11		18.31		20.55	22.20	23.29
15	09.44	13.27 (20)	08.24		06.55		06.13	04.41	03.40
	15.44	28 13.55 (20)	17.14		18.34		20.58	22.23	23.30
16	09.42	13.27 (20)	08.21		06.52		06.10	04.38	03.40
	15.47	29 13.56 (20)	17.17		18.36		21.01	22.26	23.31
17	09.40	13.27 (20)	08.18	09.02 (24)	06.49		06.07	04.35	03.39
	15.50	29 13.56 (20)	17.20	11 09.13 (24)	18.39		21.04	22.28	23.31
18	09.38	10.29 (1)	08.15	08.59 (24)	06.46		06.04	04.33	03.39
	15.52	32 13.56 (20)	17.23	17 09.16 (24)	18.42		21.07	22.31	23.32
19	09.36	10.26 (1)	08.12	08.56 (24)	06.42		06.00	04.30	03.39
	15.55	36 13.57 (20)	17.26	22 09.18 (24)	18.44		21.09	22.34	23.33
20	09.34	10.23 (1)	08.09	08.54 (24)	06.39		05.57	04.27	03.39
	15.58	40 13.57 (20)	17.29	26 09.20 (24)	18.47		21.12	22.37	23.33
21	09.32	10.20 (1)	08.06	08.53 (24)	06.36		05.54	04.25	03.39
	16.01	44 13.57 (20)	17.32	29 09.22 (24)	18.50		21.15	22.39	23.34
22	09.29	10.17 (1)	08.03	08.51 (24)	06.32		05.51	04.22	03.39
	16.03	47 13.57 (20)	17.35	31 09.22 (24)	18.53		21.18	22.42	23.34
23	09.27	10.16 (1)	08.00	08.50 (24)	06.29		05.47	04.20	03.39
	16.06	48 13.57 (20)	17.37	33 09.23 (24)	18.55		21.21	22.45	23.34
24	09.25	10.16 (1)	07.57	08.50 (24)	06.26		05.44	04.17	03.39
	16.09	48 13.57 (20)	17.40	34 09.24 (24)	18.58		21.23	22.47	23.34
25	09.22	10.16 (1)	07.54	08.48 (24)	06.22		05.41	04.15	03.40
	16.12	48 13.57 (20)	17.43	36 09.24 (24)	19.01		21.26	22.50	23.34
26	09.20	10.17 (1)	07.50	08.48 (24)	06.19		05.38	04.12	03.41
	16.15	46 13.57 (20)	17.46	37 09.25 (24)	19.03		21.29	22.52	23.33
27	09.17	10.17 (1)	07.47	08.19 (5)	06.16		05.35	04.10	03.41
	16.18	45 13.57 (20)	17.49	41 09.24 (24)	19.06		21.32	22.55	23.33
28	09.15	10.18 (1)	07.44	08.16 (5)	06.12		05.32	04.08	03.42
	16.21	43 13.56 (20)	17.52	46 09.25 (24)	19.09		21.35	22.57	23.32
29	09.12	10.18 (1)			07.09		05.28	04.06	03.43
	16.24	40 13.55 (20)			20.12		21.38	23.00	23.32
30	09.10	09.52 (2)			07.06		05.25	04.04	03.44
	16.27	39 13.54 (20)			20.14		21.40	23.02	23.31
31	09.07	09.49 (2)			07.03			04.02	
	16.30	39 13.52 (20)			20.17			23.04	
Potential sun hours	191		246		364		444	551	591
Total, worst case		1021		536		454			
Sun reduction		0,17		0,32		0,32			
Oper. time red.		0,99		0,99		0,99			
Wind dir. red.		0,69		0,64		0,62			
Total reduction		0,11		0,21		0,20			
Total, real		116		110		91			

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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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: U - Asuinrakennus U (Kaasbackantie 107/1)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March		April	May	June
1	10.02		13.32 (20)	09.05		09.56 (2)	07.41	08.27 (5)	06.59	05.22	03.59
	15.14	19	13.51 (20)	16.32	15	10.11 (2)	17.55	31 09.51 (24)	20.20	21.43	23.07
2	10.01		13.32 (20)	09.02		09.56 (2)	07.38	08.29 (5)	06.56	05.19	03.58
	15.16	20	13.52 (20)	16.35	14	10.10 (2)	17.57	20 09.48 (24)	20.22	21.46	23.09
3	10.00		13.31 (20)	08.59		09.57 (2)	07.34	09.37 (24)	06.53	05.16	03.56
	15.18	21	13.52 (20)	16.38	13	10.10 (2)	18.00	6 09.43 (24)	20.25	21.49	23.11
4	09.59		13.32 (20)	08.56		09.59 (2)	07.31		06.49	05.13	03.54
	15.19	21	13.53 (20)	16.41	10	10.09 (2)	18.03		20.28	21.52	23.13
5	09.58		13.32 (20)	08.54		10.01 (2)	07.28		06.46	05.10	03.52
	15.21	22	13.54 (20)	16.44	6	10.07 (2)	18.06		20.31	21.55	23.15
6	09.57		13.32 (20)	08.51		09.39 (24)	07.25		06.43	05.07	03.51
	15.23	23	13.55 (20)	16.47	6	09.45 (24)	18.09		20.33	21.57	23.17
7	09.56		13.32 (20)	08.48		09.35 (24)	07.22		06.39	05.04	03.49
	15.25	24	13.56 (20)	16.50	14	09.49 (24)	18.11		20.36	22.00	23.19
8	09.55		13.33 (20)	08.45		09.33 (24)	07.18		06.36	05.01	03.48
	15.27	24	13.57 (20)	16.53	19	09.52 (24)	18.14		20.39	22.03	23.20
9	09.54		13.33 (20)	08.42		09.31 (24)	07.15		06.33	04.58	03.46
	15.30	24	13.57 (20)	16.56	23	09.54 (24)	18.17		20.42	22.06	23.22
10	09.52		13.33 (20)	08.39		09.29 (24)	07.12		06.30	04.55	03.45
	15.32	25	13.58 (20)	16.59	26	09.55 (24)	18.20		20.44	22.09	23.24
11	09.51		13.33 (20)	08.36		09.28 (24)	07.09		06.26	04.52	03.44
	15.34	25	13.58 (20)	17.02	29	09.57 (24)	18.23		20.47	22.12	23.25
12	09.49		10.46 (1)	08.33		09.27 (24)	07.05		06.23	04.49	03.43
	15.37	26	13.58 (20)	17.05	31	09.58 (24)	18.25		20.50	22.15	23.26
13	09.47		10.44 (1)	08.30		09.26 (24)	07.02		06.20	04.46	03.42
	15.39	31	14.00 (20)	17.08	32	09.58 (24)	18.28		20.53	22.17	23.28
14	09.46		10.41 (1)	08.27		09.25 (24)	06.59		06.16	04.44	03.41
	15.42	35	14.00 (20)	17.11	34	09.59 (24)	18.31		20.55	22.20	23.29
15	09.44		10.38 (1)	08.24		09.25 (24)	06.55		06.13	04.41	03.40
	15.44	38	14.00 (20)	17.14	35	10.00 (24)	18.34		20.58	22.23	23.30
16	09.42		10.35 (1)	08.21		09.24 (24)	06.52		06.10	04.38	03.40
	15.47	42	14.00 (20)	17.17	36	10.00 (24)	18.36		21.01	22.26	23.31
17	09.40		10.32 (1)	08.18		09.24 (24)	06.49		06.07	04.35	03.39
	15.50	45	14.00 (20)	17.20	36	10.00 (24)	18.39		21.04	22.28	23.32
18	09.38		10.32 (1)	08.15		09.24 (24)	06.46		06.03	04.33	03.39
	15.52	46	14.01 (20)	17.23	37	10.01 (24)	18.42		21.07	22.31	23.32
19	09.36		10.32 (1)	08.12		09.23 (24)	06.42		06.00	04.30	03.39
	15.55	47	14.01 (20)	17.26	37	10.00 (24)	18.44		21.09	22.34	23.33
20	09.34		10.33 (1)	08.09		09.24 (24)	06.39		05.57	04.27	03.39
	15.58	45	14.01 (20)	17.29	36	10.00 (24)	18.47		21.12	22.37	23.33
21	09.32		10.33 (1)	08.06		09.24 (24)	06.36		05.54	04.25	03.39
	16.00	45	14.01 (20)	17.32	37	10.01 (24)	18.50		21.15	22.39	23.34
22	09.29		10.33 (1)	08.03		08.36 (5)	06.32		05.51	04.22	03.39
	16.03	45	14.01 (20)	17.35	38	09.59 (24)	18.53		21.18	22.42	23.34
23	09.27		10.34 (1)	08.00		08.33 (5)	06.29		05.47	04.20	03.39
	16.06	43	14.01 (20)	17.37	41	09.59 (24)	18.55		21.21	22.45	23.34
24	09.25		10.35 (1)	07.57		08.30 (5)	06.26		05.44	04.17	03.39
	16.09	40	14.00 (20)	17.40	45	09.59 (24)	18.58		21.23	22.47	23.34
25	09.22		10.08 (2)	07.54		08.26 (5)	06.22		05.41	04.15	03.40
	16.12	40	14.00 (20)	17.43	46	09.57 (24)	19.01		21.26	22.50	23.34
26	09.20		10.05 (2)	07.50		08.24 (5)	06.19		05.38	04.12	03.41
	16.15	40	13.59 (20)	17.46	47	09.57 (24)	19.03		21.29	22.52	23.33
27	09.17		10.02 (2)	07.47		08.24 (5)	06.16		05.35	04.10	03.41
	16.18	39	13.58 (20)	17.49	43	09.55 (24)	19.06		21.32	22.55	23.33
28	09.15		09.59 (2)	07.44		08.25 (5)	06.12		05.32	04.08	03.42
	16.21	37	13.57 (20)	17.52	38	09.53 (24)	19.09		21.35	22.57	23.32
29	09.12		09.55 (2)				07.09		05.28	04.06	03.43
	16.24	27	13.52 (20)				20.12		21.38	23.00	23.32
30	09.10		09.55 (2)				07.06		05.25	04.04	03.44
	16.27	21	10.48 (1)				20.14		21.40	23.02	23.31
31	09.07		09.55 (2)				07.03			04.01	
	16.30	16	10.11 (2)				20.17			23.04	
Potential sun hours	191			246			364		444	551	591
Total, worst case		996			824			57			
Sun reduction		0,17			0,32			0,32			
Oper. time red.		0,99			0,99			0,99			
Wind dir. red.		0,68			0,64			0,63			
Total reduction		0,11			0,21			0,20			
Total, real		113			169			12			

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

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar

Calculation: Shadow_032021_no_forest_V162Shadow receptor: V - Asuinrakennus V (Kaasbackantie 107/2)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March	April	May	June
1	10.02	13.34 (20)	09.05	10.03 (2)	07.41	06.59	05.22	03.59
	15.14	20 13.54 (20)	16.32	13 10.16 (2)	17.55	20.20	21.43	23.07
2	10.01	13.34 (20)	09.02	09.50 (24)	07.38	06.56	05.19	03.58
	15.16	20 13.54 (20)	16.35	18 10.14 (2)	17.57	20.22	21.46	23.09
3	10.00	13.34 (20)	08.59	09.47 (24)	07.34	06.53	05.16	03.56
	15.18	21 13.55 (20)	16.38	21 10.12 (2)	18.00	20.25	21.49	23.11
4	09.59	13.34 (20)	08.56	09.45 (24)	07.31	06.49	05.13	03.54
	15.19	21 13.55 (20)	16.41	19 10.04 (24)	18.03	20.28	21.52	23.13
5	09.58	13.34 (20)	08.54	09.43 (24)	07.28	06.46	05.10	03.52
	15.21	22 13.56 (20)	16.44	23 10.06 (24)	18.06	20.31	21.55	23.15
6	09.57	13.35 (20)	08.51	09.41 (24)	07.25	06.43	05.07	03.51
	15.23	22 13.57 (20)	16.47	26 10.07 (24)	18.09	20.33	21.57	23.17
7	09.56	13.35 (20)	08.48	09.40 (24)	07.22	06.39	05.04	03.49
	15.25	23 13.58 (20)	16.50	28 10.08 (24)	18.11	20.36	22.00	23.19
8	09.55	13.36 (20)	08.45	09.40 (24)	07.18	06.36	05.01	03.48
	15.27	23 13.59 (20)	16.53	30 10.10 (24)	18.14	20.39	22.03	23.20
9	09.54	13.35 (20)	08.42	09.39 (24)	07.15	06.33	04.58	03.46
	15.30	24 13.59 (20)	16.56	32 10.11 (24)	18.17	20.42	22.06	23.22
10	09.52	10.52 (1)	08.39	09.38 (24)	07.12	06.30	04.55	03.45
	15.32	26 14.00 (20)	16.59	33 10.11 (24)	18.20	20.44	22.09	23.24
11	09.51	10.49 (1)	08.36	09.38 (24)	07.09	06.26	04.52	03.44
	15.34	30 14.00 (20)	17.02	34 10.12 (24)	18.23	20.47	22.12	23.25
12	09.49	10.46 (1)	08.33	09.38 (24)	07.05	06.23	04.49	03.43
	15.37	33 14.00 (20)	17.05	35 10.13 (24)	18.25	20.50	22.15	23.26
13	09.47	10.44 (1)	08.30	09.37 (24)	07.02	06.20	04.46	03.42
	15.39	38 14.02 (20)	17.08	35 10.12 (24)	18.28	20.53	22.17	23.28
14	09.46	10.41 (1)	08.27	09.37 (24)	06.59	06.16	04.44	03.41
	15.42	41 14.02 (20)	17.11	36 10.13 (24)	18.31	20.55	22.20	23.29
15	09.44	10.38 (1)	08.24	09.37 (24)	06.55	06.13	04.41	03.40
	15.44	44 14.02 (20)	17.14	36 10.13 (24)	18.34	20.58	22.23	23.30
16	09.42	10.38 (1)	08.21	09.36 (24)	06.52	06.10	04.38	03.40
	15.47	45 14.02 (20)	17.17	37 10.13 (24)	18.36	21.01	22.26	23.31
17	09.40	10.38 (1)	08.18	09.37 (24)	06.49	06.07	04.35	03.39
	15.50	44 14.02 (20)	17.20	36 10.13 (24)	18.39	21.04	22.28	23.32
18	09.38	10.38 (1)	08.15	09.37 (24)	06.46	06.03	04.33	03.39
	15.52	45 14.02 (20)	17.23	36 10.13 (24)	18.42	21.07	22.31	23.32
19	09.36	10.39 (1)	08.12	09.37 (24)	06.42	06.00	04.30	03.39
	15.55	44 14.02 (20)	17.26	35 10.12 (24)	18.44	21.09	22.34	23.33
20	09.34	10.39 (1)	08.09	08.43 (5)	06.39	05.57	04.27	03.39
	15.58	44 14.03 (20)	17.29	35 10.11 (24)	18.47	21.12	22.37	23.33
21	09.32	10.40 (1)	08.06	08.40 (5)	06.36	05.54	04.25	03.39
	16.00	41 14.02 (20)	17.32	38 10.11 (24)	18.50	21.15	22.39	23.34
22	09.29	10.40 (1)	08.03	08.36 (5)	06.32	05.51	04.22	03.39
	16.03	40 14.02 (20)	17.35	40 10.09 (24)	18.53	21.18	22.42	23.34
23	09.27	10.41 (1)	08.00	08.33 (5)	06.29	05.47	04.20	03.39
	16.06	38 14.02 (20)	17.37	42 10.09 (24)	18.55	21.21	22.45	23.34
24	09.25	10.11 (2)	07.57	08.31 (5)	06.26	05.44	04.17	03.39
	16.09	39 14.02 (20)	17.40	41 10.07 (24)	18.58	21.23	22.47	23.34
25	09.22	10.08 (2)	07.54	08.30 (5)	06.22	05.41	04.15	03.40
	16.12	40 14.01 (20)	17.43	38 10.05 (24)	19.01	21.26	22.50	23.34
26	09.20	10.05 (2)	07.50	08.31 (5)	06.19	05.38	04.12	03.41
	16.15	39 14.00 (20)	17.46	32 10.03 (24)	19.03	21.29	22.52	23.33
27	09.17	10.02 (2)	07.47	08.32 (5)	06.16	05.35	04.10	03.41
	16.18	34 13.58 (20)	17.49	21 09.58 (24)	19.06	21.32	22.55	23.33
28	09.15	10.00 (2)	07.44	08.34 (5)	06.12	05.32	04.08	03.42
	16.21	23 10.55 (1)	17.52	6 08.40 (5)	19.09	21.35	22.57	23.32
29	09.12	10.00 (2)			07.09	05.28	04.06	03.43
	16.24	16 10.16 (2)			20.12	21.38	23.00	23.32
30	09.10	10.01 (2)			07.06	05.25	04.04	03.44
	16.27	15 10.16 (2)			20.14	21.40	23.02	23.31
31	09.07	10.02 (2)			07.03		04.01	
	16.30	14 10.16 (2)			20.17		23.04	
Potential sun hours	191		246		364	444	551	591
Total, worst case		969		856				
Sun reduction		0,17		0,32				
Oper. time red.		0,99		0,99				
Wind dir. red.		0,69		0,65				
Total reduction		0,11		0,21				
Total, real		109		178				

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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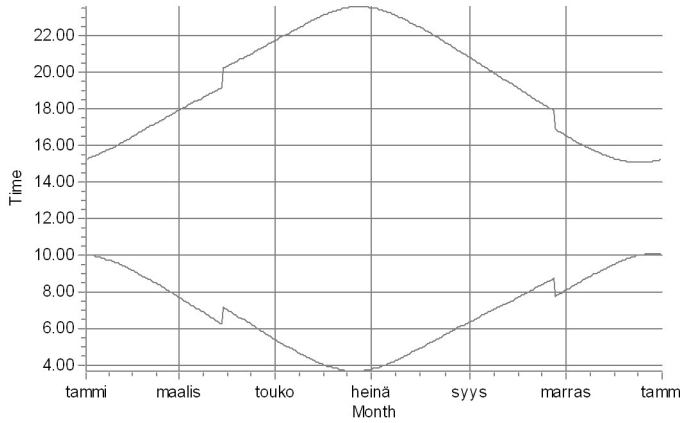
Calculated:
4.3.2021 12.19/3.4.388

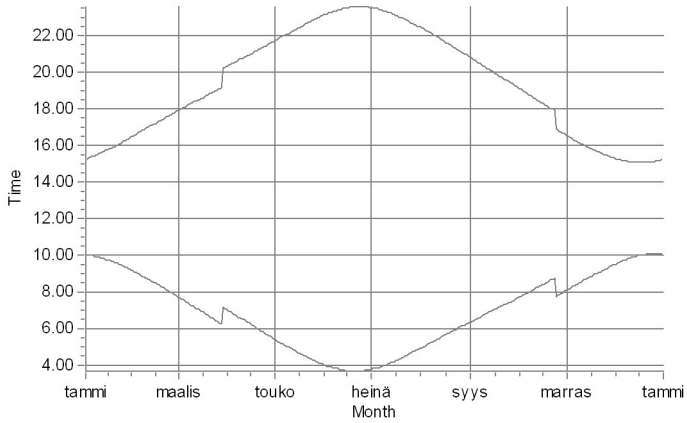
SHADOW - Calendar, graphical

Calculation: Shadow_032021_no_forest_V162

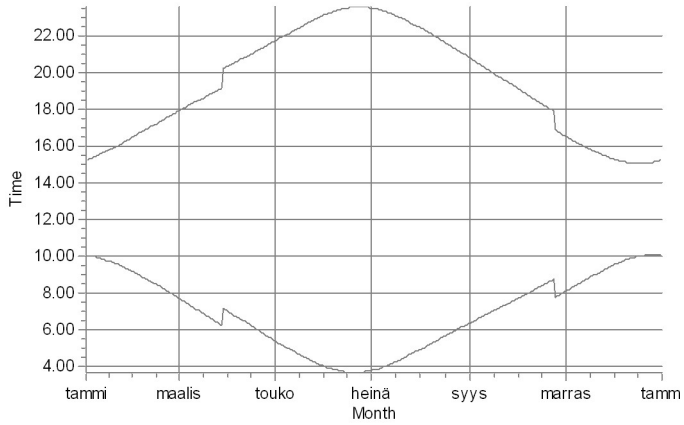
A: Laskentakohde A (Karijoentie 918)



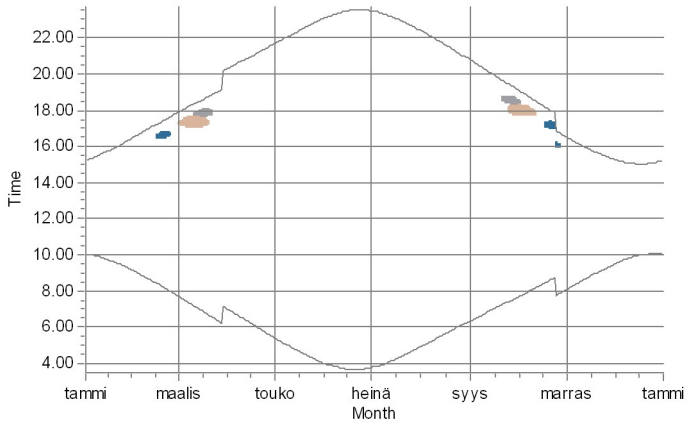
B: Laskentakohde B (Vuorenalantie 55)



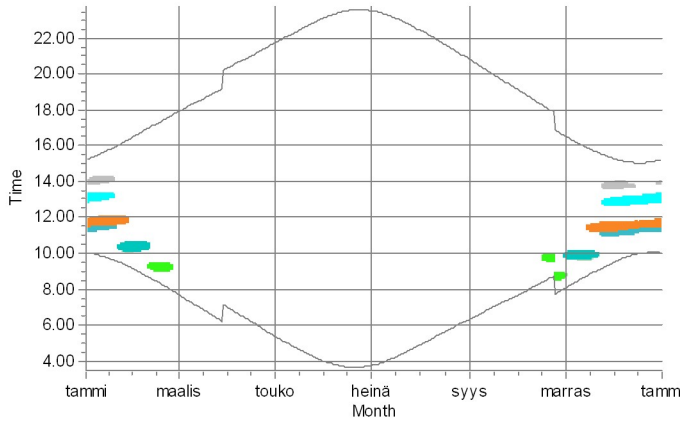
C: Laskentakohde C (Kirkkotie 160)



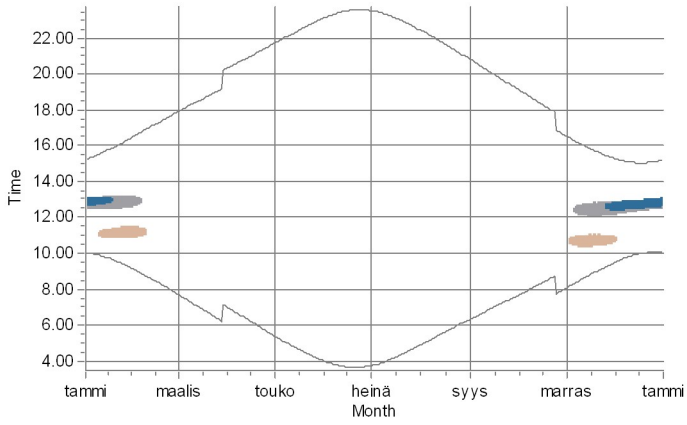
D: Asuinrakennus D (Kirkkotie 352)



E: Asuinrakennus E (Lidenintie 733)



F: Asuinrakennus F (Kirkkotie 548)



WTGs

12: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (292)
13: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (293)
14: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (294)
16: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (296)
17: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (297)
18: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (298)
19: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (300)
21: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (302)
22: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (303)
23: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (304)

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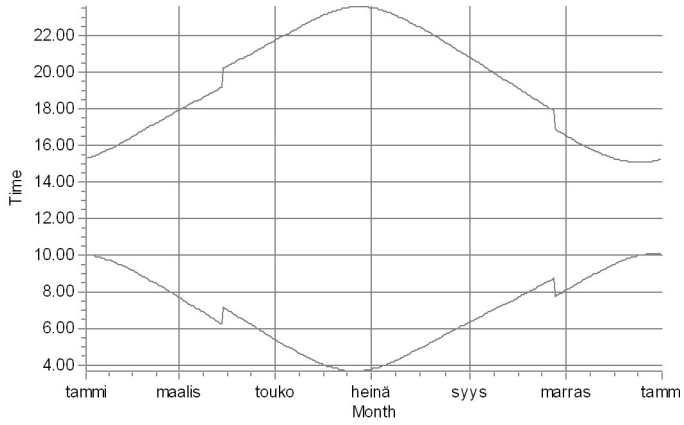
Calculated:
4.3.2021 12.19/3.4.388

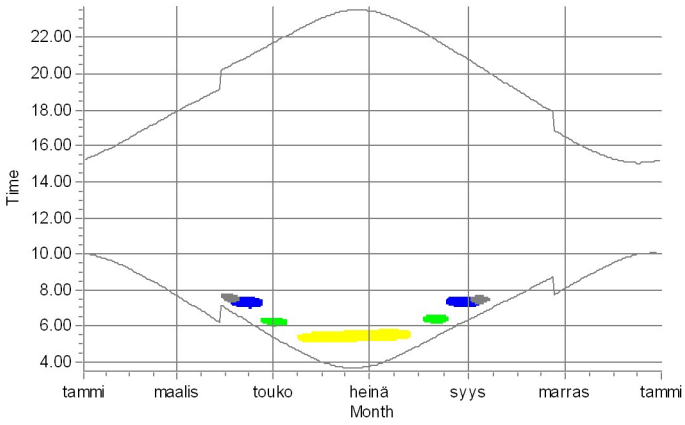
SHADOW - Calendar, graphical

Calculation: Shadow_032021_no_forest_V162

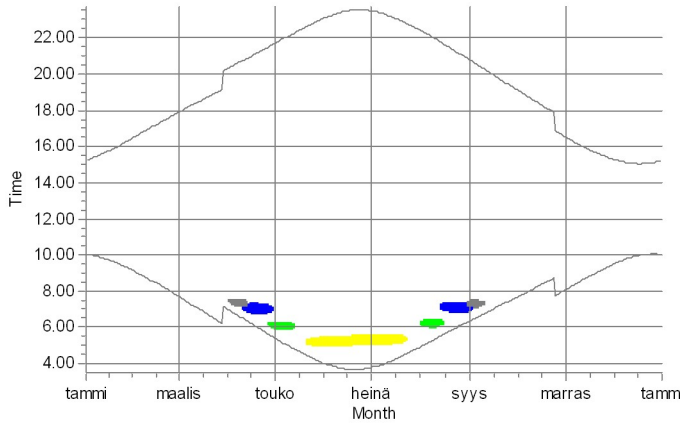
M: Asuinrakennus M (Karijoentie 144)



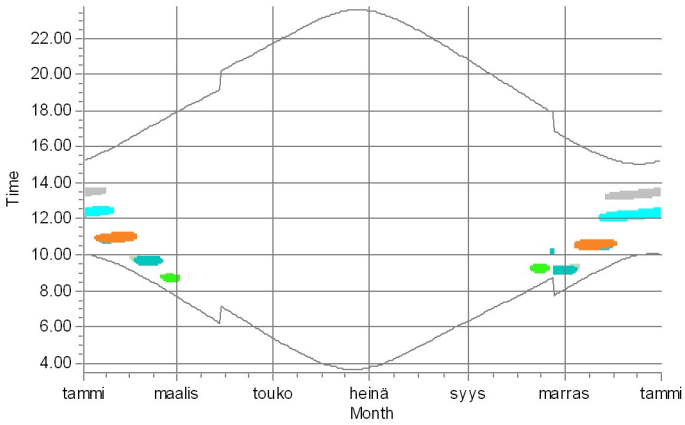
N: Asuinrakennus N (Storängsvägen 78)



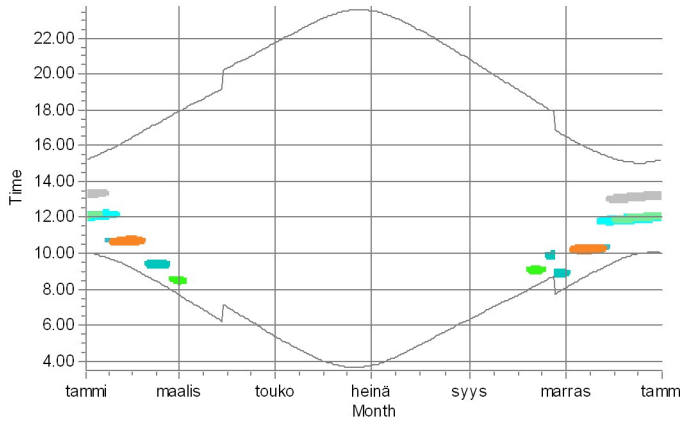
O: Asuinrakennus O(Storängsvägen 68)



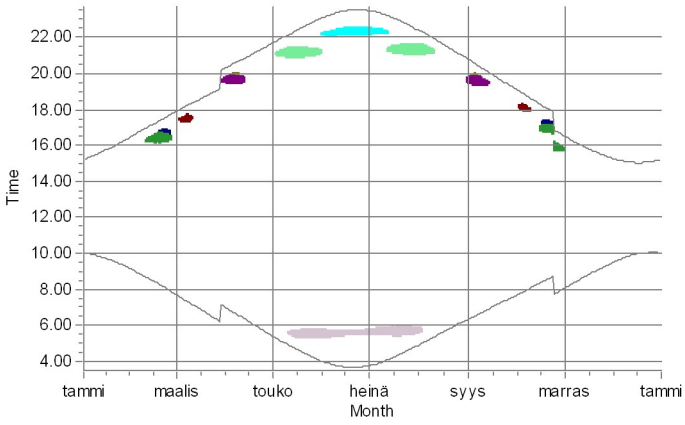
P: Asuinrakennus P (Lidenintie 709)



Q: Asuinrakennus Q (Lidenintie 697)



R: Lomarakennus R (Påskmossberget)



WTGs

2: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (282)	10: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (290)	19: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (300)
3: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (283)	11: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (291)	21: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (302)
4: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (284)	12: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (292)	23: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (304)
7: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (287)	13: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (293)	25: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (306)
8: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (288)	14: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (294)	26: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (307)
9: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (289)	18: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (298)	27: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (308)

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 1 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (281)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June
1	10.01	09.04 10.21-10.37/16	07.41	06.59	05.22	04.00
	15.14	16.33 09.46-10.03/17	17.55	20.20	21.43	23.06
2	10.01	09.02 10.21-10.35/14	07.38	06.56	05.19	03.58
	15.16	16.36 09.42-10.03/21	17.57	20.22	21.46	23.08
3	10.00	08.59 10.23-10.34/11	07.34	06.53	05.16	03.56
	15.18	16.38 09.42-10.04/22	18.00	20.25	21.49	23.11
4	09.59	08.56 10.27-10.31/4	07.31	06.49	05.13	03.54
	15.19	16.41 09.42-10.05/23	18.03	20.28	21.52	23.13
5	09.58	08.53 09.42-10.06/24	07.28	06.46	05.10	03.52
	15.21	16.44	18.06	20.31	21.54	23.15
6	09.57	08.51 09.42-10.05/23	07.25	06.43	05.07	03.51
	15.23	16.47	18.09	20.33	21.57	23.16
7	09.56	08.48 09.42-10.06/24	07.21	06.39	05.04	03.49
	15.25	16.50	18.11	20.36	22.00	23.18
8	09.55	08.45 09.42-10.06/24	07.18	06.36	05.01	03.48
	15.28	16.53	18.14	20.39	22.03	23.20
9	09.53	08.42 09.43-10.06/23	07.15	06.33	04.58	03.46
	15.30	16.56	18.17	20.42	22.06	23.22
10	09.52 10.52-10.54/2	08.39 09.43-10.05/22	07.12	06.30	04.55	03.45
	15.32	16.59	18.20	20.44	22.09	23.23
11	09.50 10.49-10.55/6	08.36 09.44-10.05/21	07.08	06.26	04.52	03.44
	15.34	17.02	18.22	20.47	22.11	23.25
12	09.49 10.46-10.55/9	08.33 09.45-10.04/19	07.05	06.23	04.49	03.43
	15.37	17.05	18.25	20.50	22.14	23.26
13	09.47 10.44-10.57/13	08.30 09.46-10.02/16	07.02	06.20	04.47	03.42
	15.39	17.08	18.28	20.53	22.17	23.27
14	09.45 10.41-10.57/16	08.27 09.48-10.01/13	06.59	06.16	04.44	03.41
	15.42	17.11	18.31	20.55	22.20	23.28
15	09.44 10.38-10.57/19	08.24 09.51-09.57/6	06.55	06.13	04.41	03.41
	15.44	17.14	18.33	20.58	22.23	23.29
16	09.42 10.35-10.58/23	08.21	06.52	06.10	04.38	03.40
	15.47	17.17	18.36	21.01	22.25	23.30
17	09.40 10.32-10.58/26	08.18	06.49	06.07	04.35	03.40
	15.50	17.20	18.39	21.04	22.28	23.31
18	09.38 10.29-10.59/30	08.15	06.45	06.03	04.33	03.39
	15.52	17.23	18.42	21.06	22.31	23.32
19	09.36 10.26-10.59/33	08.12	06.42	06.00	04.30	03.39
	15.55	17.26	18.44	21.09	22.34	23.32
20	09.34 10.23-10.59/36	08.09	06.39	05.57	04.27	03.39
	15.58	17.29	18.47	21.12	22.36	23.33
21	09.31 10.20-10.59/39	08.06	06.36	05.54	04.25	03.39
	16.01	17.32	18.50	21.15	22.39	23.33
22	09.29 10.17-10.59/42	08.03	06.32	05.51	04.22	03.39
	16.03	17.35	18.53	21.18	22.42	23.33
23	09.27 10.16-10.59/43	08.00	06.29	05.47	04.20	03.39
	16.06	17.37	18.55	21.20	22.44	23.33
24	09.25 10.16-10.59/43	07.57	06.26	05.44	04.17	03.40
	16.09	17.40	18.58	21.23	22.47	23.33
25	09.22 10.16-10.59/43	07.53	06.22	05.41	04.15	03.40
	16.12	17.43	19.01	21.26	22.50	23.33
26	09.20 10.17-10.58/41	07.50	06.19	05.38	04.13	03.41
	16.15	17.46	19.03	21.29	22.52	23.33
27	09.17 10.17-10.57/40	07.47	06.16	05.35	04.10	03.41
	16.18	17.49	19.06	21.32	22.55	23.33
28	09.15 10.18-10.55/37	07.44	06.12	05.32	04.08	03.42
	16.21	17.52	19.09	21.35	22.57	23.32
29	09.12 10.40-10.50/10 09.55-09.58/3		07.09	05.28	04.06	03.43
	16.24 10.18-10.38/20		20.12	21.37	22.59	23.31
30	09.10 10.43-10.48/5 09.52-10.00/8		07.06	05.25	04.04	03.44
	16.27 10.18-10.38/20		20.14	21.40	23.02	23.31
31	09.07 10.19-10.38/19		07.03		04.02	
	16.30 09.49-10.02/13		20.17		23.04	
Potential sun hours	191	246	364	444	550	591
Sum of minutes with flicker	639	343	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

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Liisa KArhu / liisa.karhu@fcg.fi
Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 2 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (282)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March	April	May		June	
1	10.01		09.04	09.46-10.16/30	07.41	06.59	05.22		04.00	05.00-05.36/36
	15.14		16.32		17.54	20.20	21.43		23.06	
2	10.01		09.02	09.42-10.14/32	07.37	06.56	05.19		03.58	04.59-05.36/37
	15.16		16.35		17.57	20.22	21.46		23.08	
3	10.00		08.59	09.40-10.12/32	07.34	06.53	05.16		03.56	05.00-05.36/36
	15.18		16.38		18.00	20.25	21.49		23.11	
4	09.59		08.56	09.59-10.09/10	07.31	06.49	05.13		03.54	05.00-05.37/37
	15.19		16.41	09.40-09.57/17	18.03	20.28	21.52		23.13	04.51-04.53/2
5	09.58		08.53	10.01-10.07/6	07.28	06.46	05.10		03.52	05.00-05.37/37
	15.21		16.44	09.41-09.57/16	18.06	20.31	21.54		23.15	04.49-04.57/8
6	09.57		08.51	09.41-09.56/15	07.25	06.43	05.07		03.51	05.00-05.37/37
	15.23		16.47		18.09	20.33	21.57		23.16	04.48-04.58/10
7	09.56		08.48	09.42-09.56/14	07.21	06.39	05.04		03.49	05.00-05.37/37
	15.25		16.50		18.11	20.36	22.00		23.18	04.47-04.59/12
8	09.55		08.45	09.43-09.55/12	07.18	06.36	05.01		03.48	04.46-05.38/52
	15.28		16.53	09.23-09.25/2	18.14	20.39	22.03		23.20	
9	09.53		08.42	09.45-09.53/8	07.15	06.33	04.58		03.46	04.45-05.38/53
	15.30		16.56	09.20-09.26/6	18.17	20.41	22.06		23.22	
10	09.52		08.39	09.16-09.26/10	07.12	06.30	04.55		03.45	04.45-05.37/52
	15.32		16.59		18.20	20.44	22.09		23.23	
11	09.50		08.36	09.13-09.27/14	07.08	06.26	04.52		03.44	04.44-05.37/53
	15.34		17.02		18.22	20.47	22.11		23.25	
12	09.49		08.33	09.10-09.28/18	07.05	06.23	04.49		03.43	04.44-05.38/54
	15.37		17.05		18.25	20.50	22.14		23.26	
13	09.47		08.30	09.09-09.27/18	07.02	06.20	04.46		03.42	04.44-05.38/54
	15.39		17.08		18.28	20.52	22.17		23.27	
14	09.45		08.27	09.10-09.28/18	06.59	06.16	04.44		03.41	04.44-05.38/54
	15.42		17.11		18.31	20.55	22.20		23.28	
15	09.44		08.24	09.10-09.28/18	06.55	06.13	04.41		03.41	04.44-05.39/55
	15.44		17.14		18.33	20.58	22.23		23.29	
16	09.42		08.21	09.10-09.26/16	06.52	06.10	04.38		03.40	04.44-05.38/54
	15.47		17.17		18.36	21.01	22.25		23.30	
17	09.40		08.18	09.11-09.26/15	06.49	06.07	04.35	05.19-05.25/6	03.40	04.44-05.39/55
	15.50		17.20		18.39	21.04	22.28		23.31	
18	09.38		08.15	09.13-09.24/11	06.45	06.03	04.33	05.15-05.27/12	03.39	04.44-05.39/55
	15.52		17.23		18.42	21.06	22.31		23.32	
19	09.36		08.12	09.15-09.21/6	06.42	06.00	04.30	05.14-05.28/14	03.39	04.44-05.39/55
	15.55		17.26		18.44	21.09	22.34		23.32	
20	09.33		08.09		06.39	05.57	04.27	05.12-05.30/18	03.39	04.44-05.39/55
	15.58		17.29		18.47	21.12	22.36		23.33	
21	09.31		08.06		06.36	05.54	04.25	05.08-05.31/23	03.39	04.44-05.39/55
	16.01		17.32		18.50	21.15	22.39		23.33	
22	09.29		08.03		06.32	05.51	04.22	05.06-05.32/26	03.39	04.44-05.39/55
	16.03		17.35		18.52	21.18	22.42		23.33	
23	09.27		08.00		06.29	05.47	04.20	05.04-05.32/28	03.39	04.45-05.40/55
	16.06		17.37		18.55	21.20	22.44		23.33	
24	09.24	10.11-10.14/3	07.57		06.26	05.44	04.17	05.03-05.33/30	03.40	04.45-05.40/55
	16.09		17.40		18.58	21.23	22.47		23.33	
25	09.22	10.08-10.15/7	07.53		06.22	05.41	04.15	05.02-05.33/31	03.40	04.46-05.41/55
	16.12		17.43		19.01	21.26	22.49		23.33	
26	09.20	10.05-10.16/11	07.50		06.19	05.38	04.13	05.01-05.34/33	03.41	04.46-05.40/54
	16.15		17.46		19.03	21.29	22.52		23.33	
27	09.17	10.02-10.16/14	07.47		06.16	05.35	04.10	05.01-05.35/34	03.41	04.46-05.41/55
	16.18		17.49		19.06	21.32	22.54		23.32	
28	09.15	09.59-10.17/18	07.44		06.12	05.32	04.08	05.01-05.35/34	03.42	04.47-05.41/54
	16.21		17.52		19.09	21.34	22.57		23.32	
29	09.12	09.55-10.16/21			07.09	05.28	04.06	05.00-05.35/35	03.43	04.47-05.42/55
	16.24				20.11	21.37	22.59		23.31	
30	09.10	09.55-10.16/21			07.06	05.25	04.04	05.00-05.36/36	03.44	04.47-05.41/54
	16.27	09.52-09.54/2			20.14	21.40	23.02		23.31	
31	09.07	09.49-10.16/27			07.02		04.02	05.00-05.36/36		
	16.30				20.17		23.04			
Potential sun hours	191		246		364	444	550		591	
Sum of minutes with flicker	124		344		0	0	396		1537	

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 3 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (283)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April		May		June	
1	10.01	09.04	07.41	06.59		05.22	06.47-07.13/26	04.00	21.53-22.12/19
	15.14	16.33	17.55	20.20		21.43		23.06	
2	10.01	09.02	07.37	06.56		05.19	06.47-07.12/25	03.58	21.53-22.13/20
	15.16	16.35	17.57	20.22		21.46		23.08	
3	10.00	08.59	07.34	06.53		05.16	06.49-07.11/22	03.56	21.53-22.14/21
	15.18	16.38	18.00	20.25		21.49		23.10	
4	09.59	08.56	07.31	06.49		05.13	06.50-07.09/19	03.54	21.53-22.14/21
	15.19	16.41	18.03	20.28		21.51		23.12	
5	09.58	08.53	07.28	06.46	07.17-07.26/9	05.10	06.52-07.06/14	03.52	21.53-22.15/22
	15.21	16.44	18.06	20.30		21.54		23.14	
6	09.57	08.51	07.25	06.43	07.14-07.29/15	05.07	06.56-07.03/7	03.51	21.53-22.15/22
	15.23	16.47	18.09	20.33		21.57		23.16	
7	09.56	08.48	07.21	06.39	07.12-07.31/19	05.04		03.49	21.54-22.15/21
	15.25	16.50	18.11	20.36		22.00		23.18	
8	09.55	08.45	07.18	06.36	07.10-07.32/22	05.01		03.48	21.54-22.15/21
	15.28	16.53	18.14	20.39		22.03		23.20	
9	09.53	08.42	07.15	06.33	07.08-07.32/24	04.58		03.47	21.54-22.15/21
	15.30	16.56	18.17	20.41		22.06		23.22	
10	09.52	08.39	07.12	06.30	07.01-07.33/32	04.55		03.45	21.54-22.15/21
	15.32	16.59	18.20	20.44		22.09		23.23	
11	09.50	08.36	07.08	06.26	06.57-07.33/36	04.52		03.44	21.54-22.15/21
	15.34	17.02	18.22	20.47		22.11		23.25	
12	09.49	08.33	07.05	06.23	06.55-07.34/39	04.49		03.43	21.54-22.16/22
	15.37	17.05	18.25	20.50		22.14		23.26	
13	09.47	08.30	07.02	06.20	06.53-07.34/41	04.47		03.42	21.54-22.16/22
	15.39	17.08	18.28	20.52		22.17		23.27	
14	09.45	08.27	06.59	06.16	06.52-07.34/42	04.44		03.41	21.55-22.16/21
	15.42	17.11	18.31	20.55		22.20		23.28	
15	09.43	08.24	06.55	06.13	06.51-07.33/42	04.41		03.41	21.54-22.16/22
	15.44	17.14	18.33	20.58		22.23		23.29	
16	09.42	08.21	06.52	06.10	06.49-07.32/43	04.38		03.40	21.55-22.16/21
	15.47	17.17	18.36	21.01		22.25		23.30	
17	09.40	08.18	06.49	06.07	06.49-07.31/42	04.35		03.40	21.55-22.17/22
	15.50	17.20	18.39	21.04		22.28		23.31	
18	09.38	08.15	06.45	06.03	06.48-07.31/43	04.33		03.39	21.56-22.17/21
	15.52	17.23	18.42	21.06		22.31		23.32	
19	09.36	08.12	06.42	06.00	06.47-07.30/43	04.30		03.39	21.56-22.17/21
	15.55	17.26	18.44	21.09		22.34		23.32	
20	09.33	08.09	06.39	05.57	06.46-07.28/42	04.27		03.39	21.56-22.17/21
	15.58	17.29	18.47	21.12		22.36		23.33	
21	09.31	08.06	06.36	05.54	06.45-07.27/42	04.25		03.39	21.56-22.17/21
	16.01	17.32	18.50	21.15		22.39		23.33	
22	09.29	08.03	06.32	05.51	06.45-07.25/40	04.22		03.39	21.56-22.17/21
	16.03	17.35	18.52	21.17		22.42		23.33	
23	09.27	08.00	06.29	05.47	06.45-07.22/37	04.20		03.39	21.57-22.18/21
	16.06	17.37	18.55	21.20		22.44		23.33	
24	09.24	07.57	06.26	05.44	06.44-07.18/34	04.17		03.40	21.57-22.18/21
	16.09	17.40	18.58	21.23		22.47		23.33	
25	09.22	07.53	06.22	05.41	06.44-07.17/33	04.15	21.55-21.59/4	03.40	21.58-22.19/21
	16.12	17.43	19.01	21.26		22.49		23.33	
26	09.20	07.50	06.19	05.38	06.44-07.17/33	04.13	21.54-22.01/7	03.41	21.57-22.18/21
	16.15	17.46	19.03	21.29		22.52		23.33	
27	09.17	07.47	06.16	05.35	06.45-07.17/32	04.10	21.55-22.03/8	03.42	21.58-22.19/21
	16.18	17.49	19.06	21.32		22.54		23.32	
28	09.15	07.44	06.12	05.32	06.46-07.16/30	04.08	21.54-22.05/11	03.42	21.58-22.19/21
	16.21	17.52	19.09	21.34		22.57		23.32	
29	09.12		07.09	05.28	06.46-07.16/30	04.06	21.53-22.07/14	03.43	21.57-22.19/22
	16.24		20.11	21.37		22.59		23.31	
30	09.09		07.06	05.25	06.46-07.14/28	04.04	21.54-22.09/15	03.44	21.58-22.19/21
	16.27		20.14	21.40		23.02		23.30	
31	09.07		07.02			04.02	21.53-22.10/17		
	16.30		20.17			23.04			
Potential sun hours	191	246	364	444		550		590	
Sum of minutes with flicker	0	0	0	873		189		634	

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 4 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (284)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March		April		May		June	
1	10.01	09.04	07.41		06.59	07.29-07.42/13	05.22		04.00	04.56-05.20/24
	15.14	16.32	17.54		20.20		21.43		23.06	
2	10.01	09.01	07.37		06.56	07.26-07.42/16	05.19		03.58	04.57-05.20/23
	15.16	16.35	17.57		20.22		21.46		23.08	
3	10.00	08.59	07.34		06.53	07.23-07.42/19	05.16		03.56	04.56-05.20/24
	15.18	16.38	18.00		20.25		21.49		23.10	
4	09.59	08.56	07.31		06.49	07.19-07.41/22	05.13		03.54	04.56-05.20/24
	15.19	16.41	18.03		20.28		21.51		23.12	
5	09.58	08.53	07.28		06.46	07.16-07.41/25	05.10		03.52	04.57-05.21/24
	15.21	16.44	18.06		20.30		21.54		23.14	
6	09.57	08.50	07.25		06.43	07.13-07.40/27	05.07		03.51	04.57-05.21/24
	15.23	16.47	18.08		20.33		21.57		23.16	
7	09.56	08.48	07.21		06.39	07.12-07.39/27	05.04		03.49	04.57-05.21/24
	15.25	16.50	18.11		20.36		22.00		23.18	
8	09.54	08.45	07.18		06.36	07.12-07.37/25	05.01		03.48	04.57-05.21/24
	15.28	16.53	18.14		20.39		22.03		23.20	
9	09.53	08.42	07.15		06.33	07.11-07.33/22	04.58		03.46	04.57-05.21/24
	15.30	16.56	18.17		20.41		22.06		23.21	
10	09.52	08.39	07.12		06.29	07.12-07.32/20	04.55		03.45	04.57-05.21/24
	15.32	16.59	18.20		20.44		22.08		23.23	
11	09.50	08.36	07.08		06.26	07.13-07.31/18	04.52		03.44	04.57-05.21/24
	15.34	17.02	18.22		20.47		22.11		23.24	
12	09.49	08.33	07.05		06.23	07.14-07.30/16	04.49		03.43	04.58-05.22/24
	15.37	17.05	18.25		20.50		22.14		23.26	
13	09.47	08.30	07.02		06.20	07.15-07.28/13	04.46		03.42	04.58-05.21/23
	15.39	17.08	18.28		20.52		22.17		23.27	
14	09.45	08.27	06.58		06.16	07.18-07.25/7	04.44		03.41	04.59-05.22/23
	15.42	17.11	18.31		20.55		22.20		23.28	
15	09.43	08.24	06.55		06.13		04.41		03.41	04.59-05.23/24
	15.44	17.14	18.33		20.58		22.23		23.29	
16	09.41	08.21	06.52		06.10		04.38		03.40	04.59-05.22/23
	15.47	17.17	18.36		21.01		22.25		23.30	
17	09.40	08.18	06.49		06.07		04.35		03.40	04.59-05.22/23
	15.50	17.20	18.39		21.03		22.28		23.31	
18	09.38	08.15	06.45		06.03		04.33		03.39	05.00-05.23/23
	15.52	17.23	18.42		21.06		22.31		23.32	
19	09.35	08.12	06.42		06.00		04.30		03.39	05.00-05.23/23
	15.55	17.26	18.44		21.09		22.34		23.32	
20	09.33	08.09	06.39		05.57		04.27	05.10-05.11/1	03.39	05.00-05.23/23
	15.58	17.29	18.47		21.12		22.36		23.33	
21	09.31	08.06	06.35		05.54		04.25	05.08-05.13/5	03.39	05.00-05.23/23
	16.01	17.32	18.50		21.15		22.39		23.33	
22	09.29	08.03	06.32		05.51		04.22	05.06-05.14/8	03.39	05.00-05.23/23
	16.03	17.34	18.52		21.17		22.42		23.33	
23	09.27	08.00	06.29		05.47		04.20	05.04-05.15/11	03.39	05.01-05.24/23
	16.06	17.37	18.55		21.20		22.44		23.33	
24	09.24	07.56	06.26		05.44		04.17	05.02-05.16/14	03.40	05.01-05.24/23
	16.09	17.40	18.58		21.23		22.47		23.33	
25	09.22	07.53	06.22		05.41		04.15	05.00-05.17/17	03.40	05.01-05.25/24
	16.12	17.43	19.01		21.26		22.49		23.33	
26	09.20	07.50	06.19		05.38		04.13	04.58-05.17/19	03.41	05.01-05.24/23
	16.15	17.46	19.03		21.29		22.52		23.33	
27	09.17	07.47	06.16		05.35		04.10	04.57-05.18/21	03.42	05.02-05.25/23
	16.18	17.49	19.06		21.32		22.54		23.32	
28	09.15	07.44	06.12		05.32		04.08	04.56-05.18/22	03.42	05.02-05.25/23
	16.21	17.52	19.09		21.34		22.57		23.32	
29	09.12		07.09		05.28		04.06	04.56-05.18/22	03.43	05.02-05.26/24
	16.24		20.11		21.37		22.59		23.31	
30	09.09		07.06	07.36-07.41/5	05.25		04.04	04.56-05.19/23	03.44	05.01-05.25/24
	16.27		20.14		21.40		23.02		23.30	
31	09.07		07.02	07.32-07.41/9			04.02	04.56-05.19/23		
	16.30		20.17				23.04			
Potential sun hours	191	246	364		444		550		590	
Sum of minutes with flicker	0	0	14		270		186		705	

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 5 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (285)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June
1	10.01 11.46-12.04/18	09.04	07.41 08.27-08.37/10	06.59	05.22	03.59
	15.14	16.32	17.54 08.13-08.25/12	20.20	21.43	23.06
2	10.01 11.47-12.04/17	09.02	07.37 08.29-08.33/4	06.56	05.19	03.58
	15.16	16.35	17.57 08.09-08.24/15	20.22	21.46	23.08
3	10.00 11.48-12.05/17	08.59	07.34 08.08-08.24/16	06.52	05.16	03.56
	15.17	16.38	18.00	20.25	21.49	23.11
4	09.59 11.49-12.05/16	08.56	07.31 08.09-08.23/14	06.49	05.13	03.54 04.45-04.46/1
	15.19	16.41	18.03	20.28	21.52	23.13
5	09.58 11.48-12.04/16	08.53	07.28 08.09-08.21/12	06.46	05.10	03.52 04.44-04.46/2
	15.21	16.44	18.06	20.30	21.54	23.15
6	09.57 11.49-12.05/16	08.51	07.25 08.11-08.19/8	06.43	05.07	03.51 04.43-04.47/4
	15.23	16.47	18.08	20.33	21.57	23.16
7	09.56 11.50-12.05/15	08.48	07.21	06.39	05.04	03.49 04.42-04.47/5
	15.25	16.50	18.11	20.36	22.00	23.18
8	09.55 11.52-12.05/13	08.45	07.18 07.49-07.50/1	06.36	05.01	03.48 04.41-04.48/7
	15.27	16.53	18.14	20.39	22.03	23.20
9	09.53 11.52-12.05/13	08.42	07.15 07.46-07.51/5	06.33	04.58	03.46 04.40-04.48/8
	15.30	16.56	18.17	20.41	22.06	23.22
10	09.52 11.54-12.05/11	08.39	07.12 07.42-07.51/9	06.29	04.55	03.45 04.39-04.48/9
	15.32	16.59	18.20	20.44	22.09	23.23
11	09.50 11.55-12.04/9	08.36	07.08 07.39-07.51/12	06.26	04.52	03.44 04.38-04.48/10
	15.34	17.02	18.22	20.47	22.11	23.25
12	09.49 11.56-12.02/6	08.33	07.05 07.36-07.51/15	06.23	04.49	03.43 04.38-04.49/11
	15.37	17.05	18.25	20.50	22.14	23.26
13	09.47	08.30	07.02 07.35-07.50/15	06.20	04.46	03.42 04.37-04.49/12
	15.39	17.08	18.28	20.52	22.17	23.27
14	09.45	08.27	06.59 07.35-07.49/14	06.16	04.44	03.41 04.37-04.50/13
	15.42	17.11	18.31	20.55	22.20	23.28
15	09.44	08.24	06.55 07.37-07.48/11	06.13	04.41	03.40 04.37-04.50/13
	15.44	17.14	18.33	20.58	22.23	23.29
16	09.42	08.21	06.52 07.38-07.45/7	06.10	04.38	03.40 04.36-04.50/14
	15.47	17.17	18.36	21.01	22.25	23.30
17	09.40	08.18	06.49	06.07	04.35	03.39 04.36-04.50/14
	15.49	17.20	18.39	21.04	22.28	23.31
18	09.38	08.15	06.45	06.03	04.33	03.39 04.36-04.51/15
	15.52	17.23	18.42	21.06	22.31	23.32
19	09.36	08.12	06.42	06.00	04.30	03.39 04.36-04.51/15
	15.55	17.26	18.44	21.09	22.34	23.32
20	09.34	08.09 08.43-08.45/2	06.39	05.57	04.27	03.39 04.36-04.51/15
	15.58	17.29	18.47	21.12	22.36	23.33
21	09.31	08.06 08.40-08.46/6	06.35	05.54	04.25	03.39 04.36-04.51/15
	16.00	17.32	18.50	21.15	22.39	23.33
22	09.29	08.03 08.36-08.46/10	06.32	05.50	04.22	03.39 04.36-04.51/15
	16.03	17.34	18.52	21.18	22.42	23.33
23	09.27	08.00 08.33-08.46/13	06.29	05.47	04.20	03.39 04.37-04.52/15
	16.06	17.37	18.55	21.20	22.44	23.33
24	09.24	07.57 08.30-08.47/17	06.26	05.44	04.17	03.39 04.37-04.52/15
	16.09	17.40	18.58	21.23	22.47	23.33
25	09.22	07.53 08.26-08.45/19	06.22	05.41	04.15	03.40 04.38-04.52/14
	16.12	17.43	19.01	21.26	22.49	23.33
26	09.20	07.50 08.24-08.45/21	06.19	05.38	04.12	03.41 04.38-04.52/14
	16.15	17.46	19.03	21.29	22.52	23.33
27	09.17	07.47 08.24-08.43/19	06.16	05.35	04.10	03.41 04.39-04.52/13
	16.18	17.49 08.19-08.23/4	19.06	21.32	22.55	23.33
28	09.15	07.44 08.25-08.40/15	06.12	05.31	04.08	03.42 04.40-04.53/13
	16.21	17.52 08.16-08.24/8	19.09	21.34	22.57	23.32
29	09.12		07.09	05.28	04.06	03.43 04.40-04.52/12
	16.24		20.11	21.37	22.59	23.31
30	09.10		07.06	05.25	04.04	03.44 04.41-04.52/11
	16.26		20.14	21.40	23.02	23.31
31	09.07		07.02		04.01	
	16.29		20.17		23.04	
Potential sun hours	191	246	364	444	550	591
Sum of minutes with flicker	167	134	180	0	0	305

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 6 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (286)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February	March	April	May	June	July	August	September	October	November		December	
1	10.01	11.11-11.19/8	09.04	07.41	06.59	05.22	03.59	03.45	04.55	06.20	07.39	08.05		09.29	10.47-11.07/20
	15.14		16.32	17.54	20.20	21.43	23.06	23.30	22.24	20.47	19.08	16.30		15.17	
2	10.01	11.09-11.19/10	09.02	07.37	06.56	05.19	03.57	03.47	04.58	06.23	07.42	08.08		09.31	10.47-11.07/20
	15.16		16.35	17.57	20.22	21.46	23.08	23.29	22.21	20.44	19.05	16.27		15.16	
3	10.00	11.08-11.21/13	08.59	07.34	06.52	05.16	03.56	03.48	05.01	06.25	07.44	08.10		09.33	10.48-11.08/20
	15.17		16.38	18.00	20.25	21.49	23.11	23.28	22.18	20.41	19.02	16.24		15.14	
4	09.59	11.06-11.21/15	08.56	07.31	06.49	05.13	03.54	03.49	05.03	06.28	07.47	08.13		09.35	10.48-11.08/20
	15.19		16.41	18.03	20.28	21.52	23.13	23.26	22.16	20.37	18.58	16.22		15.13	
5	09.58	11.03-11.21/18	08.53	07.28	06.46	05.10	03.52	03.51	05.06	06.31	07.50	08.16		09.38	10.48-11.08/20
	15.21		16.44	18.06	20.30	21.54	23.15	23.25	22.13	20.34	18.55	16.19		15.11	
6	09.57	11.03-11.22/19	08.51	07.25	06.43	05.07	03.51	03.53	05.09	06.33	07.52	08.19		09.40	10.49-11.08/19
	15.23		16.47	18.08	20.33	21.57	23.16	23.24	22.10	20.31	18.52	16.16		15.10	
7	09.56	11.03-11.23/20	08.48	07.21	06.39	05.04	03.49	03.54	05.12	06.36	07.55	08.22		09.42	10.50-11.08/18
	15.25		16.50	18.11	20.36	22.00	23.18	23.22	22.07	20.28	18.49	16.13		15.09	
8	09.55	11.04-11.24/20	08.45	07.18	06.36	05.01	03.48	03.56	05.14	06.39	07.58	08.25		09.44	10.53-11.09/16
	15.27		16.53	18.14	20.39	22.03	23.20	23.21	22.04	20.24	18.45	16.10		15.08	
9	09.53	11.04-11.24/20	08.42	07.15	06.33	04.58	03.46	03.58	05.17	06.41	08.00	08.28		09.46	10.56-11.09/13
	15.30		16.56	18.17	20.41	22.06	23.22	23.19	22.01	20.21	18.42	16.07		15.07	
10	09.52	11.05-11.25/20	08.39	07.12	06.29	04.55	03.45	04.00	05.20	06.44	08.03	08.31		09.48	10.59-11.10/11
	15.32		16.59	18.20	20.44	22.09	23.23	23.17	21.58	20.18	18.39	16.05		15.06	
11	09.50	11.05-11.25/20	08.36	07.08	06.26	04.52	03.44	04.02	05.23	06.46	08.06	08.34		09.49	11.01-11.09/8
	15.34		17.02	18.22	20.47	22.11	23.25	23.16	21.54	20.14	18.36	16.02		15.05	
12	09.49	11.05-11.25/20	08.33	07.05	06.23	04.49	03.43	04.04	05.26	06.49	08.08	08.37		09.51	11.04-11.10/6
	15.37		17.05	18.25	20.50	22.14	23.26	23.14	21.51	20.11	18.32	15.59		15.04	
13	09.47	11.06-11.26/20	08.30	07.02	06.20	04.46	03.42	04.07	05.28	06.52	08.11	08.39		09.53	11.06-11.10/4
	15.39		17.08	18.28	20.52	22.17	23.27	23.12	21.48	20.08	18.29	15.57		15.04	
14	09.45	11.06-11.26/20	08.27	06.58	06.16	04.44	03.41	04.09	05.31	06.54	08.14	08.42		09.54	11.08-11.10/2
	15.42		17.11	18.31	20.55	22.20	23.28	23.10	21.45	20.04	18.26	15.54		15.03	
15	09.44	11.06-11.26/20	08.24	06.55	06.13	04.41	03.40	04.11	05.34	06.57	08.17	08.45		09.55	
	15.44		17.14	18.33	20.58	22.23	23.29	23.08	21.42	20.01	18.23	15.52		15.03	
16	09.42	11.07-11.26/19	08.21	06.52	06.10	04.38	03.40	04.13	05.37	07.00	08.19	08.48		09.57	
	15.47		17.17	18.36	21.01	22.25	23.30	23.05	21.39	19.58	18.20	15.49		15.02	
17	09.40	11.07-11.26/19	08.18	06.49	06.07	04.35	03.39	04.16	05.39	07.02	08.22	08.51		09.58	
	15.49		17.20	18.39	21.04	22.28	23.31	23.03	21.36	19.54	18.16	15.47		15.02	
18	09.38	11.08-11.25/17	08.15	06.45	06.03	04.32	03.39	04.18	05.42	07.05	08.25	08.54		09.59	
	15.52		17.23	18.42	21.06	22.31	23.32	23.01	21.33	19.51	18.13	15.44		15.02	
19	09.36	11.09-11.25/16	08.12	06.42	06.00	04.30	03.39	04.21	05.45	07.07	08.28	08.57	10.52-10.54/2	10.00	
	15.55		17.26	18.44	21.09	22.34	23.32	22.59	21.29	19.48	18.10	15.42		15.02	
20	09.34	11.10-11.25/15	08.09	06.39	05.57	04.27	03.39	04.23	05.48	07.10	08.30	08.59	10.48-10.58/10	10.01	
	15.58		17.29	18.47	21.12	22.36	23.33	22.56	21.26	19.44	18.07	15.39		15.02	
21	09.31	11.11-11.24/13	08.06	06.35	05.54	04.25	03.39	04.26	05.50	07.13	08.33	09.02	10.48-11.00/12	10.01	
	16.00		17.32	18.50	21.15	22.39	23.33	22.54	21.23	19.41	18.04	15.37		15.03	
22	09.29	11.13-11.23/10	08.03	06.32	05.50	04.22	03.39	04.28	05.53	07.15	08.36	09.05	10.46-11.01/15	10.02	
	16.03		17.34	18.52	21.18	22.42	23.33	22.51	21.20	19.38	18.01	15.35		15.03	
23	09.27	11.17-11.19/2	08.00	06.29	05.47	04.20	03.39	04.31	05.56	07.18	08.39	09.08	10.46-11.02/16	10.02	
	16.06		17.37	18.55	21.20	22.44	23.33	22.49	21.17	19.35	17.57	15.33		15.04	
24	09.24		07.56	06.26	05.44	04.17	03.39	04.33	05.58	07.21	08.42	09.11	10.46-11.03/17	10.03	
	16.09		17.40	18.58	21.23	22.47	23.33	22.46	21.13	19.31	17.54	15.30		15.04	
25	09.22		07.53	06.22	05.41	04.15	03.40	04.36	06.01	07.23	07.45	09.13	10.46-11.04/18	10.03	
	16.12		17.43	19.01	21.26	22.50	23.33	22.43	21.10	19.28	16.51	15.28		15.05	
26	09.20		07.50	06.19	05.38	04.12	03.40	04.39	06.04	07.26	07.47	09.16	10.46-11.05/19	10.03	
	16.15		17.46	19.03	21.29	22.52	23.33	22.41	21.07	19.25	16.48	15.26		15.06	
27	09.17		07.47	06.16	05.35	04.10	03.41	04.41	06.07	07.28	07.50	09.18	10.46-11.05/19	10.03	
	16.18		17.49	19.06	21.32	22.55	23.33	22.38	21.04	19.21	16.45	15.24		15.07	
28	09.15		07.44	06.12	05.31	04.08	03.42	04.44	06.09	07.31	07.53	09.21	10.46-11.06/20	10.03	
	16.21		17.52	19.09	21.34	22.57	23.32	22.35	21.00	19.18	16.42	15.22		15.08	
29	09.12			07.09	05.28	04.06	03.43	04.47	06.12	07.34	07.56	09.24	10.46-11.06/20	10.03	11.16-11.17/1
	16.23			20.11	21.37	22.59	23.31	22.33	20.57	19.15	16.39	15.21		15.09	
30	09.10			07.06	05.25	04.03	03.44	04.50	06.15	07.36	07.59	09.26	10.46-11.06/20	10.03	11.14-11.17/3
	16.26			20.14	21.40	23.02	23.31	22.30	20.54	19.11	16.36	15.19		15.11	
31	09.07			07.02		04.01		04.52	06.17		08.02			10.02	11.13-11.18/5
	16.29			20.17		23.04		22.27	20.51		16.33			15.12	
Potential sun hours	191		246	364	444	551	591	583	497	391	310	213		162	
Sum of minutes with flicker	374		0	0	0	0	0	0	0	0	0	188		206	

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 8 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (288)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March		April		May		June	
1	10.01	09.04	07.41		06.59		05.22		04.00	04.50-05.08/18
	15.14	16.32	17.54		20.20		21.43		23.06	
2	10.01	09.01	07.37		06.56		05.19		03.58	04.51-05.08/17
	15.16	16.35	17.57		20.22		21.46		23.08	
3	10.00	08.59	07.34	17.25-17.26/1	06.52		05.16		03.56	04.50-05.08/18
	15.18	16.38	18.00		20.25		21.49		23.10	
4	09.59	08.56	07.31	17.24-17.28/4	06.49		05.13		03.54	04.51-05.08/17
	15.19	16.41	18.03		20.28		21.51		23.12	
5	09.58	08.53	07.28	17.24-17.31/7	06.46		05.10		03.52	04.51-05.08/17
	15.21	16.44	18.06		20.30		21.54		23.14	
6	09.57	08.50	07.25	17.23-17.34/11	06.43		05.07		03.51	04.52-05.08/16
	15.23	16.47	18.08		20.33		21.57		23.16	
7	09.56	08.48	07.21	17.23-17.37/14	06.39		05.04		03.49	04.52-05.08/16
	15.25	16.50	18.11		20.36		22.00		23.18	
8	09.54	08.45	07.18	17.24-17.40/16	06.36		05.01		03.48	04.52-05.08/16
	15.27	16.53	18.14		20.39		22.03		23.20	
9	09.53	08.42	07.15	17.24-17.38/14	06.33		04.58		03.46	04.52-05.08/16
	15.30	16.56	18.17		20.41		22.06		23.21	
10	09.52	08.39	07.12	17.26-17.36/10	06.29		04.55		03.45	04.53-05.08/15
	15.32	16.59	18.20		20.44		22.08		23.23	
11	09.50	08.36	07.08	17.31-17.32/1	06.26		04.52		03.44	04.53-05.08/15
	15.34	17.02	18.22		20.47		22.11		23.24	
12	09.49	08.33	07.05		06.23		04.49		03.43	04.54-05.08/14
	15.37	17.05	18.25		20.50		22.14		23.26	
13	09.47	08.30	07.02		06.20		04.46		03.42	04.54-05.08/14
	15.39	17.08	18.28		20.52		22.17		23.27	
14	09.45	08.27	06.58		06.16	06.48-06.49/1	04.44		03.41	04.54-05.08/14
	15.42	17.11	18.31		20.55		22.20		23.28	
15	09.43	08.24	06.55		06.13	06.44-06.49/5	04.41		03.41	04.55-05.09/14
	15.44	17.14	18.33		20.58		22.23		23.29	
16	09.42	08.21	06.52		06.10	06.41-06.50/9	04.38		03.40	04.55-05.08/13
	15.47	17.17	18.36		21.01		22.25		23.30	
17	09.40	08.18	06.49		06.07	06.38-06.50/12	04.35		03.39	04.55-05.08/13
	15.49	17.20	18.39		21.03		22.28		23.31	
18	09.38	08.15	06.45		06.03	06.35-06.50/15	04.33		03.39	04.56-05.08/12
	15.52	17.23	18.42		21.06		22.31		23.32	
19	09.35	08.12	06.42		06.00	06.33-06.49/16	04.30		03.39	04.56-05.09/13
	15.55	17.26	18.44		21.09		22.34		23.32	
20	09.33	08.09	06.39		05.57	06.33-06.49/16	04.27		03.39	04.56-05.09/13
	15.58	17.29	18.47		21.12		22.36		23.33	
21	09.31	08.06	06.35		05.54	06.34-06.48/14	04.25		03.39	04.56-05.09/13
	16.00	17.32	18.50		21.15		22.39		23.33	
22	09.29	08.03	06.32		05.50	06.35-06.47/12	04.22		03.39	04.56-05.09/13
	16.03	17.34	18.52		21.17		22.42		23.33	
23	09.27	08.00	06.29		05.47	06.36-06.45/9	04.20		03.39	04.57-05.10/13
	16.06	17.37	18.55		21.20		22.44		23.33	
24	09.24	07.56	06.26		05.44		04.17	05.02-05.05/3	03.40	04.57-05.09/12
	16.09	17.40	18.58		21.23		22.47		23.33	
25	09.22	07.53	06.22		05.41		04.15	05.00-05.05/5	03.40	04.57-05.10/13
	16.12	17.43	19.01		21.26		22.49		23.33	
26	09.20	07.50	06.19		05.38		04.12	04.58-05.06/8	03.41	04.57-05.10/13
	16.15	17.46	19.03		21.29		22.52		23.33	
27	09.17	07.47	06.16		05.35		04.10	04.57-05.07/10	03.41	04.57-05.11/14
	16.18	17.49	19.06		21.32		22.54		23.32	
28	09.15	07.44	06.12		05.31		04.08	04.55-05.07/12	03.42	04.58-05.11/13
	16.21	17.52	19.09		21.34		22.57		23.32	
29	09.12		07.09		05.28		04.06	04.53-05.07/14	03.43	04.58-05.12/14
	16.24		20.11		21.37		22.59		23.31	
30	09.09		07.06		05.25		04.04	04.52-05.07/15	03.44	04.57-05.11/14
	16.26		20.14		21.40		23.02		23.30	
31	09.07		07.02				04.02	04.50-05.07/17		
	16.29		20.17				23.04			
Potential sun hours	191	246	364		444		550		591	
Sum of minutes with flicker	0	0	78		109		84		433	

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

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Calculated:
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SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 9 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (289)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04	07.41	06.59	05.22 05.57-06.24/27	04.00	03.46	04.55 05.55-06.17/22	06.20	07.39	08.05	09.28
	15.14	16.32	17.54	20.20	21.43	23.06	23.30	22.24	20.47	19.08	16.30	15.17
2	10.01	09.02	07.37	06.56	05.19 05.54-06.23/29	03.58	03.47	04.58 05.54-06.19/25	06.23	07.42	08.08	09.31
	15.16	16.35	17.57	20.22	21.46	23.08	23.29	22.21	20.44	19.05	16.27	15.16
3	10.00	08.59	07.34	06.53	05.16 05.52-06.23/31	03.56	03.48	05.01 05.54-06.20/26	06.25	07.44	08.10	09.33
	15.18	16.38	18.00	20.25	21.49	23.10	23.28	22.18	20.41	19.02	16.24	15.14
4	09.59	08.56	07.31	06.49	05.13 05.49-06.23/34	03.54	03.50	05.03 05.54-06.25/31	06.28	07.47	08.13	09.35
	15.19	16.41	18.03	20.28	21.51	23.12	23.26	22.15	20.37	18.58	16.22	15.13
5	09.58	08.53	07.28	06.46	05.10 05.46-06.21/35	03.52	03.51	05.06 05.54-06.28/34	06.31	07.50	08.16	09.38
	15.21	16.44	18.06	20.30	21.54	23.14	23.25	22.13	20.34	18.55	16.19	15.11
6	09.57	08.51	07.25	06.43	05.07 05.45-06.21/36	03.51	03.53	05.09 05.55-06.30/35	06.33	07.52	08.19	09.40
	15.23	16.47	18.09	20.33	21.57	23.16	23.24	22.10	20.31	18.52	16.16	15.10
7	09.56	08.48	07.21	06.39	05.04 05.44-06.19/35	03.49	03.55	05.12 05.54-06.31/37	06.36	07.55	08.22	09.42
	15.25	16.50	18.11	20.36	22.00	23.18	23.22	22.07	20.28	18.49	16.13	15.09
8	09.55	08.45	07.18	06.36	05.01 05.44-06.17/33	03.48	03.57	05.15 05.57-06.32/35	06.39	07.58	08.25	09.44
	15.27	16.53	18.14	20.39	22.03	23.20	23.21	22.04	20.24	18.45	16.10	15.08
9	09.53	08.42	07.15	06.33	04.58 05.44-06.11/27	03.46	03.58	05.17 05.59-06.32/33	06.41	08.00	08.28	09.46
	15.30	16.56	18.17	20.41	22.06	23.22	23.19	22.01	20.21	18.42	16.08	15.07
10	09.52	08.39	07.12	06.29	04.55 05.44-06.09/25	03.45	04.00	05.20 06.01-06.32/31	06.44	08.03	08.31	09.47
	15.32	16.59	18.20	20.44	22.09	23.23	23.17	21.57	20.18	18.39	16.05	15.06
11	09.50	08.36	07.08	06.26	04.52 05.44-06.08/24	03.44	04.02	05.23 06.04-06.33/29	06.47	08.06	08.34	09.49
	15.34	17.02	18.22	20.47	22.11	23.25	23.15	21.54	20.14	18.36	16.02	15.05
12	09.49	08.33	07.05	06.23	04.49 05.44-06.06/22	03.43	04.05	05.26 06.06-06.32/26	06.49	08.08	08.37	09.51
	15.37	17.05	18.25	20.50	22.14	23.26	23.14	21.51	20.11	18.32	15.59	15.04
13	09.47	08.30	07.02	06.20	04.46 05.45-06.06/21	03.42	04.07	05.28 06.09-06.32/23	06.52	08.11	08.39	09.52
	15.39	17.08	18.28	20.52	22.17	23.27	23.12	21.48	20.08	18.29	15.57	15.04
14	09.45	08.27	06.59	06.16	04.44 05.45-06.05/20	03.41	04.09	05.31 06.11-06.32/21	06.54	08.14	08.42	09.54
	15.42	17.11	18.31	20.55	22.20	23.28	23.10	21.45	20.04	18.26	15.54	15.03
15	09.43	08.24	06.55	06.13	04.41 05.46-06.04/18	03.41	04.11	05.34 06.14-06.32/18	06.57	08.17	08.45	09.55
	15.44	17.14	18.33	20.58	22.23	23.29	23.07	21.42	20.01	18.23	15.52	15.03
16	09.42	08.21	06.52	06.10	04.38 05.47-06.04/17	03.40	04.14	05.37 06.16-06.30/14	07.00	08.19	08.48	09.56
	15.47	17.17	18.36	21.01	22.25	23.30	23.05	21.39	19.58	18.20	15.49	15.03
17	09.40	08.18	06.49	06.07	04.35 05.48-06.03/15	03.40	04.16	05.39 06.19-06.30/11	07.02	08.22	08.51	09.58
	15.50	17.20	18.39	21.04	22.28	23.31	23.03	21.36	19.54	18.16	15.47	15.02
18	09.38	08.15	06.45	06.03	04.33 05.48-06.01/13	03.39	04.18	05.42 06.21-06.28/7	07.05	08.25	08.54	09.59
	15.52	17.23	18.42	21.06	22.31	23.32	23.01	21.33	19.51	18.13	15.44	15.02
19	09.36	08.12	06.42	06.00	04.30 05.50-06.00/10	03.39	04.21	05.45 06.24-06.27/3	07.07	08.28	08.57	10.00
	15.55	17.26	18.44	21.09	22.34	23.32	22.58	21.29	19.48	18.10	15.42	15.02
20	09.33	08.09	06.39	05.57	04.27 05.53-05.57/4	03.39	04.23	05.48	07.10	08.30	08.59	10.00
	15.58	17.29	18.47	21.12	22.36	23.33	22.56	21.26	19.45	18.07	15.39	15.03
21	09.31	08.06	06.35	05.54	04.25	03.39	04.26	05.50	07.13	08.33	09.02	10.01
	16.00	17.32	18.50	21.15	22.39	23.33	22.54	21.23	19.41	18.04	15.37	15.03
22	09.29	08.03	06.32	05.51	04.22	03.39	04.28	05.53	07.15	08.36	09.05	10.02
	16.03	17.34	18.52	21.17	22.42	23.33	22.51	21.20	19.38	18.01	15.35	15.03
23	09.27	08.00	06.29	05.47	04.20	03.39	04.31	05.56	07.18	08.39	09.08	10.02
	16.06	17.37	18.55	21.20	22.44	23.33	22.49	21.17	19.35	17.58	15.33	15.04
24	09.24	07.56	06.26	05.44 06.17-06.21/4	04.17	03.40	04.34 06.01-06.09/8	05.59	07.21	08.42	09.10	10.03
	16.09	17.40	18.58	21.23	22.47	23.33	22.46	21.13	19.31	17.54	15.31	15.05
25	09.22	07.53	06.22	05.41 06.14-06.22/8	04.15	03.40	04.36 06.00-06.12/12	06.01	07.23	07.45	09.13	10.03
	16.12	17.43	19.01	21.26	22.49	23.33	22.43	21.10	19.28	16.51	15.28	15.05
26	09.20	07.50	06.19	05.38 06.11-06.23/12	04.12	03.41	04.39 05.59-06.13/14	06.04	07.26	07.47	09.16	10.03
	16.15	17.46	19.03	21.29	22.52	23.33	22.41	21.07	19.25	16.48	15.26	15.06
27	09.17	07.47	06.16	05.35 06.09-06.24/15	04.10	03.41	04.42 05.57-06.14/17	06.07	07.28	07.50	09.18	10.03
	16.18	17.49	19.06	21.32	22.54	23.32	22.38	21.04	19.21	16.45	15.24	15.07
28	09.15	07.44	06.12	05.32 06.06-06.24/18	04.08	03.42	04.44 05.56-06.14/18	06.09	07.31	07.53	09.21	10.03
	16.21	17.52	19.09	21.34	22.57	23.32	22.35	21.00	19.18	16.42	15.23	15.08
29	09.12		07.09	05.28 06.03-06.24/21	04.06	03.43	04.47 05.56-06.16/20	06.12	07.34	07.56	09.24	10.03
	16.24		20.11	21.37	22.59	23.31	22.33	20.57	19.15	16.39	15.21	15.09
30	09.09		07.06	05.25 06.00-06.24/24	04.04	03.44	04.50 05.56-06.16/20	06.15	07.36	07.59	09.26	10.02
	16.27		20.14	21.40	23.02	23.30	22.30	20.54	19.11	16.36	15.19	15.11
31	09.07		07.02		04.02		04.52 05.55-06.16/21	06.17		08.02		10.02
	16.29		20.17		23.04		22.27	20.51		16.33		15.12
Potential sun hours	191	246	364	444	550	591	582	497	391	310	213	163
Sum of minutes with flicker	0	0	0	102	476	0	130	461	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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 11 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (291)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04	07.41	06.59 19.32-19.46/14	05.22	03.59	03.45	04.55	06.20 19.31-19.46/15	07.39	08.05	09.28
	15.14	16.32	17.54	20.19	21.43	23.06	23.30	22.24	20.47	19.08	16.30	15.17
2	10.01	09.01	07.37	06.56 19.31-19.49/18	05.19	03.57	03.47	04.58	06.23 19.29-19.47/18	07.42	08.07	09.31
	15.16	16.35	17.57	20.22	21.46	23.08	23.29	22.21	20.44	19.05	16.27	15.16
3	10.00	08.59	07.34	06.52 19.30-19.51/21	05.16	03.56	03.48	05.01	06.25 19.28-19.48/20	07.44	08.10	09.33
	15.17	16.38	18.00	20.25	21.49	23.10	23.28	22.18	20.41	19.02	16.24	15.14
4	09.59	08.56	07.31	06.49 19.29-19.53/24	05.13	03.54	03.50	05.03	06.28 19.26-19.48/22	07.47	08.13	09.35
	15.19	16.41	18.03	20.28	21.51	23.12	23.26	22.15	20.37	18.58	16.21	15.13
5	09.58	08.53	07.28	06.46 19.29-19.53/24	05.10	03.52	03.51	05.06	06.31 19.26-19.49/23	07.50	08.16	09.38
	15.21	16.44	18.06	20.30	21.54	23.14	23.25	22.12	20.34	18.55	16.19	15.11
6	09.57	08.50	07.24	06.43 19.29-19.53/24	05.07	03.51	03.53	05.09	06.33 19.24-19.48/24	07.52	08.19	09.40
	15.23	16.47	18.08	20.33	21.57	23.16	23.24	22.09	20.31	18.52	16.16	15.10
7	09.56	08.48	07.21	06.39 19.28-19.52/24	05.04	03.49	03.55	05.12	06.36 19.24-19.49/25	07.55	08.22	09.42
	15.25	16.50	18.11	20.36	22.00	23.18	23.22	22.07	20.27	18.48	16.13	15.09
8	09.55	08.45	07.18	06.36 19.29-19.51/22	05.01	03.48	03.56	05.14	06.39 19.23-19.48/25	07.58	08.25	09.44
	15.27	16.53	18.14	20.39	22.03	23.20	23.21	22.03	20.24	18.45	16.10	15.08
9	09.53	08.42	07.15	06.33 19.30-19.50/20	04.58	03.46	03.58	05.17	06.41 19.24-19.45/21	08.00	08.28	09.46
	15.30	16.56	18.17	20.41	22.06	23.22	23.19	22.00	20.21	18.42	16.07	15.07
10	09.52	08.39	07.11	06.29 19.31-19.49/18	04.55	03.45	04.00	05.20	06.44 19.23-19.41/18	08.03	08.31	09.47
	15.32	16.59	18.20	20.44	22.08	23.23	23.17	21.57	20.18	18.39	16.05	15.06
11	09.50	08.36	07.08	06.26 19.32-19.47/15	04.52	03.44	04.02	05.23	06.46 19.24-19.39/15	08.06	08.34	09.49
	15.34	17.02	18.22	20.47	22.11	23.25	23.15	21.54	20.14	18.35	16.02	15.05
12	09.49	08.33	07.05	06.23 19.35-19.45/10	04.49	03.43	04.04	05.26	06.49 19.25-19.36/11	08.08	08.36	09.51
	15.37	17.05	18.25	20.50	22.14	23.26	23.14	21.51	20.11	18.32	15.59	15.04
13	09.47	08.30	07.02	06.20	04.46	03.42	04.07	05.28	06.52 19.25-19.32/7	08.11	08.39	09.52
	15.39	17.08	18.28	20.52	22.17	23.27	23.12	21.48	20.08	18.29	15.57	15.04
14	09.45	08.27	06.58	06.16	04.43	03.41	04.09	05.31	06.54 19.27-19.29/2	08.14	08.42	09.54
	15.42	17.11	18.31	20.55	22.20	23.28	23.10	21.45	20.04	18.26	15.54	15.03
15	09.43	08.24	06.55	06.13	04.41	03.40	04.11	05.34	06.57	08.17	08.45	09.55
	15.44	17.14	18.33	20.58	22.23	23.29	23.07	21.42	20.01	18.23	15.52	15.03
16	09.42	08.21	06.52	06.10	04.38	03.40	04.13	05.37	07.00	08.19	08.48	09.56
	15.47	17.17	18.36	21.01	22.25	23.30	23.05	21.39	19.58	18.19	15.49	15.02
17	09.40	08.18	06.49	06.07	04.35	03.39	04.16	05.39	07.02	08.22	08.51	09.58
	15.49	17.20	18.39	21.03	22.28	23.31	23.03	21.36	19.54	18.16	15.46	15.02
18	09.38	08.15	06.45	06.03	04.32	03.39	04.18	05.42	07.05	08.25	08.54	09.59
	15.52	17.23	18.41	21.06	22.31	23.32	23.01	21.32	19.51	18.13	15.44	15.02
19	09.36	08.12	06.42	06.00	04.30	03.39	04.21	05.45	07.07	08.28	08.57	10.00
	15.55	17.26	18.44	21.09	22.34	23.32	22.58	21.29	19.48	18.10	15.42	15.02
20	09.33	08.09	06.39	05.57	04.27	03.39	04.23	05.48	07.10	08.30	08.59	10.00
	15.58	17.29	18.47	21.12	22.36	23.33	22.56	21.26	19.44	18.07	15.39	15.02
21	09.31	08.06	06.35	05.54	04.25	03.39	04.26	05.50	07.13	08.33	09.02	10.01
	16.00	17.31	18.50	21.15	22.39	23.33	22.54	21.23	19.41	18.04	15.37	15.03
22	09.29	08.03	06.32	05.50	04.22	03.39	04.28	05.53	07.15	08.36	09.05	10.02
	16.03	17.34	18.52	21.17	22.42	23.33	22.51	21.20	19.38	18.01	15.35	15.03
23	09.27	08.00	06.29	05.47	04.20	03.39	04.31	05.56	07.18	08.39	09.08	10.02
	16.06	17.37	18.55	21.20	22.44	23.33	22.49	21.17	19.34	17.57	15.33	15.04
24	09.24	07.56	06.25	05.44	04.17	03.39	04.33	05.58	07.20	08.42	09.10	10.03
	16.09	17.40	18.58	21.23	22.47	23.33	22.46	21.13	19.31	17.54	15.30	15.04
25	09.22	07.53	06.22	05.41	04.15	03.40	04.36	06.01	07.23	07.44	09.13	10.03
	16.12	17.43	19.00	21.26	22.49	23.33	22.43	21.10	19.28	16.51	15.28	15.05
26	09.20	07.50	06.19	05.38	04.12	03.41	04.39	06.04	07.26	07.47	09.16	10.03
	16.15	17.46	19.03	21.29	22.52	23.33	22.41	21.07	19.25	16.48	15.26	15.06
27	09.17	07.47	06.16	05.35	04.10	03.41	04.41	06.07	07.28	07.50	09.18	10.03
	16.18	17.49	19.06	21.32	22.54	23.32	22.38	21.04	19.21	16.45	15.24	15.07
28	09.15	07.44	06.12	05.31	04.08	03.42	04.44	06.09	07.31	07.53	09.21	10.03
	16.20	17.52	19.09	21.34	22.57	23.32	22.35	21.00	19.18	16.42	15.22	15.08
29	09.12		07.09 19.37-19.38/1	05.28	04.06	03.43	04.47	06.12	07.34	07.56	09.23	10.03
	16.23		20.11	21.37	22.59	23.31	22.33	20.57	19.15	16.39	15.21	15.09
30	09.09		07.06 19.34-19.40/6	05.25	04.03	03.44	04.50	06.15	07.36	07.59	09.26	10.02
	16.26		20.14	21.40	23.02	23.30	22.30	20.54	19.11	16.36	15.19	15.11
31	09.07		07.02 19.33-19.43/10		04.01		04.52	06.17 19.34-19.44/10		08.02		10.02
	16.29		20.17		23.04		22.27	20.51		16.33		15.12
Potential sun hours	191	246	364	444	550	591	583	497	391	310	213	162
Sum of minutes with flicker	0	0	17	234	0	0	0	10	246	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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 12 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (292)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	July	August	September	October	November	December
1	03.45	04.55 21.15-21.29/14	06.20	07.39	08.05	09.29 12.55-13.22/27
	23.30	22.24	20.47	19.08	16.30	15.17 13.40-13.56/16
2	03.47	04.58 21.15-21.31/16	06.23	07.42	08.08	09.31 12.54-13.23/29
	23.29	22.21	20.44	19.05	16.27	15.15 13.39-13.56/17
3	03.48	05.01 21.14-21.31/17	06.25	07.44	08.10 09.30-09.35/5	09.33 12.54-13.23/29
	23.28	22.18	20.41	19.02	16.24	15.14 13.39-13.57/18
4	03.49	05.03 21.13-21.31/18	06.28	07.47	08.13 09.27-09.38/11	09.35 12.55-13.24/29
	23.26	22.15	20.37	18.58	16.21	15.12 13.40-13.58/18
5	03.51	05.06 21.13-21.30/17	06.31	07.50	08.16 09.26-09.40/14	09.38 12.55-13.25/30
	23.25	22.13	20.34	18.55	16.19	15.11 13.41-13.58/17
6	03.53	05.09 21.13-21.27/14	06.33	07.52	08.19 09.25-09.41/16	09.40 12.55-13.25/30
	23.24	22.10	20.31	18.52	16.16	15.10 13.41-13.58/17
7	03.54	05.12 21.13-21.25/12	06.36	07.55	08.22 09.24-09.42/18	09.42 12.55-13.26/31
	23.22	22.07	20.28	18.48	16.13	15.09 13.41-13.59/18
8	03.56	05.14 21.13-21.21/8	06.39	07.58	08.25 09.24-09.42/18	09.44 12.55-13.26/31
	23.21	22.04	20.24	18.45	16.10	15.07 13.42-13.57/15
9	03.58	05.17 21.13-21.19/6	06.41	08.00	08.28 09.23-09.42/19	09.46 12.56-13.27/31
	23.19	22.01	20.21	18.42	16.07	15.06 13.43-13.55/12
10	04.00	05.20 21.13-21.16/3	06.44	08.03	08.31 09.23-09.43/20	09.48 12.55-13.27/32
	23.17	21.57	20.18	18.39	16.05	15.06 13.42-13.52/10
11	04.02	05.23	06.46	08.06	08.34 09.23-09.43/20	09.49 12.56-13.28/32
	23.16	21.54	20.14	18.35	16.02	15.05 13.43-13.51/8
12	04.04	05.26	06.49	08.08	08.37 09.24-09.43/19	09.51 12.57-13.29/32
	23.14	21.51	20.11	18.32	15.59	15.04 13.44-13.50/6
13	04.06	05.28	06.52	08.11	08.39 09.27-09.42/15	09.53 12.57-13.29/32
	23.12	21.48	20.08	18.29	15.57	15.03 13.45-13.48/3
14	04.09	05.31	06.54	08.14	08.42 09.31-09.43/12	09.54 12.58-13.29/31
	23.10	21.45	20.04	18.26	15.54	15.03 13.45-13.47/2
15	04.11	05.34	06.57	08.17	08.45 09.34-09.42/8	09.55 12.58-13.30/32
	23.08	21.42	20.01	18.23	15.51	15.03 13.45-13.46/1
16	04.13	05.37	07.00	08.19	08.48 09.38-09.42/4	09.57 12.59-13.30/31
	23.05	21.39	19.58	18.19	15.49	15.02
17	04.16	05.39	07.02	08.22	08.51	09.58 12.59-13.30/31
	23.03	21.36	19.54	18.16	15.46	15.02
18	04.18	05.42	07.05	08.25	08.54	09.59 13.00-13.31/31
	23.01	21.33	19.51	18.13	15.44	15.02
19	04.21	05.45	07.07	08.28	08.57	10.00 13.00-13.32/32
	22.59	21.29	19.48	18.10	15.42	15.02
20	04.23	05.48	07.10	08.30	08.59	10.01 13.00-13.32/32
	22.56	21.26	19.44	18.07	15.39	15.02
21	04.26	05.50	07.13	08.33	09.02	10.01 13.01-13.33/32
	22.54	21.23	19.41	18.04	15.37	15.03
22	04.28	05.53	07.15	08.36	09.05	10.02 13.01-13.33/32
	22.51	21.20	19.38	18.01	15.35	15.03
23	04.31	05.56	07.18	08.39	09.08	10.02 13.01-13.33/32
	22.49	21.17	19.35	17.57	15.32	15.04
24	04.33	05.58	07.20	08.42	09.10 13.42-13.48/6	10.03 13.03-13.34/31
	22.46	21.13	19.31	17.54	15.30	15.04
25	04.36	06.01	07.23	07.45	09.13 13.41-13.51/10	10.03 13.02-13.34/32
	22.43	21.10	19.28	16.51	15.28	15.05
26	04.39	06.04	07.26	07.47	09.16 13.41-13.52/11	10.03 13.03-13.35/32
	22.41	21.07	19.25	16.48	15.26	15.06
27	04.41	06.07	07.28	07.50	09.18 12.57-13.04/7 13.40-13.53/13	10.03 13.03-13.35/32
	22.38	21.04	19.21	16.45	15.24 13.10-13.17/7	15.07
28	04.44	06.09	07.31	07.53	09.21 12.57-13.07/10 13.40-13.54/14	10.03 13.04-13.36/32
	22.35	21.00	19.18	16.42	15.22 13.09-13.19/10	15.08
29	04.47	06.12	07.34	07.56	09.24 12.55-13.20/25	10.03 13.05-13.37/32
	22.33	20.57	19.15	16.39	15.21 13.39-13.55/16	15.09 13.52-13.54/2
30	04.50 21.19-21.27/8	06.15	07.36	07.59	09.26 12.54-13.21/27	10.02 13.05-13.36/31
	22.30	20.54	19.11	16.36	15.19 13.39-13.55/16	15.11 13.52-13.55/3
31	04.52 21.17-21.28/11	06.17		08.02		10.02 13.05-13.37/32
	22.27	20.51		16.33		15.12 13.53-13.58/5
Potential sun hours	583	497	391	310	213	162
Sum of minutes with flicker	19	125	0	0	371	1153

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 13 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (293)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	July		August	September	October		November		December	
1	03.45	22.14-22.31/17	04.55	06.20	07.39		08.05		09.28	11.39-12.18/39
	23.30		22.24	20.47	19.08		16.30		15.17	12.43-13.02/19
2	03.46	22.14-22.30/16	04.58	06.23	07.42		08.07		09.31	11.39-12.18/39
	23.29		22.21	20.44	19.05		16.27		15.15	12.43-13.02/19
3	03.48	22.15-22.29/14	05.00	06.25	07.44		08.10		09.33	11.39-12.18/39
	23.28		22.18	20.41	19.01		16.24		15.14	12.42-13.03/21
4	03.49	22.15-22.28/13	05.03	06.28	07.47		08.13		09.35	11.40-12.19/39
	23.26		22.15	20.37	18.58		16.21		15.12	12.43-13.04/21
5	03.51	22.16-22.28/12	05.06	06.31	07.50		08.16		09.38	11.40-12.20/40
	23.25		22.13	20.34	18.55		16.19		15.11	12.43-13.04/21
6	03.53	22.16-22.27/11	05.09	06.33	07.52		08.19		09.40	11.40-12.20/40
	23.24		22.10	20.31	18.52		16.16		15.10	12.44-13.05/21
7	03.54	22.16-22.25/9	05.12	06.36	07.55		08.22		09.42	11.41-12.21/40
	23.22		22.07	20.27	18.48		16.13		15.08	12.44-13.05/21
8	03.56	22.17-22.25/8	05.14	06.38	07.58		08.25		09.44	11.41-12.21/40
	23.21		22.04	20.24	18.45		16.10		15.07	12.44-13.06/22
9	03.58	22.17-22.23/6	05.17	06.41	08.00		08.28		09.46	11.42-12.22/40
	23.19		22.01	20.21	18.42		16.07		15.06	12.45-13.06/21
10	04.00	22.18-22.22/4	05.20	06.44	08.03		08.31		09.48	11.41-12.21/40
	23.17		21.57	20.18	18.39		16.05		15.05	12.45-13.06/21
11	04.02	22.18-22.21/3	05.23	06.46	08.06		08.34		09.49	11.42-12.22/40
	23.16		21.54	20.14	18.35		16.02		15.05	12.45-13.07/22
12	04.04	22.18-22.19/1	05.25	06.49	08.08		08.37		09.51	11.43-12.23/40
	23.14		21.51	20.11	18.32		15.59		15.04	12.46-13.08/22
13	04.06		05.28	06.52	08.11		08.39		09.53	11.44-12.23/39
	23.12		21.48	20.08	18.29		15.57		15.03	12.46-13.08/22
14	04.09		05.31	06.54	08.14		08.42		09.54	11.44-12.23/39
	23.10		21.45	20.04	18.26		15.54		15.03	12.47-13.08/21
15	04.11		05.34	06.57	08.17		08.45		09.55	11.45-12.24/39
	23.08		21.42	20.01	18.23		15.51		15.02	12.47-13.09/22
16	04.13		05.36	06.59	08.19		08.48		09.57	11.45-12.24/39
	23.05		21.39	19.58	18.19		15.49		15.02	12.48-13.09/21
17	04.16		05.39	07.02	08.22		08.51		09.58	11.45-12.24/39
	23.03		21.36	19.54	18.16		15.46		15.02	12.48-13.09/21
18	04.18		05.42	07.05	08.25		08.54		09.59	11.46-12.25/39
	23.01		21.33	19.51	18.13		15.44		15.02	12.49-13.10/21
19	04.21		05.45	07.07	08.28	09.27-09.35/8	08.57		10.00	11.47-12.26/39
	22.58		21.29	19.48	18.10		15.42		15.02	12.49-13.10/21
20	04.23		05.47	07.10	08.30	09.25-09.37/12	08.59		10.01	11.47-12.26/39
	22.56		21.26	19.44	18.07		15.39		15.02	12.50-13.11/21
21	04.26		05.50	07.13	08.33	09.23-09.38/15	09.02	11.44-11.50/6	10.01	11.48-12.27/39
	22.54		21.23	19.41	18.04		15.37		15.03	12.50-13.12/22
22	04.28		05.53	07.15	08.36	09.22-09.38/16	09.05	11.41-11.52/11	10.02	11.48-12.27/39
	22.51		21.20	19.38	18.00		15.35		15.03	12.50-13.12/22
23	04.31		05.56	07.18	08.39	09.22-09.39/17	09.08	11.40-11.55/15	10.02	11.48-12.27/39
	22.49		21.17	19.34	17.57		15.32	12.01-12.08/7	15.04	12.51-13.12/21
24	04.33		05.58	07.20	08.42	09.21-09.39/18	09.10	11.39-11.55/16 12.48-12.51/3	10.03	11.49-12.28/39
	22.46		21.13	19.31	17.54		15.30	11.58-12.10/12	15.04	12.52-13.13/21
25	04.36		06.01	07.23	07.45	08.24-08.39/15	09.13	11.39-11.57/18 12.46-12.55/9	10.03	11.49-12.28/39
	22.43		21.10	19.28	16.51		15.28	11.58-12.12/14	15.05	12.52-13.13/21
26	04.39		06.04	07.26	07.47	08.27-08.39/12	09.16	11.39-12.14/35	10.03	11.50-12.29/39
	22.41		21.07	19.25	16.48		15.26	12.45-12.57/12	15.06	12.52-13.14/22
27	04.41		06.06	07.28	07.50	08.30-08.38/8	09.18	11.38-12.14/36	10.03	11.50-12.29/39
	22.38		21.04	19.21	16.45		15.24	12.44-12.58/14	15.07	12.52-13.14/22
28	04.44		06.09	07.31	07.53	08.33-08.37/4	09.21	11.39-12.16/37	10.03	11.51-12.30/39
	22.35		21.00	19.18	16.42		15.22	12.44-13.00/16	15.08	12.54-13.15/21
29	04.47		06.12	07.34	07.56		09.24	11.38-12.16/38	10.03	11.51-12.31/40
	22.33		20.57	19.15	16.39		15.20	12.43-13.00/17	15.09	12.54-13.16/22
30	04.49		06.15	07.36	07.59		09.26	11.38-12.16/38	10.02	11.51-12.30/39
	22.30		20.54	19.11	16.36		15.19	12.42-13.01/19	15.10	12.54-13.15/21
31	04.52		06.17		08.02				10.02	11.52-12.31/39
	22.27		20.51		16.33				15.12	12.55-13.16/21
Potential sun hours	583		497	391	310		213		162	
Sum of minutes with flicker	114		0	0	125		373		1875	

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

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SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 15 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (295)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04	07.40	06.59	05.22 20.56-21.02/6	03.59	03.45	04.55	06.20	07.39	08.04	09.28
	15.14	16.32	17.54	20.19	21.43	23.06	23.30	22.24	20.47	19.08	16.30	15.17
2	10.01	09.01	07.37	06.55	05.19 20.58-21.06/8	03.57	03.46	04.57	06.22	07.41	08.07	09.31
	15.15	16.35	17.57	20.22	21.46	23.08	23.29	22.21	20.44	19.05	16.27	15.15
3	10.00	08.59	07.34	06.52	05.16 21.00-21.07/7	03.55	03.48	05.00	06.25	07.44	08.10	09.33
	15.17	16.38	18.00	20.25	21.48	23.10	23.28	22.18	20.41	19.01	16.24	15.14
4	09.59	08.56	07.31	06.49	05.13	03.53	03.49	05.03	06.28	07.47	08.13	09.35
	15.19	16.41	18.03	20.27	21.51	23.12	23.26	22.15	20.37	18.58	16.21	15.12
5	09.58	08.53	07.28	06.46	05.09	03.52	03.51	05.06	06.30	07.49	08.16	09.38
	15.21	16.44	18.05	20.30	21.54	23.14	23.25	22.12	20.34	18.55	16.18	15.11
6	09.57	08.50	07.24	06.42	05.06	03.50	03.52	05.09	06.33	07.52	08.19	09.40
	15.23	16.47	18.08	20.33	21.57	23.16	23.24	22.09	20.31	18.51	16.15	15.09
7	09.56	08.47	07.21	06.39	05.03	03.49	03.54	05.11	06.36	07.55	08.22	09.42
	15.25	16.50	18.11	20.36	22.00	23.18	23.22	22.06	20.27	18.48	16.13	15.08
8	09.54	08.45	07.18	06.36	05.01	03.47	03.56	05.14	06.38	07.57	08.25	09.44
	15.27	16.53	18.14	20.38	22.03	23.20	23.21	22.03	20.24	18.45	16.10	15.07
9	09.53	08.42	07.15	06.32	04.58	03.46	03.58	05.17	06.41	08.00	08.28	09.46
	15.29	16.56	18.17	20.41	22.06	23.22	23.19	22.00	20.21	18.42	16.07	15.06
10	09.52	08.39	07.11	06.29	04.55	03.45	04.00	05.20 21.08-21.16/8	06.44	08.03	08.31	09.47
	15.31	16.59	18.19	20.44	22.08	23.23	23.17	21.57	20.17	18.38	16.04	15.05
11	09.50	08.36	07.08	06.26	04.52	03.43	04.02	05.22 21.06-21.13/7	06.46	08.05	08.33	09.49
	15.34	17.02	18.22	20.47	22.11	23.25	23.15	21.54	20.14	18.35	16.02	15.04
12	09.49	08.33	07.05	06.23	04.49	03.42	04.04	05.25 21.05-21.11/6	06.49	08.08	08.36	09.51
	15.36	17.05	18.25	20.49	22.14	23.26	23.13	21.51	20.11	18.32	15.59	15.04
13	09.47	08.30	07.01	06.19	04.46	03.41	04.06	05.28 21.04-21.08/4	06.51	08.11	08.39	09.52
	15.39	17.08	18.28	20.52	22.17	23.27	23.12	21.48	20.07	18.29	15.56	15.03
14	09.45	08.27	06.58	06.16	04.43	03.41	04.08	05.31 21.03-21.05/2	06.54	08.14	08.42	09.54
	15.41	17.11	18.30	20.55	22.20	23.28	23.09	21.45	20.04	18.26	15.54	15.03
15	09.43	08.24	06.55	06.13	04.40	03.40	04.11	05.34	06.57	08.16	08.45	09.55
	15.44	17.14	18.33	20.58	22.22	23.29	23.07	21.42	20.01	18.22	15.51	15.02
16	09.41	08.21	06.52	06.09	04.38	03.39	04.13	05.36	06.59	08.19	08.48	09.56
	15.46	17.17	18.36	21.01	22.25	23.30	23.05	21.39	19.57	18.19	15.49	15.02
17	09.40	08.18	06.48	06.06	04.35	03.39	04.15	05.39	07.02	08.22	08.51	09.58
	15.49	17.20	18.39	21.03	22.28	23.31	23.03	21.36	19.54	18.16	15.46	15.02
18	09.38	08.15	06.45	06.03	04.32	03.38	04.18	05.42	07.04	08.25	08.54	09.59
	15.52	17.22	18.41	21.06	22.31	23.32	23.01	21.32	19.51	18.13	15.44	15.02
19	09.35	08.12	06.42	06.00	04.29	03.38	04.20	05.45	07.07	08.27	08.56	10.00
	15.54	17.25	18.44	21.09	22.33	23.32	22.58	21.29	19.48	18.10	15.41	15.02
20	09.33	08.09	06.38	05.57	04.27	03.38	04.23	05.47	07.10	08.30	08.59	10.00
	15.57	17.28	18.47	21.12	22.36	23.33	22.56	21.26	19.44	18.07	15.39	15.02
21	09.31	08.06	06.35	05.53	04.24	03.38	04.25	05.50	07.12	08.33	09.02	10.01
	16.00	17.31	18.49	21.14	22.39	23.33	22.54	21.23	19.41	18.03	15.37	15.02
22	09.29	08.03	06.32	05.50	04.22	03.38	04.28	05.53	07.15	08.36	09.05	10.02
	16.03	17.34	18.52	21.17	22.42	23.33	22.51	21.20	19.38	18.00	15.34	15.03
23	09.27	07.59	06.29	05.47	04.19	03.39	04.30	05.55	07.18	08.39	09.08	10.02
	16.06	17.37	18.55	21.20	22.44	23.33	22.48	21.16	19.34	17.57	15.32	15.03
24	09.24	07.56	06.25	05.44	04.17	03.39	04.33	05.58	07.20	08.41	09.10	10.03
	16.09	17.40	18.58	21.23	22.47	23.33	22.46	21.13	19.31	17.54	15.30	15.04
25	09.22	07.53	06.22	05.41	04.14	03.39	04.36	06.01	07.23	07.44	09.13	10.03
	16.11	17.43	19.00	21.26	22.49	23.33	22.43	21.10	19.28	16.51	15.28	15.05
26	09.19	07.50	06.19	05.37	04.12	03.40	04.38	06.04	07.25	07.47	09.16	10.03
	16.14	17.46	19.03	21.29	22.52	23.33	22.41	21.07	19.24	16.48	15.26	15.06
27	09.17	07.47	06.15	05.34	04.10	03.41	04.41	06.06	07.28	07.50	09.18	10.03
	16.17	17.48	19.06	21.31	22.54	23.32	22.38	21.03	19.21	16.45	15.24	15.07
28	09.14	07.44	06.12	05.31	04.07	03.42	04.44	06.09	07.31	07.53	09.21	10.03
	16.20	17.51	19.08	21.34	22.57	23.32	22.35	21.00	19.18	16.42	15.22	15.08
29	09.12		07.09	05.28 20.55-20.58/3	04.05	03.43	04.46	06.12	07.33	07.56	09.23	10.03
	16.23		20.11	21.37	22.59	23.31	22.32	20.57	19.14	16.39	15.20	15.09
30	09.09		07.05	05.25 20.56-21.00/4	04.03	03.44	04.49	06.14	07.36	07.59	09.26	10.02
	16.26		20.14	21.40	23.02	23.31	22.30	20.54	19.11	16.36	15.18	15.10
31	09.07		07.02		04.01		04.52	06.17		08.02		10.02
	16.29		20.17		23.04		22.27	20.50		16.33		15.12
Potential sun hours	191	246	364	444	551	591	583	497	391	310	213	162
Sum of minutes with flicker	0	0	0	7	21	0	0	27	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

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4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 16 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (296)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	July	August	September	October	November	December
1	03.45	04.55	06.20	07.39 18.24-18.32/8	08.04	09.28 12.14-12.47/33
	23.30	22.24	20.47	19.08	16.30	15.17
2	03.46	04.57	06.22	07.41 18.25-18.28/3	08.07	09.31 12.14-12.46/32
	23.29	22.21	20.44	19.05	16.27	15.15
3	03.47	05.00	06.25	07.44	08.10	09.33 12.15-12.46/31
	23.28	22.18	20.41	19.01	16.24	15.13
4	03.49	05.03	06.28	07.47	08.13	09.35 12.16-12.47/31
	23.27	22.15	20.37	18.58	16.21	15.12
5	03.50	05.06	06.30	07.49	08.16	09.38 12.17-12.47/30
	23.25	22.12	20.34	18.55	16.18	15.11
6	03.52	05.08	06.33	07.52	08.19 12.22-12.28/6	09.40 12.17-12.47/30
	23.24	22.09	20.31	18.51	16.15	15.09
7	03.54	05.11	06.36	07.55	08.22 12.17-12.32/15	09.42 12.18-12.47/29
	23.22	22.06	20.27	18.48	16.13	15.08
8	03.56	05.14	06.38	07.57	08.25 12.15-12.35/20	09.44 12.19-12.47/28
	23.21	22.03	20.24	18.45	16.10	15.07
9	03.58	05.17	06.41	08.00	08.28 12.13-12.36/23	09.46 12.20-12.47/27
	23.19	22.00	20.21	18.42	16.07	15.06
10	04.00	05.20	06.43	08.03	08.31 12.13-12.38/25	09.48 12.21-12.47/26
	23.17	21.57	20.17	18.38	16.04	15.05
11	04.02	05.22	06.46	08.05	08.34 12.11-12.39/28	09.49 12.21-12.47/26
	23.16	21.54	20.14	18.35	16.02	15.04
12	04.04	05.25	06.49	08.08	08.36 12.11-12.40/29	09.51 12.23-12.47/24
	23.14	21.51	20.11	18.32	15.59	15.04
13	04.06	05.28	06.51	08.11	08.39 12.10-12.41/31	09.53 12.23-12.47/24
	23.12	21.48	20.07	18.29	15.56	15.03
14	04.08	05.31	06.54	08.14	08.42 12.10-12.42/32	09.54 12.24-12.47/23
	23.10	21.45	20.04	18.26	15.54	15.02
15	04.10	05.33	06.57	08.16	08.45 12.09-12.42/33	09.55 12.24-12.47/23
	23.08	21.42	20.01	18.22	15.51	15.02
16	04.13	05.36	06.59	08.19	08.48 12.09-12.43/34	09.57 12.25-12.48/23
	23.05	21.39	19.57	18.19	15.49	15.02
17	04.15	05.39	07.02	08.22	08.51 12.09-12.43/34	09.58 12.26-12.48/22
	23.03	21.36	19.54	18.16	15.46	15.02
18	04.18	05.42	07.04	08.25	08.54 12.09-12.44/35	09.59 12.27-12.48/21
	23.01	21.32	19.51	18.13	15.44	15.02
19	04.20	05.44	07.07	08.27	08.57 12.09-12.45/36	10.00 12.27-12.48/21
	22.58	21.29	19.48	18.10	15.41	15.02
20	04.23	05.47	07.10	08.30	08.59 12.09-12.44/35	10.01 12.28-12.49/21
	22.56	21.26	19.44	18.06	15.39	15.02
21	04.25	05.50	07.12	08.33	09.02 12.10-12.45/35	10.01 12.28-12.49/21
	22.54	21.23	19.41	18.03	15.37	15.02
22	04.28	05.53	07.15 18.34-18.41/7	08.36	09.05 12.09-12.45/36	10.02 12.28-12.49/21
	22.51	21.20	19.38	18.00	15.34	15.03
23	04.30	05.55	07.18 18.31-18.44/13	08.39	09.08 12.10-12.46/36	10.02 12.30-12.50/20
	22.49	21.16	19.34	17.57	15.32	15.03
24	04.33	05.58	07.20 18.28-18.45/17	08.42	09.10 12.10-12.45/35	10.03 12.30-12.51/21
	22.46	21.13	19.31	17.54	15.30	15.04
25	04.36	06.01	07.23 18.27-18.46/19	07.44	09.13 12.11-12.46/35	10.03 12.30-12.52/22
	22.43	21.10	19.28	16.51	15.28	15.04
26	04.38	06.04	07.25 18.26-18.46/20	07.47	09.16 12.12-12.46/34	10.03 12.30-12.52/22
	22.41	21.07	19.24	16.48	15.26	15.05
27	04.41	06.06	07.28 18.25-18.45/20	07.50	09.18 12.12-12.46/34	10.03 12.31-12.53/22
	22.38	21.03	19.21	16.45	15.24	15.06
28	04.44	06.09	07.31 18.25-18.42/17	07.53	09.21 12.13-12.47/34	10.03 12.31-12.54/23
	22.35	21.00	19.18	16.42	15.22	15.07
29	04.46	06.12	07.33 18.25-18.39/14	07.56	09.24 12.13-12.46/33	10.03 12.31-12.54/23
	22.33	20.57	19.14	16.39	15.20	15.09
30	04.49	06.14	07.36 18.24-18.35/11	07.59	09.26 12.13-12.46/33	10.03 12.31-12.54/23
	22.30	20.54	19.11	16.36	15.18	15.10
31	04.52	06.17		08.02		10.02 12.31-12.55/24
	22.27	20.50		16.33		15.11
Potential sun hours	583	497	391	310	213	162
Sum of minutes with flicker	0	0	138	11	761	767

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

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SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 17 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (297)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	July	August	September		October		November		December	
1	03.45	04.55	06.20		07.39	17.46-18.15/29	08.04		09.28	10.41-10.52/11
	23.30	22.24	20.47		19.08		16.30		15.17	
2	03.46	04.57	06.22		07.41	17.46-18.16/30	08.07		09.31	10.44-10.50/6
	23.29	22.21	20.44		19.04		16.27		15.15	
3	03.47	05.00	06.25		07.44	17.45-18.15/30	08.10	10.36-10.46/10	09.33	
	23.28	22.18	20.40		19.01		16.24		15.13	
4	03.49	05.03	06.28		07.47	17.45-18.15/30	08.13	10.33-10.48/15	09.35	
	23.27	22.15	20.37		18.58		16.21		15.12	
5	03.50	05.06	06.30		07.49	17.45-18.15/30	08.16	10.31-10.50/19	09.38	
	23.25	22.12	20.34		18.55		16.18		15.11	
6	03.52	05.08	06.33		07.52	17.45-18.14/29	08.19	10.30-10.52/22	09.40	
	23.24	22.09	20.31		18.51		16.15		15.09	
7	03.54	05.11	06.36		07.55	17.45-18.12/27	08.22	10.28-10.53/25	09.42	
	23.22	22.06	20.27		18.48		16.12		15.08	
8	03.56	05.14	06.38		07.57	17.45-18.07/22	08.25	10.28-10.54/26	09.44	
	23.21	22.03	20.24		18.45		16.10		15.07	
9	03.58	05.17	06.41		08.00	17.45-18.04/19	08.28	10.27-10.55/28	09.46	
	23.19	22.00	20.21		18.42		16.07		15.06	
10	04.00	05.20	06.43		08.03	17.46-18.01/15	08.31	10.27-10.56/29	09.48	
	23.17	21.57	20.17		18.38		16.04		15.05	
11	04.02	05.22	06.46		08.05	17.48-17.58/10	08.34	10.27-10.56/29	09.49	
	23.16	21.54	20.14		18.35		16.01		15.04	
12	04.04	05.25	06.49		08.08	17.49-17.54/5	08.36	10.27-10.57/30	09.51	
	23.14	21.51	20.11		18.32		15.59		15.03	
13	04.06	05.28	06.51		08.11		08.39	10.26-10.57/31	09.52	
	23.12	21.48	20.07		18.29		15.56		15.03	
14	04.08	05.31	06.54		08.14		08.42	10.27-10.57/30	09.54	
	23.10	21.45	20.04		18.25		15.54		15.02	
15	04.10	05.33	06.57		08.16		08.45	10.26-10.57/31	09.55	
	23.07	21.42	20.01		18.22		15.51		15.02	
16	04.13	05.36	06.59		08.19		08.48	10.27-10.58/31	09.57	
	23.05	21.39	19.57		18.19		15.48		15.02	
17	04.15	05.39	07.02		08.22		08.51	10.27-10.57/30	09.58	
	23.03	21.36	19.54		18.16		15.46		15.02	
18	04.18	05.42	07.04		08.25		08.54	10.28-10.57/29	09.59	
	23.01	21.32	19.51		18.13		15.44		15.02	
19	04.20	05.44	07.07		08.27		08.57	10.28-10.58/30	10.00	
	22.58	21.29	19.47		18.10		15.41		15.02	
20	04.23	05.47	07.10		08.30		08.59	10.28-10.57/29	10.01	
	22.56	21.26	19.44		18.06		15.39		15.02	
21	04.25	05.50	07.12		08.33		09.02	10.29-10.58/29	10.01	
	22.54	21.23	19.41		18.03		15.36		15.02	
22	04.28	05.53	07.15		08.36		09.05	10.30-10.57/27	10.02	
	22.51	21.20	19.38		18.00		15.34		15.02	
23	04.30	05.55	07.18		08.39		09.08	10.31-10.57/26	10.02	
	22.49	21.16	19.34		17.57		15.32		15.03	
24	04.33	05.58	07.20		08.41		09.10	10.31-10.56/25	10.03	
	22.46	21.13	19.31		17.54		15.30		15.04	
25	04.36	06.01	07.23	17.57-18.09/12	07.44		09.13	10.32-10.56/24	10.03	
	22.43	21.10	19.28		16.51		15.28		15.04	
26	04.38	06.03	07.25	17.54-18.12/18	07.47		09.16	10.34-10.56/22	10.03	
	22.41	21.07	19.24		16.48		15.26		15.05	
27	04.41	06.06	07.28	17.51-18.13/22	07.50		09.18	10.35-10.55/20	10.03	
	22.38	21.03	19.21		16.45		15.24		15.06	
28	04.44	06.09	07.31	17.50-18.14/24	07.53		09.21	10.36-10.55/19	10.03	
	22.35	21.00	19.18		16.42		15.22		15.07	
29	04.46	06.12	07.33	17.49-18.15/26	07.56		09.23	10.37-10.54/17	10.03	
	22.33	20.57	19.14		16.39		15.20		15.09	
30	04.49	06.14	07.36	17.47-18.15/28	07.59		09.26	10.38-10.53/15	10.02	
	22.30	20.54	19.11		16.36		15.18		15.10	
31	04.52	06.17			08.02				10.02	
	22.27	20.50			16.33				15.11	
Potential sun hours	583	497	391		310		213		162	
Sum of minutes with flicker	0	0	130		276		698		17	

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

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SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 19 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (300)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February	March	April	May	June	July	August	September	October	November		December	
1	10.01	11.16-11.34/18	09.04	07.40	06.59	05.22	03.59	03.45	04.55	06.20	07.39	08.05		09.28	10.31-10.40/9
	15.14		16.32	17.54	20.19	21.43	23.06	23.30	22.24	20.47	19.08	16.30		15.17	11.02-11.21/19
2	10.01	11.16-11.35/19	09.01	07.37	06.56	05.19	03.57	03.46	04.58	06.23	07.41	08.07		09.31	10.34-10.40/6
	15.15		16.35	17.57	20.22	21.46	23.08	23.29	22.21	20.44	19.05	16.27		15.15	11.02-11.21/19
3	10.00	11.16-11.35/19	08.59	07.34	06.52	05.16	03.55	03.48	05.00	06.25	07.44	08.10		09.33	10.37-10.39/2
	15.17		16.38	18.00	20.25	21.49	23.10	23.28	22.18	20.41	19.01	16.24		15.14	11.02-11.21/19
4	09.59	11.18-11.36/18	08.56	07.31	06.49	05.13	03.54	03.49	05.03	06.28	07.47	08.13		09.35	11.03-11.23/20
	15.19		16.41	18.03	20.28	21.51	23.13	23.26	22.15	20.37	18.58	16.21		15.12	
5	09.58	11.17-11.36/19	08.53	07.28	06.46	05.10	03.52	03.51	05.06	06.30	07.49	08.16		09.38	11.04-11.23/19
	15.21		16.44	18.06	20.30	21.54	23.15	23.25	22.12	20.34	18.55	16.18		15.11	
6	09.57	11.18-11.37/19	08.50	07.24	06.42	05.07	03.50	03.53	05.09	06.33	07.52	08.19		09.40	11.04-11.23/19
	15.23		16.47	18.08	20.33	21.57	23.16	23.24	22.09	20.31	18.52	16.16		15.10	
7	09.56	11.18-11.37/19	08.48	07.21	06.39	05.04	03.49	03.54	05.12	06.36	07.55	08.22		09.42	11.04-11.23/19
	15.25		16.50	18.11	20.36	22.00	23.18	23.22	22.06	20.27	18.48	16.13		15.08	
8	09.55	11.19-11.38/19	08.45	07.18	06.36	05.01	03.47	03.56	05.14	06.38	07.57	08.25		09.44	11.05-11.24/19
	15.27		16.53	18.14	20.39	22.03	23.20	23.21	22.03	20.24	18.45	16.10		15.07	
9	09.53	10.54-10.56/2	08.42	07.15	06.33	04.58	03.46	03.58	05.17	06.41	08.00	08.28		09.46	11.05-11.24/19
	15.29	11.19-11.38/19	16.56	18.17	20.41	22.06	23.22	23.19	22.00	20.21	18.42	16.07		15.06	
10	09.52	10.52-10.58/6	08.39	07.11	06.29	04.55	03.45	04.00	05.20	06.44	08.03	08.31		09.48	11.05-11.24/19
	15.32	11.20-11.39/19	16.59	18.19	20.44	22.08	23.23	23.17	21.57	20.18	18.39	16.05		15.05	
11	09.50	10.49-10.58/9	08.36	07.08	06.26	04.52	03.44	04.02	05.23	06.46	08.06	08.34		09.49	11.06-11.25/19
	15.34	11.20-11.39/19	17.02	18.22	20.47	22.11	23.25	23.15	21.54	20.14	18.35	16.02		15.05	
12	09.49	10.46-10.58/12	08.33	07.05	06.23	04.49	03.43	04.04	05.25	06.49	08.08	08.36		09.51	11.07-11.26/19
	15.36	11.21-11.39/18	17.05	18.25	20.50	22.14	23.26	23.14	21.51	20.11	18.32	15.59		15.04	
13	09.47	10.44-11.00/16	08.30	07.02	06.19	04.46	03.42	04.06	05.28	06.52	08.11	08.39	10.08-10.16/8	09.52	11.07-11.26/19
	15.39	11.22-11.39/17	17.08	18.28	20.52	22.17	23.27	23.12	21.48	20.08	18.29	15.57		15.03	
14	09.45	10.41-11.00/19	08.27	06.58	06.16	04.43	03.41	04.09	05.31	06.54	08.14	08.42	10.07-10.19/12	09.54	11.08-11.26/18
	15.41	11.22-11.39/17	17.11	18.30	20.55	22.20	23.28	23.10	21.45	20.04	18.26	15.54		15.03	
15	09.43	10.38-11.00/22	08.24	06.55	06.13	04.41	03.40	04.11	05.34	06.57	08.17	08.45	10.06-10.20/14	09.55	11.10-11.26/16
	15.44	11.23-11.39/16	17.14	18.33	20.58	22.23	23.29	23.07	21.42	20.01	18.23	15.51		15.02	
16	09.42	10.35-11.01/26	08.21	06.52	06.10	04.38	03.40	04.13	05.36	06.59	08.19	08.48	10.05-10.21/16	09.57	11.12-11.27/15
	15.47	11.24-11.38/14	17.17	18.36	21.01	22.25	23.30	23.05	21.39	19.58	18.19	15.49	10.24-10.31/7	15.02	
17	09.40	10.32-11.01/29	08.18	06.48	06.06	04.35	03.39	04.16	05.39	07.02	08.22	08.51	10.04-10.21/17	09.58	11.13-11.26/13
	15.49	11.25-11.38/13	17.20	18.39	21.03	22.28	23.31	23.03	21.36	19.54	18.16	15.46	10.22-10.33/11	15.02	
18	09.38	10.29-11.01/32	08.15	06.45	06.03	04.32	03.39	04.18	05.42	07.05	08.25	08.54	10.05-10.35/30	09.59	11.15-11.27/12
	15.52	11.26-11.37/11	17.23	18.41	21.06	22.31	23.32	23.01	21.32	19.51	18.13	15.44		15.02	
19	09.36	10.29-11.02/33	08.12	06.42	06.00	04.30	03.38	04.20	05.45	07.07	08.28	08.57	10.05-10.36/31	10.00	11.16-11.28/12
	15.55	11.28-11.36/8	17.26	18.44	21.09	22.34	23.32	22.58	21.29	19.48	18.10	15.41		15.02	
20	09.33	10.29-11.02/33	08.09	06.39	05.57	04.27	03.38	04.23	05.47	07.10	08.30	08.59	10.05-10.37/32	10.00	11.17-11.28/11
	15.57		17.28	18.47	21.12	22.36	23.33	22.56	21.26	19.44	18.07	15.39		15.02	
21	09.31	10.29-11.02/33	08.06	06.35	05.53	04.24	03.38	04.26	05.50	07.12	08.33	09.02	10.05-10.38/33	10.01	11.18-11.29/11
	16.00		17.31	18.50	21.15	22.39	23.33	22.54	21.23	19.41	18.04	15.37		15.03	
22	09.29	10.30-11.02/32	08.03	06.32	05.50	04.22	03.39	04.28	05.53	07.15	08.36	09.05	10.05-10.38/33	10.02	11.18-11.29/11
	16.03		17.34	18.52	21.17	22.42	23.33	22.51	21.20	19.38	18.00	15.35		15.03	
23	09.27	10.30-11.01/31	07.59	06.29	05.47	04.19	03.39	04.31	05.56	07.18	08.39	09.08	10.06-10.39/33	10.02	11.18-11.29/11
	16.06		17.37	18.55	21.20	22.44	23.33	22.49	21.16	19.34	17.57	15.32	11.05-11.13/8	15.03	
24	09.24	10.31-11.01/30	07.56	06.25	05.44	04.17	03.39	04.33	05.58	07.20	08.42	09.10	10.06-10.38/32	10.03	11.19-11.30/11
	16.09		17.40	18.58	21.23	22.47	23.33	22.46	21.13	19.31	17.54	15.30	11.03-11.14/11	15.04	
25	09.22	10.32-10.48/16	07.53	06.22	05.41	04.14	03.40	04.36	06.01	07.23	07.44	09.13	10.10-10.39/29	10.03	11.18-11.30/12
	16.12	10.49-11.00/11	17.43	19.00	21.26	22.49	23.33	22.43	21.10	19.28	16.51	15.28	11.03-11.16/13	15.05	
26	09.20	10.33-10.48/15	07.50	06.19	05.38	04.12	03.40	04.39	06.04	07.26	07.47	09.16	10.14-10.40/26	10.03	11.18-11.31/13
	16.14	10.51-10.58/7	17.46	19.03	21.29	22.52	23.33	22.41	21.07	19.24	16.48	15.26	11.03-11.18/15	15.06	
27	09.17	10.34-10.48/14	07.47	06.15	05.34	04.10	03.41	04.41	06.06	07.28	07.50	09.18	10.17-10.40/23	10.03	11.17-11.31/14
	16.17		17.49	19.06	21.31	22.54	23.32	22.38	21.04	19.21	16.45	15.24	11.02-11.18/16	15.07	
28	09.15	10.34-10.46/12	07.44	06.12	05.31	04.08	03.42	04.44	06.09	07.31	07.53	09.21	10.21-10.40/19	10.03	11.17-11.33/16
	16.20		17.51	19.09	21.34	22.57	23.32	22.35	21.00	19.18	16.42	15.22	11.03-11.19/16	15.08	
29	09.12	10.36-10.44/8		07.09	05.28	04.05	03.43	04.47	06.12	07.34	07.56	09.23	10.24-10.40/16	10.03	11.16-11.33/17
	16.23			20.11	21.37	22.59	23.31	22.33	20.57	19.15	16.39	15.20	11.02-11.20/18	15.09	
30	09.09			07.06	05.25	04.03	03.44	04.49	06.15	07.36	07.59	09.26	10.27-10.40/13	10.02	11.15-11.33/18
	16.26			20.14	21.40	23.02	23.31	22.30	20.54	19.11	16.36	15.19	11.02-11.20/18	15.10	
31	09.07			07.02		04.01		04.52	06.17		08.02			10.02	11.16-11.34/18
	16.29			20.17		23.04		22.27	20.50		16.33			15.12	
Potential sun hours	191		246	364	444	551	591	583	497	391	310	213		162	
Sum of minutes with flicker	769		0	0	0	0	0	0	0	0	0	550		514	

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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 21 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (302)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.01	09.04 10.11-10.37/26	07.40	06.59	05.22	03.59	03.45	04.55	06.20	07.39	08.05 08.46-09.20/34	09.28
	15.14	16.32	17.54	20.19	21.43	23.06	23.30	22.24	20.47	19.08	16.30 09.48-10.00/12	15.17
2	10.01	09.01 10.11-10.36/25	07.37	06.56	05.19	03.57	03.46	04.58	06.22	07.41	08.07 08.49-09.19/30	09.31
	15.15	16.35	17.57	20.22	21.46	23.08	23.29	22.21	20.44	19.05	16.27 09.45-10.02/17	15.15
3	10.00	08.59 09.39-09.43/4	07.34	06.52	05.16	03.55	03.48	05.00	06.25	07.44	08.10 08.53-08.58/5 09.45-10.04/19	09.33
	15.17	16.38 10.11-10.36/25	18.00	20.25	21.49	23.11	23.28	22.18	20.41	19.01	16.24 08.59-09.20/21	15.14
4	09.59	08.56 09.36-09.46/10	07.31	06.49	05.13	03.54	03.49	05.03	06.28	07.47	08.13 08.59-09.19/20	09.35
	15.19	16.41 10.12-10.36/24	18.03	20.28	21.51	23.13	23.26	22.15	20.37	18.58	16.21 09.43-10.04/21	15.12
5	09.58	08.53 09.33-09.48/15	07.28	06.46	05.10	03.52	03.51	05.06	06.30	07.49	08.16 09.00-09.19/19	09.38
	15.21	16.44 10.13-10.36/23	18.05	20.30	21.54	23.15	23.25	22.12	20.34	18.55	16.18 09.43-10.06/23	15.11
6	09.57	08.50 09.30-09.48/18	07.24	06.42	05.07	03.50	03.52	05.09	06.33	07.52	08.19 09.03-09.17/14	09.40
	15.23	16.47 10.13-10.35/22	18.08	20.33	21.57	23.16	23.24	22.10	20.31	18.52	16.16 09.43-10.06/23	15.10
7	09.56	08.48 09.29-09.49/20	07.21	06.39	05.04	03.49	03.54	05.11	06.36	07.55	08.22 09.06-09.15/9	09.42
	15.25	16.50 10.14-10.35/21	18.11	20.36	22.00	23.18	23.22	22.07	20.27	18.48	16.13 09.42-10.06/24	15.08
8	09.55	08.45 09.23-09.50/27	07.18	06.36	05.01	03.47	03.56	05.14	06.38	07.57	08.25 09.10-09.14/4	09.44
	15.27	16.53 10.15-10.34/19	18.14	20.39	22.03	23.20	23.21	22.04	20.24	18.45	16.10 09.42-10.07/25	15.07
9	09.53	08.42 09.19-09.50/31	07.15	06.32	04.58	03.46	03.58	05.17	06.41	08.00	08.28 09.42-10.07/25	09.46
	15.29	16.56 10.16-10.32/16	18.17	20.41	22.06	23.22	23.19	22.00	20.21	18.42	16.07	15.06
10	09.52	08.39 09.16-09.51/35	07.11	06.29	04.55	03.45	04.00	05.20	06.44	08.03	08.31 09.42-10.07/25	09.48
	15.32	16.59 10.19-10.30/11	18.19	20.44	22.09	23.23	23.17	21.57	20.17	18.39	16.04	15.05
11	09.50	08.36 09.14-09.51/37	07.08	06.26	04.52	03.44	04.02	05.23	06.46	08.06	08.34 09.42-10.07/25	09.49
	15.34	17.02	18.22	20.47	22.11	23.25	23.16	21.54	20.14	18.35	16.02	15.05
12	09.49	08.33 09.13-09.51/38	07.05	06.23	04.49	03.42	04.04	05.25	06.49	08.08	08.37 09.43-10.07/24	09.51
	15.36	17.05	18.25	20.50	22.14	23.26	23.14	21.51	20.11	18.32	15.59	15.04
13	09.47	08.30 09.13-09.51/38	07.02	06.19	04.46	03.42	04.06	05.28	06.52	08.11	08.39 09.43-10.07/24	09.52
	15.39	17.08	18.28	20.52	22.17	23.27	23.12	21.48	20.08	18.29	15.56	15.03
14	09.45	08.27 09.13-09.51/38	06.58	06.16	04.43	03.41	04.08	05.31	06.54	08.14	08.42 09.44-10.07/23	09.54
	15.41	17.11	18.30	20.55	22.20	23.28	23.10	21.45	20.04	18.26	15.54	15.03
15	09.43	08.24 09.12-09.49/37	06.55	06.13	04.40	03.40	04.11	05.34	06.57	08.17	08.45 09.44-10.06/22	09.55
	15.44	17.14	18.33	20.58	22.23	23.29	23.07	21.42	20.01	18.22	15.51	15.02
16	09.42	08.21 09.12-09.49/37	06.52	06.10	04.38	03.39	04.13	05.36	06.59	08.19	08.48 09.45-10.06/21	09.57
	15.46	17.17	18.36	21.01	22.25	23.30	23.05	21.39	19.58	18.19	15.49	15.02
17	09.40	08.18 09.13-09.48/35	06.48	06.06	04.35	03.39	04.15	05.39	07.02	08.22	08.51 09.45-10.05/20	09.58
	15.49	17.20	18.39	21.03	22.28	23.31	23.03	21.36	19.54	18.16	15.46	15.02
18	09.38	08.15 09.13-09.45/32	06.45	06.03	04.32	03.39	04.18	05.42	07.05	08.25	08.54 09.47-10.05/18	09.59
	15.52	17.23	18.41	21.06	22.31	23.32	23.01	21.32	19.51	18.13	15.44	15.02
19	09.36	08.12 09.14-09.33/19	06.42	06.00	04.30	03.38	04.20	05.45	07.07	08.28	08.57 09.49-10.04/15	10.00
	15.55	17.25 09.37-09.41/4	18.44	21.09	22.34	23.32	22.58	21.29	19.48	18.10	15.41	15.02
20	09.33	08.09 09.15-09.32/17	06.39	05.57	04.27	03.38	04.23	05.47	07.10	08.30 09.48-09.59/11	08.59 09.52-10.02/10	10.01
	15.57	17.28	18.47	21.12	22.36	23.33	22.56	21.26	19.44	18.07	15.39	15.02
21	09.31 10.20-10.25/5	08.06 09.16-09.30/14	06.35	05.53	04.24	03.38	04.25	05.50	07.12	08.33 09.46-10.01/15	09.02 09.56-10.01/5	10.01
	16.00	17.31	18.50	21.15	22.39	23.33	22.54	21.23	19.41	18.04	15.37	15.02
22	09.29 10.17-10.27/10	08.03 09.18-09.27/9	06.32	05.50	04.22	03.38	04.28	05.53	07.15	08.36 09.45-10.02/17	09.05	10.02
	16.03	17.34	18.52	21.17	22.42	23.33	22.51	21.20	19.38	18.00	15.34	15.03
23	09.27 10.14-10.29/15	07.59	06.29	05.47	04.19	03.39	04.31	05.56	07.18	08.39 09.44-10.03/19	09.08	10.02
	16.06	17.37	18.55	21.20	22.44	23.34	22.49	21.16	19.34	17.57 10.06-10.13/7	15.32	15.03
24	09.24 10.13-10.31/18	07.56	06.25	05.44	04.17	03.39	04.33	05.58	07.20	08.42 09.43-10.16/33	09.10	10.03
	16.09	17.40	18.58	21.23	22.47	23.33	22.46	21.13	19.31	17.54	15.30	15.04
25	09.22 10.12-10.32/20	07.53	06.22	05.41	04.14	03.40	04.36	06.01	07.23	07.44 08.42-09.17/35	09.13	10.03
	16.11	17.43	19.00	21.26	22.49	23.33	22.43	21.10	19.28	16.51	15.28	15.05
26	09.20 10.12-10.33/21	07.50	06.19	05.37	04.12	03.40	04.38	06.04	07.26	07.47 08.43-09.19/36	09.16	10.03
	16.14	17.46	19.03	21.29	22.52	23.33	22.41	21.07	19.24	16.48	15.26	15.06
27	09.17 10.12-10.34/22	07.47	06.15	05.34	04.10	03.41	04.41	06.06	07.28	07.50 08.42-09.20/38	09.18	10.03
	16.17	17.49	19.06	21.31	22.54	23.33	22.38	21.04	19.21	16.45	15.24	15.07
28	09.15 10.11-10.34/23	07.44	06.12	05.31	04.07	03.42	04.44	06.09	07.31	07.53 08.42-09.20/38	09.21	10.03
	16.20	17.51	19.09	21.34	22.57	23.32	22.35	21.00	19.18	16.42	15.22	15.08
29	09.12 10.11-10.35/24		07.09	05.28	04.05	03.43	04.47	06.12	07.33	07.56 08.42-09.20/38	09.24	10.03
	16.23		20.11	21.37	22.59	23.31	22.33	20.57	19.15	16.39	15.20	15.09
30	09.09 10.11-10.36/25		07.05	05.25	04.03	03.44	04.49	06.14	07.36	07.59 08.43-09.21/38	09.26	10.02
	16.26		20.14	21.40	23.02	23.31	22.30	20.54	19.11	16.36	15.19	15.10
31	09.07 10.11-10.36/25		07.02		04.01		04.52	06.17		08.02 08.44-09.21/37		10.02
	16.29		20.17		23.04		22.27	20.50		16.33 09.52-09.56/4		15.12
Potential sun hours	191	246	364	444	551	591	583	497	391	310	213	162
Sum of minutes with flicker	208	727	0	0	0	0	0	0	0	366	577	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

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Calculated:
4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 23 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (304)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March	April	May	June
1	10.01 11.33-11.53/20	09.04 10.31-11.10/39	07.41	06.59	05.22	03.59
	15.14	16.32	17.54	20.19	21.43	23.06
2	10.01 11.33-11.54/21	09.02 10.31-10.53/22	07.37	06.56	05.19	03.57
	15.15	16.35 10.54-11.08/14	17.57	20.22	21.46	23.08
3	10.00 11.33-11.54/21	08.59 10.32-10.52/20	07.34	06.52	05.16	03.55
	15.17	16.38 10.57-11.05/8	18.00	20.25	21.49	23.11
4	09.59 11.34-11.56/22	08.56 10.34-10.52/18	07.31	06.49	05.13	03.54
	15.19	16.41	18.03	20.28	21.51	23.13
5	09.58 11.34-11.56/22	08.53 10.35-10.51/16	07.28	06.46	05.10	03.52
	15.21	16.44	18.06	20.30	21.54	23.15
6	09.57 11.34-11.56/22	08.50 10.37-10.48/11	07.24	06.42	05.07	03.50
	15.23	16.47	18.08	20.33	21.57	23.16
7	09.56 11.34-11.57/23	08.48 10.42-10.43/1	07.21	06.39	05.04	03.49
	15.25	16.50	18.11	20.36	22.00	23.18
8	09.55 11.35-11.58/23	08.45	07.18	06.36	05.01	03.47
	15.27	16.53	18.14	20.39	22.03	23.20
9	09.53 10.54-10.55/1	08.42	07.15	06.33	04.58	03.46
	15.29 11.35-11.59/24	16.56	18.17	20.41	22.06	23.22
10	09.52 10.52-10.59/7	08.39	07.11	06.29	04.55	03.45
	15.32 11.35-12.00/25	16.59	18.19	20.44	22.09	23.23
11	09.50 10.50-11.01/11	08.36	07.08	06.26	04.52	03.44
	15.34 11.35-12.00/25	17.02	18.22	20.47	22.11	23.25
12	09.49 10.49-11.02/13	08.33	07.05	06.23	04.49	03.43
	15.36 11.35-12.00/25	17.05	18.25	20.50	22.14	23.26
13	09.47 10.49-11.04/15	08.30	07.02	06.19	04.46	03.42
	15.39 11.36-12.01/25	17.08	18.28	20.52	22.17	23.27
14	09.45 10.48-11.05/17	08.27	06.58	06.16	04.43	03.41
	15.41 11.36-12.01/25	17.11	18.30	20.55	22.20	23.28
15	09.43 10.47-11.06/19	08.24	06.55	06.13	04.40	03.40
	15.44 11.37-12.02/25	17.14	18.33	20.58	22.23	23.29
16	09.42 10.35-10.42/7 11.37-12.02/25	08.21	06.52	06.10	04.38	03.40
	15.47 10.47-11.07/20	17.17	18.36	21.01	22.25	23.30
17	09.40 10.32-10.44/12 11.37-12.02/25	08.18	06.48	06.06	04.35	03.39
	15.49 10.47-11.08/21	17.20	18.39	21.03	22.28	23.31
18	09.38 10.31-10.45/14 11.38-12.02/24	08.15	06.45	06.03	04.32	03.39
	15.52 10.46-11.08/22	17.23	18.41	21.06	22.31	23.32
19	09.36 10.30-11.09/39	08.12	06.42	06.00	04.30	03.38
	15.55 11.38-12.02/24	17.26	18.44	21.09	22.34	23.32
20	09.33 10.30-11.10/40	08.09	06.39	05.57	04.27	03.38
	15.57 11.39-12.02/23	17.28	18.47	21.12	22.36	23.33
21	09.31 10.29-11.10/41	08.06	06.35	05.53	04.24	03.38
	16.00 11.39-12.02/23	17.31	18.50	21.15	22.39	23.33
22	09.29 10.29-11.11/42	08.03	06.32	05.50	04.22	03.38
	16.03 11.40-12.02/22	17.34	18.52	21.17	22.42	23.33
23	09.27 10.29-11.11/42	08.00	06.29	05.47	04.19	03.39
	16.06 11.41-12.02/21	17.37	18.55	21.20	22.44	23.34
24	09.24 10.29-11.12/43	07.56	06.25	05.44	04.17	03.39
	16.09 11.42-12.01/19	17.40	18.58	21.23	22.47	23.33
25	09.22 10.29-11.12/43	07.53	06.22	05.41	04.14	03.40
	16.12 11.44-12.00/16	17.43	19.00	21.26	22.49	23.33
26	09.20 10.29-11.12/43	07.50	06.19	05.38	04.12	03.40
	16.14 11.46-11.59/13	17.46	19.03	21.29	22.52	23.33
27	09.17 10.29-11.12/43	07.47	06.15	05.34	04.10	03.41
	16.17 11.48-11.57/9	17.49	19.06	21.32	22.54	23.33
28	09.15 10.29-11.11/42	07.44	06.12	05.31	04.08	03.42
	16.20	17.51	19.09	21.34	22.57	23.32
29	09.12 10.29-11.11/42		07.09	05.28	04.05	03.43
	16.23		20.11	21.37	22.59	23.31
30	09.09 10.30-11.11/41		07.06	05.25	04.03	03.44
	16.26		20.14	21.40	23.02	23.31
31	09.07 10.31-11.11/40		07.02		04.01	
	16.29		20.17		23.04	
Potential sun hours	191	246	364	444	551	591
Sum of minutes with flicker	1312	149	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

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4.3.2021 12.19/3.4.388

SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 24 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (305)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February		March		April		May	June
1	10.02		09.04		07.41	09.30-09.51/21	06.59	08.27-08.59/32	05.22	04.00
	15.14		16.32		17.55	08.47-09.25/38	20.20		21.43	23.06
2	10.01		09.02	09.50-09.57/7	07.38	09.32-09.48/16	06.56	08.28-08.58/30	05.19	03.58
	15.16		16.35		17.57	08.47-09.24/37	20.22		21.46	23.09
3	10.00		08.59	09.47-10.01/14	07.34	09.37-09.43/6	06.53	08.29-08.57/28	05.16	03.56
	15.18		16.38		18.00	08.47-09.24/37	20.25		21.49	23.11
4	09.59		08.56	09.45-10.04/19	07.31	08.47-09.24/37	06.49	08.29-08.54/25	05.13	03.54
	15.19		16.41		18.03		20.28		21.52	23.13
5	09.58		08.53	09.43-10.06/23	07.28	08.47-09.23/36	06.46	08.32-08.51/19	05.10	03.52
	15.21		16.44		18.06		20.31		21.55	23.15
6	09.57		08.51	09.39-10.07/28	07.25	08.48-09.22/34	06.43	08.35-08.47/12	05.07	03.51
	15.23		16.47		18.09		20.33		21.57	23.17
7	09.56		08.48	09.35-10.08/33	07.21	08.48-09.21/33	06.39		05.04	03.49
	15.25		16.50		18.11		20.36		22.00	23.18
8	09.55		08.45	09.33-10.10/37	07.18	08.49-09.20/31	06.36		05.01	03.48
	15.27		16.53		18.14		20.39		22.03	23.20
9	09.53		08.42	09.31-10.11/40	07.15	08.50-09.18/28	06.33		04.58	03.46
	15.30		16.56		18.17		20.42		22.06	23.22
10	09.52		08.39	09.29-10.11/42	07.12	08.51-09.16/25	06.30		04.55	03.45
	15.32		16.59		18.20		20.44		22.09	23.23
11	09.50		08.36	09.28-10.12/44	07.08	08.53-09.14/21	06.26		04.52	03.44
	15.34		17.02		18.22		20.47		22.12	23.25
12	09.49	14.32-14.35/3	08.33	09.27-10.13/46	07.05	08.55-09.11/16	06.23		04.49	03.43
	15.37		17.05		18.25		20.50		22.14	23.26
13	09.47	14.33-14.39/6	08.30	09.26-10.12/46	07.02	09.00-09.04/4	06.20		04.46	03.42
	15.39		17.08		18.28	07.43-07.55/12	20.53		22.17	23.27
14	09.45	14.32-14.42/10	08.27	09.25-10.13/48	06.59	07.39-07.59/20	06.16		04.44	03.41
	15.42		17.11		18.31		20.55		22.20	23.29
15	09.44	14.32-14.45/13	08.24	09.25-10.13/48	06.55	07.37-08.01/24	06.13		04.41	03.40
	15.44		17.14		18.33		20.58		22.23	23.30
16	09.42	14.32-14.49/17	08.21	09.24-10.13/49	06.52	07.34-08.02/28	06.10		04.38	03.40
	15.47		17.17		18.36		21.01		22.26	23.31
17	09.40	14.32-14.51/19	08.18	09.24-10.13/49	06.49	07.33-08.04/31	06.07		04.35	03.39
	15.50		17.20	09.02-09.13/11	18.39		21.04		22.28	23.31
18	09.38	14.32-14.51/19	08.15	09.24-10.13/49	06.45	07.32-08.05/33	06.03		04.33	03.39
	15.52		17.23	08.59-09.16/17	18.42		21.06		22.31	23.32
19	09.36	14.33-14.52/19	08.12	09.23-10.12/49	06.42	07.30-08.05/35	06.00		04.30	03.39
	15.55		17.26	08.56-09.18/22	18.44		21.09		22.34	23.33
20	09.34	14.33-14.52/19	08.09	09.24-10.11/47	06.39	07.29-08.05/36	05.57		04.27	03.39
	15.58		17.29	08.54-09.20/26	18.47		21.12		22.37	23.33
21	09.31	14.34-14.52/18	08.06	09.24-10.11/47	06.36	07.28-08.06/38	05.54		04.25	03.39
	16.00		17.32	08.53-09.22/29	18.50		21.15		22.39	23.33
22	09.29	14.34-14.52/18	08.03	09.24-10.09/45	06.32	07.27-08.06/39	05.51		04.22	03.39
	16.03		17.35	08.51-09.22/31	18.53		21.18		22.42	23.34
23	09.27	14.35-14.52/17	08.00	09.25-10.09/44	06.29	07.27-08.06/39	05.47		04.20	03.39
	16.06		17.37	08.50-09.23/33	18.55		21.20		22.44	23.34
24	09.25	14.36-14.52/16	07.57	09.25-10.07/42	06.26	07.26-08.06/40	05.44		04.17	03.40
	16.09		17.40	08.50-09.24/34	18.58		21.23		22.47	23.34
25	09.22	14.37-14.52/15	07.53	09.25-10.05/40	06.22	07.25-08.05/40	05.41		04.15	03.40
	16.12		17.43	08.48-09.24/36	19.01		21.26		22.50	23.33
26	09.20	14.38-14.51/13	07.50	09.26-10.03/37	06.19	07.25-08.05/40	05.38		04.12	03.41
	16.15		17.46	08.48-09.25/37	19.03		21.29		22.52	23.33
27	09.17	14.40-14.50/10	07.47	09.27-09.58/31	06.16	07.26-08.05/39	05.35		04.10	03.41
	16.18		17.49	08.47-09.24/37	19.06		21.32		22.55	23.33
28	09.15	14.44-14.48/4	07.44	09.28-09.53/25	06.12	07.25-08.04/39	05.32		04.08	03.42
	16.21		17.52	08.47-09.25/38	19.09		21.35		22.57	23.32
29	09.12				07.09	08.25-09.03/38	05.28		04.06	03.43
	16.24				20.12		21.37		23.00	23.32
30	09.10				07.06	08.26-09.02/36	05.25		04.04	03.44
	16.27				20.14		21.40		23.02	23.31
31	09.07				07.03	08.26-09.01/35			04.02	
	16.30				20.17				23.04	
Potential sun hours	191		246		364		444		551	591
Sum of minutes with flicker	236		1380		1062		146		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

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SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 25 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (306)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January	February	March		April	May		June	
1	10.01	09.04	07.40		06.59	05.22		03.59	05.20-05.43/23
	15.14	16.32	17.54		20.19	21.43		23.06	
2	10.00	09.01	07.37		06.55	05.19		03.57	05.21-05.44/23
	15.15	16.35	17.57		20.22	21.46		23.08	
3	10.00	08.59	07.34		06.52	05.16		03.55	05.22-05.44/22
	15.17	16.38	18.00		20.25	21.48		23.10	
4	09.59	08.56	07.31		06.49	05.13		03.54	05.21-05.43/22
	15.19	16.41	18.03		20.27	21.51		23.12	
5	09.58	08.53	07.28		06.46	05.10		03.52	05.22-05.43/21
	15.21	16.44	18.05		20.30	21.54		23.14	
6	09.57	08.50	07.24		06.42	05.07		03.50	05.23-05.43/20
	15.23	16.47	18.08		20.33	21.57		23.16	
7	09.56	08.47	07.21		06.39	05.04		03.49	05.23-05.42/19
	15.25	16.50	18.11		20.36	22.00		23.18	
8	09.54	08.45	07.18		06.36	05.01		03.47	05.24-05.42/18
	15.27	16.53	18.14		20.38	22.03		23.20	
9	09.53	08.42	07.15		06.32	04.58		03.46	05.24-05.42/18
	15.29	16.56	18.17		20.41	22.05		23.21	
10	09.52	08.39	07.11		06.29	04.55	05.33-05.36/3	03.45	05.26-05.42/16
	15.32	16.59	18.19		20.44	22.08		23.23	
11	09.50	08.36	07.08		06.26	04.52	05.30-05.37/7	03.44	05.26-05.41/15
	15.34	17.02	18.22		20.47	22.11		23.24	
12	09.48	08.33	07.05		06.23	04.49	05.28-05.39/11	03.43	05.26-05.41/15
	15.36	17.05	18.25		20.49	22.14		23.26	
13	09.47	08.30	07.01		06.19	04.46	05.25-05.40/15	03.42	05.27-05.41/14
	15.39	17.08	18.28		20.52	22.17		23.27	
14	09.45	08.27	06.58		06.16	04.43	05.23-05.41/18	03.41	05.27-05.40/13
	15.41	17.11	18.30		20.55	22.20		23.28	
15	09.43	08.24	06.55		06.13	04.40	05.21-05.42/21	03.40	05.28-05.40/12
	15.44	17.14	18.33		20.58	22.22		23.29	
16	09.41	08.21	06.52		06.10	04.38	05.19-05.42/23	03.39	05.29-05.41/12
	15.46	17.17	18.36		21.00	22.25		23.30	
17	09.39	08.18	06.48		06.06	04.35	05.18-05.43/25	03.39	05.30-05.41/11
	15.49	17.20	18.39		21.03	22.28		23.31	
18	09.37	08.15	06.45		06.03	04.32	05.18-05.43/25	03.39	05.30-05.41/11
	15.52	17.22	18.41		21.06	22.31		23.32	
19	09.35	08.12	06.42		06.00	04.30	05.18-05.44/26	03.38	05.31-05.41/10
	15.55	17.25	18.44		21.09	22.33		23.32	
20	09.33	08.09	06.38		05.57	04.27	05.18-05.44/26	03.38	05.31-05.41/10
	15.57	17.28	18.47		21.12	22.36		23.33	
21	09.31	08.06	06.35		05.53	04.24	05.18-05.45/27	03.38	05.31-05.41/10
	16.00	17.31	18.49		21.14	22.39		23.33	
22	09.29	08.02	06.32		05.50	04.22	05.18-05.45/27	03.38	05.31-05.41/10
	16.03	17.34	18.52		21.17	22.41		23.33	
23	09.27	07.59	06.29		05.47	04.19	05.18-05.45/27	03.39	05.31-05.41/10
	16.06	17.37	18.55		21.20	22.44		23.33	
24	09.24	07.56	06.25	18.22-18.24/2	05.44	04.17	05.18-05.45/27	03.39	05.31-05.42/11
	16.09	17.40	18.58		21.23	22.47		23.33	
25	09.22	07.53	06.22	18.22-18.27/5	05.41	04.14	05.18-05.45/27	03.40	05.31-05.42/11
	16.11	17.43	19.00		21.26	22.49		23.33	
26	09.19	07.50	06.19	18.22-18.29/7	05.37	04.12	05.18-05.45/27	03.40	05.31-05.43/12
	16.14	17.46	19.03		21.29	22.52		23.33	
27	09.17	07.47	06.15	18.23-18.32/9	05.34	04.10	05.18-05.44/26	03.41	05.31-05.43/12
	16.17	17.48	19.06		21.31	22.54		23.32	
28	09.14	07.44	06.12	18.25-18.35/10	05.31	04.07	05.19-05.45/26	03.42	05.31-05.43/12
	16.20	17.51	19.08		21.34	22.57		23.32	
29	09.12		07.09	19.27-19.32/5	05.28	04.05	05.19-05.44/25	03.43	05.31-05.44/13
	16.23		20.11		21.37	22.59		23.31	
30	09.09		07.05		05.25	04.03	05.19-05.44/25	03.44	05.31-05.45/14
	16.26		20.14		21.40	23.01		23.30	
31	09.07		07.02			04.01	05.20-05.44/24		
	16.29		20.17			23.04			
Potential sun hours	191	246	364		444	551		591	
Sum of minutes with flicker	0	0	38		0	488		440	

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

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SHADOW - Calendar per WTG

Calculation: Shadow_032021_no_forest_V162WTG: 26 - VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (307)

Assumptions for shadow calculations

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
811	698	499	412	477	705	1 141	1 297	688	616	663	636	8 643

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

	January		February	March	April	May		June	July		August		September	October	November	December	
1	10.01	11.58-12.14/16	09.04	07.41	06.59	05.22		03.59	03.45		04.55	21.07-21.35/28	06.20	07.39	08.05	09.28	11.51-11.55/4
	15.14		16.32	17.54	20.19	21.43		23.06	23.30		22.24		20.47	19.08	16.30	15.17	
2	10.01	11.59-12.14/15	09.01	07.37	06.56	05.19		03.57	03.47		04.58	21.08-21.35/27	06.23	07.42	08.07	09.31	11.49-11.57/8
	15.16		16.35	17.57	20.22	21.46		23.08	23.29		22.21		20.44	19.05	16.27	15.15	
3	10.00	11.59-12.15/16	08.59	07.34	06.52	05.16	21.05-21.08/3	03.56	03.48		05.01	21.08-21.35/27	06.25	07.44	08.10	09.33	11.48-11.58/10
	15.17		16.38	18.00	20.25	21.49		23.10	23.28		22.18		20.41	19.01	16.24	15.14	
4	09.59	12.01-12.16/15	08.56	07.31	06.49	05.13	21.03-21.11/8	03.54	03.49		05.03	21.08-21.32/24	06.28	07.47	08.13	09.35	11.48-12.00/12
	15.19		16.41	18.03	20.28	21.51		23.13	23.26		22.15		20.37	18.58	16.21	15.12	
5	09.58	12.00-12.15/15	08.53	07.28	06.46	05.10	21.02-21.13/11	03.52	03.51		05.06	21.09-21.30/21	06.31	07.50	08.16	09.38	11.48-12.01/13
	15.21		16.44	18.06	20.30	21.54		23.15	23.25		22.12		20.34	18.55	16.19	15.11	
6	09.57	12.01-12.15/14	08.50	07.24	06.42	05.07	21.00-21.15/15	03.50	03.53		05.09	21.09-21.27/18	06.33	07.52	08.19	09.40	11.48-12.01/13
	15.23		16.47	18.08	20.33	21.57		23.16	23.24		22.10		20.31	18.52	16.16	15.10	
7	09.56	12.03-12.15/12	08.48	07.21	06.39	05.04	21.00-21.18/18	03.49	03.54		05.12	21.11-21.25/14	06.36	07.55	08.22	09.42	11.48-12.02/14
	15.25		16.50	18.11	20.36	22.00		23.18	23.22		22.07		20.27	18.48	16.13	15.09	
8	09.55	12.04-12.16/12	08.45	07.18	06.36	05.01	20.59-21.20/21	03.47	03.56		05.14	21.11-21.21/10	06.38	07.58	08.25	09.44	11.48-12.03/15
	15.27		16.53	18.14	20.39	22.03		23.20	23.21		22.04		20.24	18.45	16.10	15.07	
9	09.53	12.05-12.15/10	08.42	07.15	06.33	04.58	20.58-21.22/24	03.46	03.58		05.17	21.13-21.19/6	06.41	08.00	08.28	09.46	11.48-12.04/16
	15.29		16.56	18.17	20.41	22.06		23.22	23.19		22.00		20.21	18.42	16.07	15.06	
10	09.52	12.07-12.15/8	08.39	07.11	06.29	04.55	20.58-21.25/27	03.45	04.00		05.20	21.15-21.16/1	06.44	08.03	08.31	09.48	11.48-12.04/16
	15.32		16.59	18.19	20.44	22.09		23.23	23.17		21.57		20.18	18.39	16.05	15.06	
11	09.50	12.08-12.13/5	08.36	07.08	06.26	04.52	20.57-21.24/27	03.44	04.02		05.23		06.46	08.06	08.34	09.49	11.49-12.05/16
	15.34		17.02	18.22	20.47	22.11		23.25	23.15		21.54		20.14	18.35	16.02	15.05	
12	09.49		08.33	07.05	06.23	04.49	20.57-21.25/28	03.43	04.04	21.18-21.23/5	05.25		06.49	08.08	08.37	09.51	11.49-12.06/17
	15.37		17.05	18.25	20.50	22.14		23.26	23.14		21.51		20.11	18.32	15.59	15.04	
13	09.47		08.30	07.02	06.20	04.46	20.56-21.25/29	03.42	04.06	21.16-21.25/9	05.28		06.52	08.11	08.39	09.52	11.49-12.06/17
	15.39		17.08	18.28	20.52	22.17		23.27	23.12		21.48		20.08	18.29	15.57	15.03	
14	09.45		08.27	06.58	06.16	04.43	20.56-21.25/29	03.41	04.09	21.15-21.27/12	05.31		06.54	08.14	08.42	09.54	11.50-12.06/16
	15.41		17.11	18.31	20.55	22.20		23.28	23.10		21.45		20.04	18.26	15.54	15.03	
15	09.43		08.24	06.55	06.13	04.41	20.57-21.25/28	03.40	04.11	21.14-21.29/15	05.34		06.57	08.17	08.45	09.55	11.50-12.07/17
	15.44		17.14	18.33	20.58	22.23		23.29	23.07		21.42		20.01	18.23	15.51	15.03	
16	09.42		08.21	06.52	06.10	04.38	20.56-21.25/29	03.40	04.13	21.12-21.29/17	05.37		06.59	08.19	08.48	09.57	11.51-12.08/17
	15.47		17.17	18.36	21.01	22.25		23.30	23.05		21.39		19.58	18.19	15.49	15.02	
17	09.40		08.18	06.49	06.06	04.35	20.57-21.25/28	03.39	04.16	21.11-21.30/19	05.39		07.02	08.22	08.51	09.58	11.50-12.07/17
	15.49		17.20	18.39	21.03	22.28		23.31	23.03		21.36		19.54	18.16	15.46	15.02	
18	09.38		08.15	06.45	06.03	04.32	20.57-21.25/28	03.39	04.18	21.10-21.31/21	05.42		07.05	08.25	08.54	09.59	11.51-12.09/18
	15.52		17.23	18.41	21.06	22.31		23.32	23.01		21.32		19.51	18.13	15.44	15.02	
19	09.36		08.12	06.42	06.00	04.30	20.58-21.25/27	03.39	04.21	21.10-21.32/22	05.45		07.07	08.28	08.57	10.00	11.52-12.09/17
	15.55		17.26	18.44	21.09	22.34		23.32	22.58		21.29		19.48	18.10	15.42	15.02	
20	09.33		08.09	06.39	05.57	04.27	20.58-21.24/26	03.39	04.23	21.09-21.32/23	05.48		07.10	08.30	08.59	10.00	11.52-12.09/17
	15.57		17.29	18.47	21.12	22.36		23.33	22.56		21.26		19.44	18.07	15.39	15.02	
21	09.31		08.06	06.35	05.54	04.25	20.59-21.24/25	03.39	04.26	21.10-21.34/24	05.50		07.13	08.33	09.02	10.01	11.53-12.10/17
	16.00		17.31	18.50	21.15	22.39		23.33	22.54		21.23		19.41	18.04	15.37	15.03	
22	09.29		08.03	06.32	05.50	04.22	20.59-21.24/25	03.39	04.28	21.09-21.34/25	05.53		07.15	08.36	09.05	10.02	11.53-12.10/17
	16.03		17.34	18.52	21.17	22.42		23.33	22.51		21.20		19.38	18.01	15.35	15.03	
23	09.27		08.00	06.29	05.47	04.19	21.00-21.23/23	03.39	04.31	21.08-21.34/26	05.56		07.18	08.39	09.08	10.02	11.53-12.10/17
	16.06		17.37	18.55	21.20	22.44		23.33	22.49		21.17		19.34	17.57	15.32	15.04	
24	09.24		07.56	06.25	05.44	04.17	21.00-21.23/23	03.39	04.33	21.08-21.35/27	05.58		07.20	08.42	09.10	10.03	11.55-12.12/17
	16.09		17.40	18.58	21.23	22.47		23.33	22.46		21.13		19.31	17.54	15.30	15.04	
25	09.22		07.53	06.22	05.41	04.15	21.01-21.22/21	03.40	04.36	21.07-21.35/28	06.01		07.23	07.44	09.13	10.03	11.54-12.11/17
	16.12		17.43	19.00	21.26	22.49		23.33	22.43		21.10		19.28	16.51	15.28	15.05	
26	09.20		07.50	06.19	05.38	04.12	21.02-21.21/19	03.40	04.39	21.07-21.35/28	06.04		07.26	07.47	09.16	10.03	11.55-12.12/17
	16.15		17.46	19.03	21.29	22.52		23.33	22.41		21.07		19.25	16.48	15.26	15.06	
27	09.17		07.47	06.16	05.34	04.10	21.03-21.20/17	03.41	04.41	21.08-21.36/28	06.07		07.28	07.50	09.18	10.03	11.55-12.12/17
	16.17		17.49	19.06	21.32	22.54		23.32	22.38		21.04		19.21	16.45	15.24	15.07	
28	09.15		07.44	06.12	05.31	04.08	21.04-21.20/16	03.42	04.44	21.07-21.36/29	06.09		07.31	07.53	09.21	10.03	11.56-12.13/17
	16.20		17.51	19.09	21.34	22.57		23.32	22.35		21.00		19.18	16.42	15.22	15.08	
29	09.12			07.09	05.28	04.05	21.05-21.19/14	03.43	04.47	21.07-21.35/28	06.12		07.34	07.56	09.23	10.03	11.57-12.14/17
	16.23			20.11	21.37	22.59		23.31	22.33		20.57		19.15	16.39	15.20	15.09	
30	09.09			07.06	05.25	04.03	21.06-21.17/11	03.44	04.50	21.08-21.36/28	06.15		07.36	07.59	09.26	10.02	11.57-12.13/16
	16.26			20.14	21.40	23.02		23.31	22.30		20.54		19.11	16.36	15.19	15.11	
31	09.07			07.02		04.01	21.09-21.16/7		04.52	21.07-21.36/29	06.17			08.02		10.02	11.58-12.14/16
	16.29			20.17		23.04			22.27		20.51			16.33		15.12	
Potential sun hours	191		246	364	444	551		591	583		497		391	310	213	162	
Sum of minutes with flicker	138		0	0	0	607		0	443		176		0	0	0	475	

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

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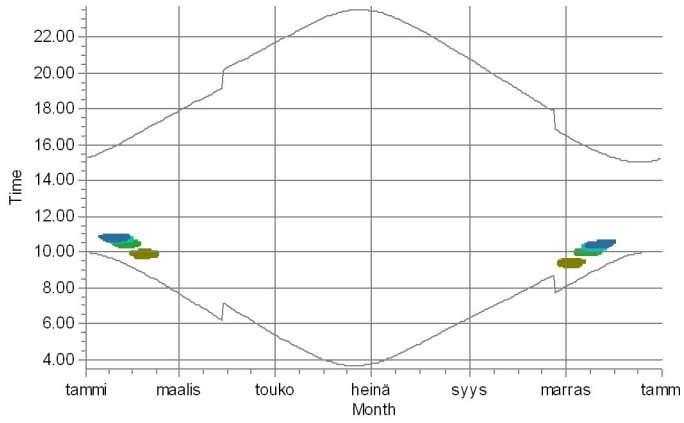
Calculated:
4.3.2021 12.19/3.4.388

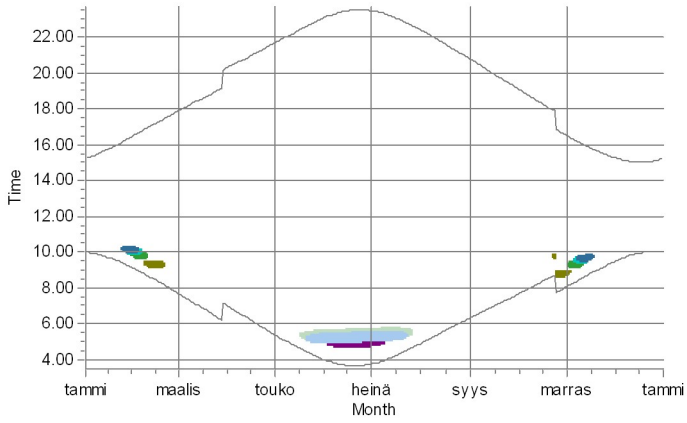
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_032021_no_forest_V162

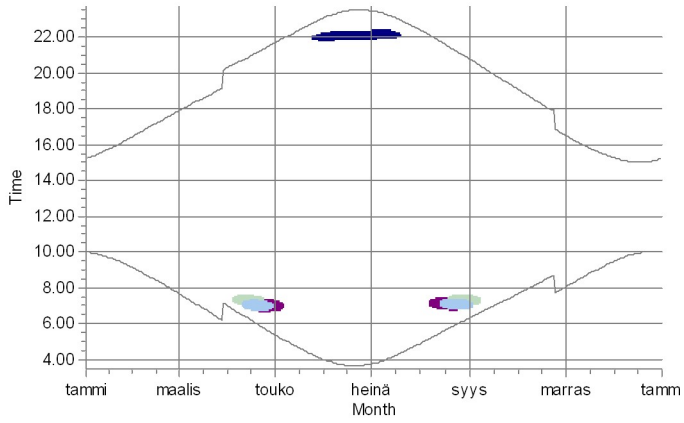
1: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (281)



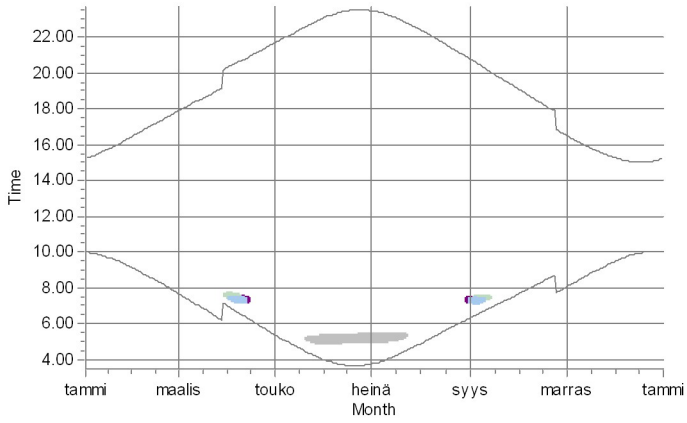
2: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (282)



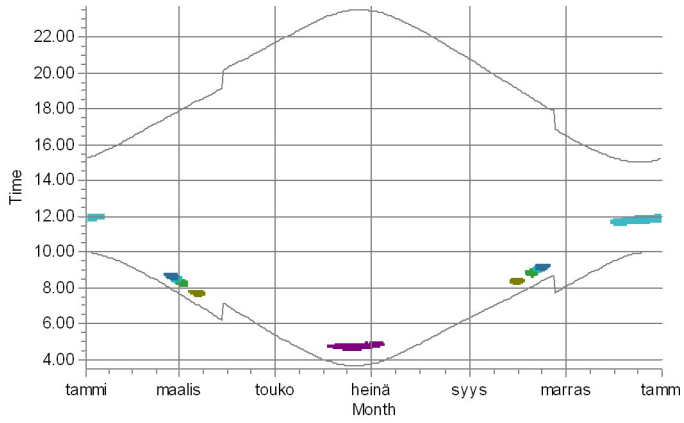
3: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (283)



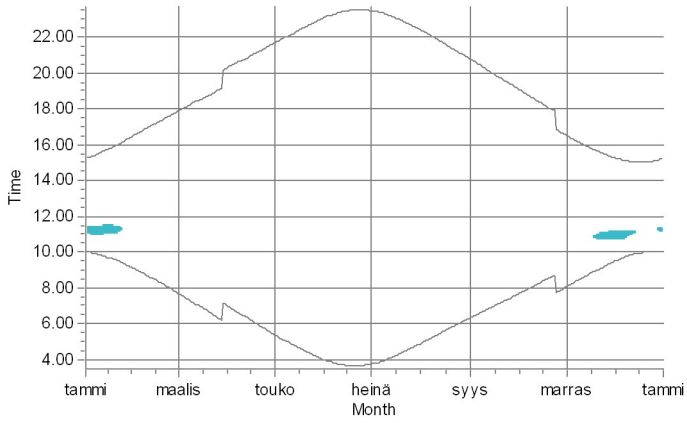
4: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (284)



5: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (285)



6: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (286)



Shadow receptors

- G: Asuinrakennus G (Karijoentie 203)
- J: Asuinrakennus J (Lidenintie 351)
- K: Asuinrakennus K (Storängintie 49)
- L: Asuinrakennus L (Nyskiftanintie 1493)
- N: Asuinrakennus N (Storängsvägen 78)
- O: Asuinrakennus O(Storängsvägen 68)
- S: Lomarakennus S (Brannängskullen)
- T: Asuinrakennus T (Kaasbackantie 85)
- U: Asuinrakennus U (Kaasbackantie 107/1)
- V: Asuinrakennus V (Kaasbackantie 107/2)

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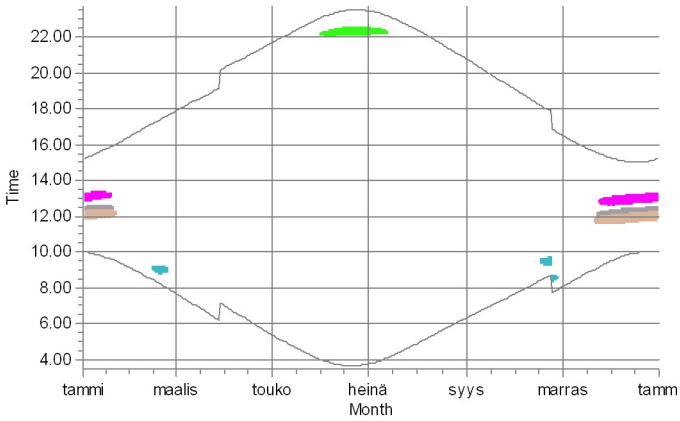
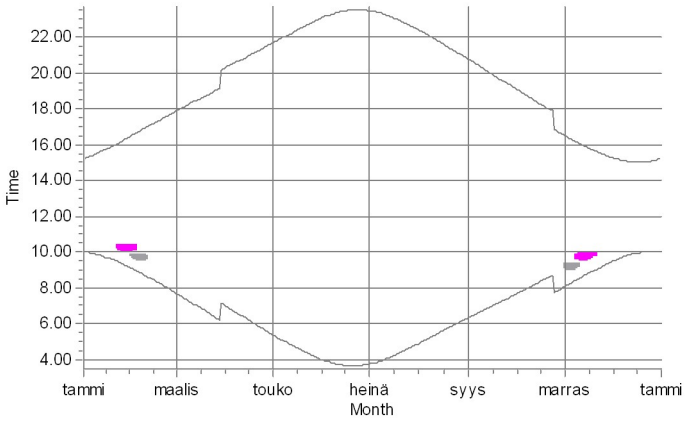
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_032021_no_forest_V162

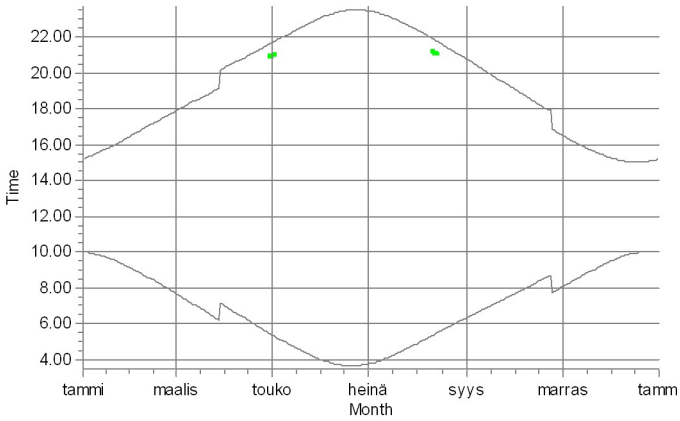
13: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (293)



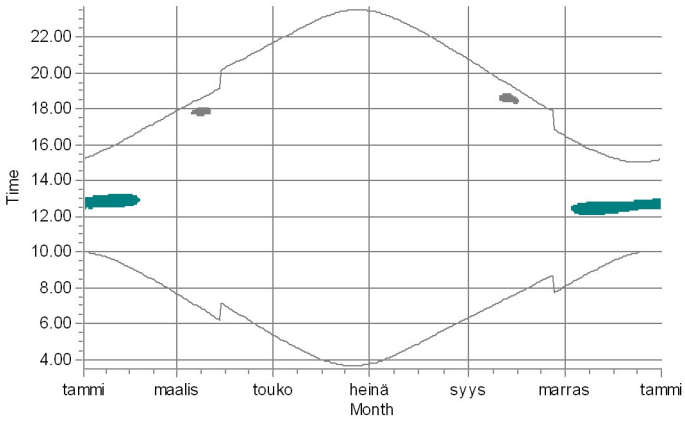
14: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (294)



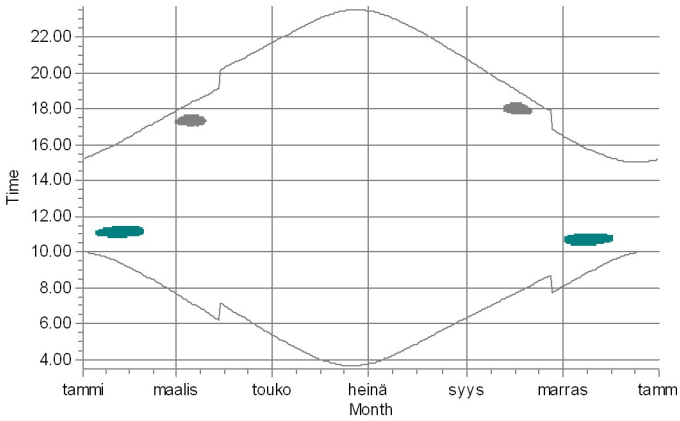
15: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (295)



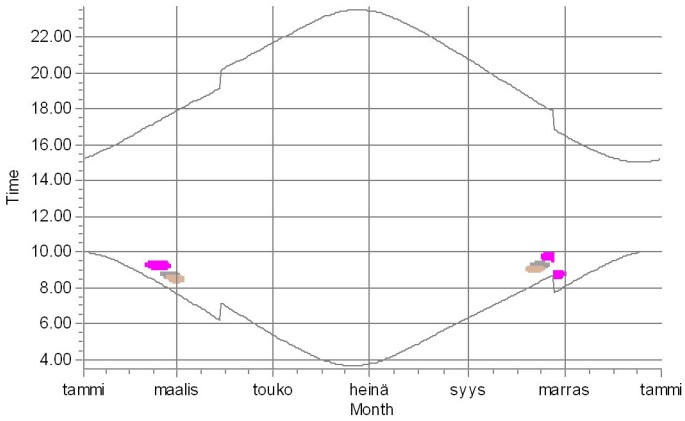
16: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (296)



17: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (297)



18: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (298)



Shadow receptors

- D: Asuinrakennus D (Kirkkotie 352)
- E: Asuinrakennus E (Lidenintie 733)
- F: Asuinrakennus F (Kirkkotie 548)
- I: Näkötorni I (Susivuoren näkötorni)
- P: Asuinrakennus P (Lidenintie 709)
- Q: Asuinrakennus Q (Lidenintie 697)
- R: Lomarakennus R (Påskmossberget)
- S: Lomarakennus S (Brannängskullen)

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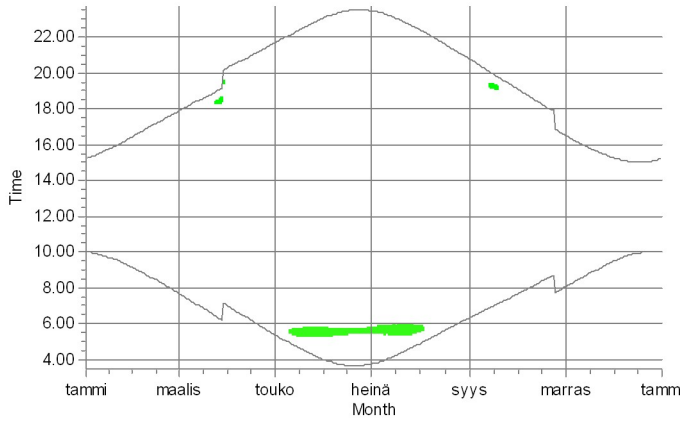
Calculated:
4.3.2021 12.19/3.4.388

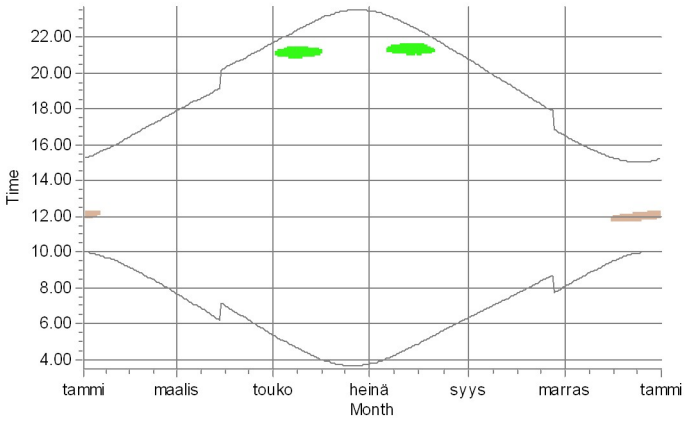
SHADOW - Calendar per WTG, graphical

Calculation: Shadow_032021_no_forest_V162

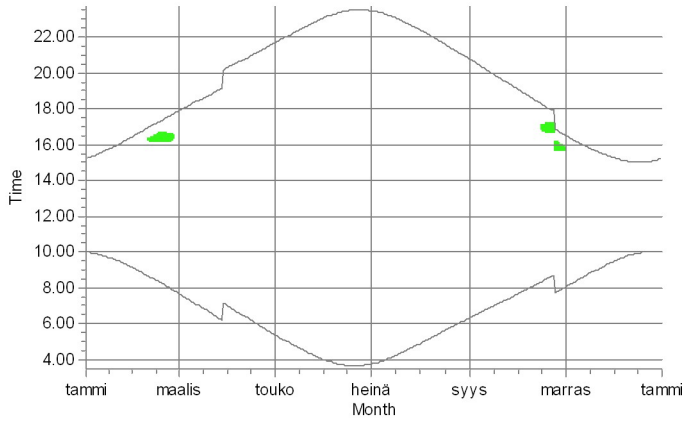
25: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (306)



26: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (307)



27: VESTAS V162-6.0 6000 162.0 !O! hub: 149,0 m (TOT: 230,0 m) (308)



Shadow receptors

I: Näkötorni I (Susivuoren näkötorni)

Q: Asuinrakennus Q (Lidenintie 697)

R: Lomarakennus R (Påskmossberget)