Vedlegg 5: Pvsyst-fil

NTNU

Kunnskap for en bedre verden

Vedlegg til rapport Masteroppgave Arkitektur NTNU, høst 2014- vår 2015

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Grid-Connected System: Simulation parameters

Project : **Grid-Connected Project at Bergen**

Geographical Site	**Bergen**		Country	**Norway**
Situation	Latitude	60.4°N	Longitude	5.3°E
Time defined as	Legal Time	Time zone UT+1	Altitude	9 m
	Albedo	0.20		
Meteo data:	**Bergen**	Synthetic - Meteonorm 6.1		

Simulation variant : **New simulation variant**

	Simulation date	20/03/15 16h34

Simulation parameters

Collector Plane Orientation	Tilt	31°	Azimuth	45°
Models used	Transposition	Perez	Diffuse	Erbs, Meteonorm
Horizon	Free Horizon			
Near Shadings	Linear shadings			

PV Array Characteristics

PV module	Si-mono	Model	**Mono 250 Wp 60 cells**		
		Manufacturer	Generic		
Number of PV modules		In series	10 modules	In parallel	3 strings
Total number of PV modules		Nb. modules	30	Unit Nom. Power	250 Wp
Array global power		Nominal (STC)	**7.50 kWp**	At operating cond.	6.66 kWp (50°C)
Array operating characteristics (50°C)		U mpp	271 V	I mpp	25 A
Total area		Module area	**48.8 m²**	Cell area	42.7 m²
Inverter		Model	**IG 4000**		
		Manufacturer	Fronius USA		
Characteristics		Operating Voltage	150-450 V	Unit Nom. Power	4.00 kWac
Inverter pack		Nb. of inverters	2 units	Total Power	8.00 kWac

PV Array loss factors

Thermal Loss factor	Uc (const)	20.0 W/m²K	Uv (wind)	0.0 W/m²K / m/s
Wiring Ohmic Loss	Global array res.	188 mOhm	Loss Fraction	1.5 % at STC
Module Quality Loss			Loss Fraction	-0.8 %
Module Mismatch Losses			Loss Fraction	1.0 % at MPP
Incidence effect, ASHRAE parametrization	IAM =	1 - bo (1/cos i - 1)	bo Param.	0.05

User's needs : Unlimited load (grid)

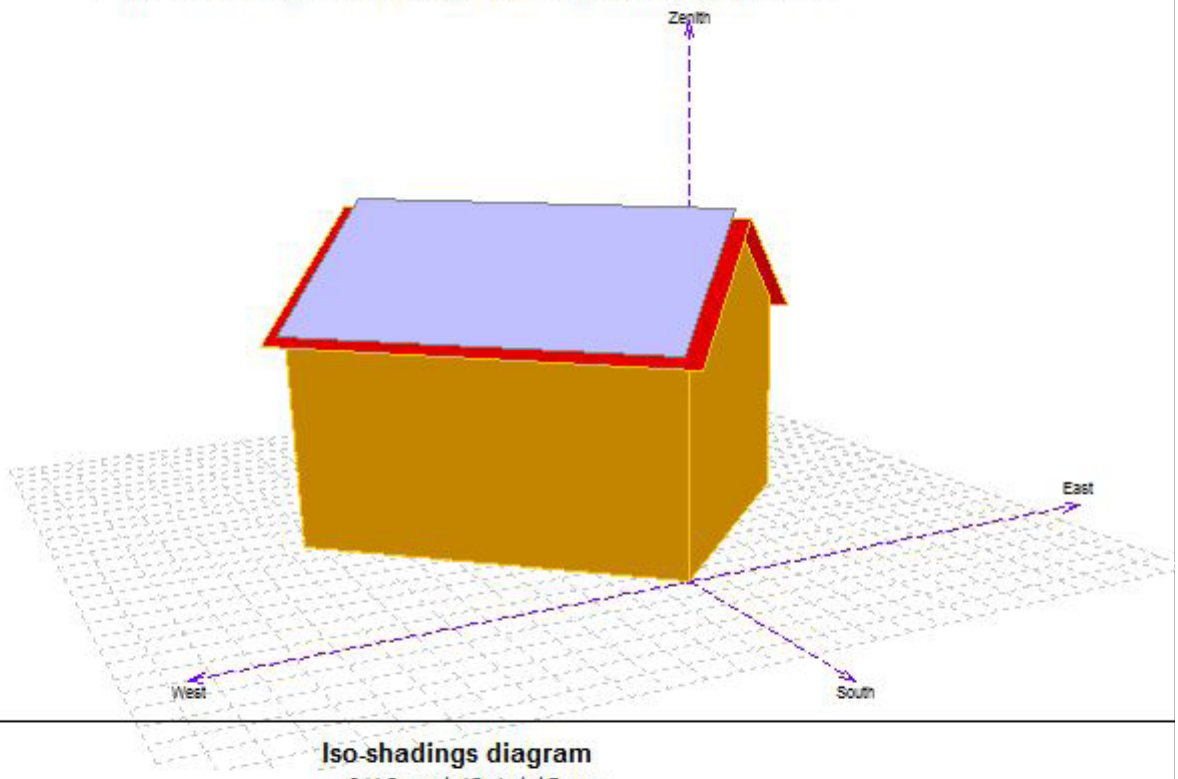
Grid-Connected System: Near shading definition

Project : **Grid-Connected Project at Bergen**

Simulation variant : **New simulation variant**

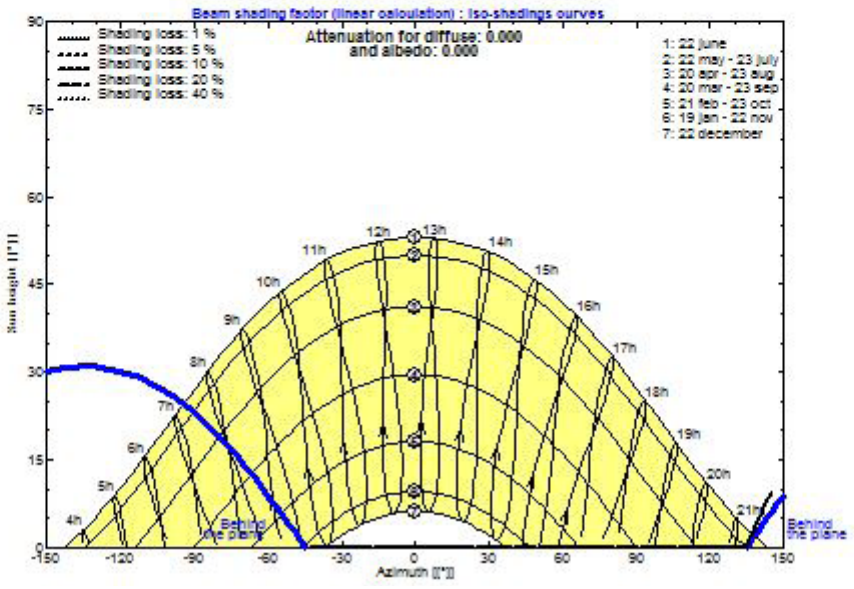
Main system parameters	System type	**Grid-Connected**		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	31°	azimuth	45°
PV modules	Model	Mono 250 Wp 60 cells	Pnom	250 Wp
PV Array	Nb. of modules	30	Pnom total	**7.50 kWp**
Inverter	Model	IG 4000	Pnom	4000 W ac
Inverter pack	Nb. of units	2.0	Pnom total	**8.00 kW ac**
User's needs	Unlimited load (grid)			

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Grid-Connected Project at Bergen



Grid-Connected System: Main results

Project : **Grid-Connected Project at Bergen**

Simulation variant : **New simulation variant**

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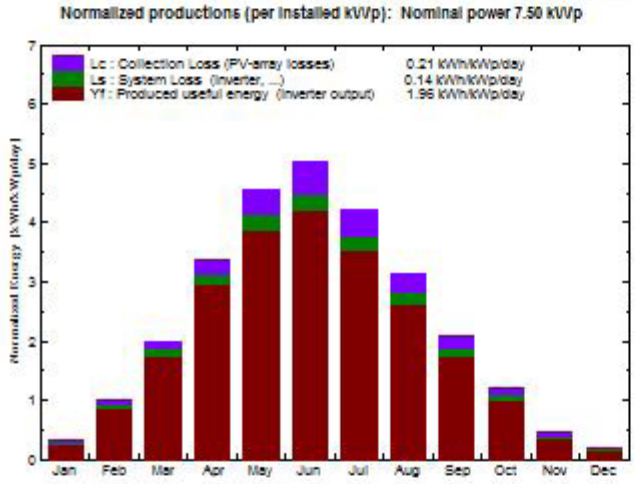
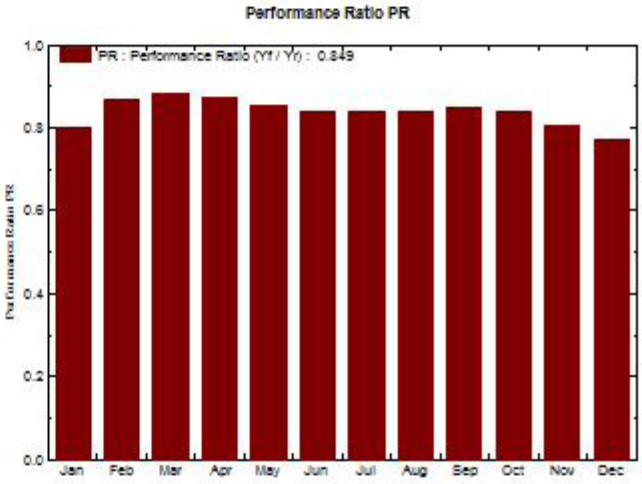
User's needs	Unlimited load (grid)			

Main simulation results

System Production	**Produced Energy**	**5.35 MWh/year**	Specific prod.	714 kWh/kWp/year
	Performance Ratio PR	84.9 %		





New simulation variant

Balances and main results

	GlobHor kWh/m²	T Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	EffArrR %	EffSysR %
January	6.0	2.55	10.0	9.3	0.068	0.060	13.98	12.31
February	19.5	2.13	28.0	26.7	0.199	0.182	14.58	13.34
March	48.4	3.37	61.8	59.6	0.441	0.409	14.60	13.56
April	91.4	7.03	101.4	97.8	0.709	0.664	14.33	13.41
May	133.2	10.01	141.5	136.7	0.984	0.905	13.97	13.11
June	148.3	12.91	150.8	145.6	1.012	0.950	13.75	12.90
July	131.7	15.03	131.0	126.3	0.881	0.826	13.78	12.91
August	90.0	15.75	97.3	93.9	0.655	0.611	13.79	12.86
September	54.0	12.71	62.3	59.9	0.427	0.396	14.04	13.02
October	26.0	8.35	37.0	35.4	0.253	0.233	14.04	12.90
November	8.6	4.85	13.5	12.6	0.092	0.082	13.91	12.39
December	3.7	2.53	6.3	5.8	0.042	0.037	13.69	11.86
Year	760.8	8.14	841.0	809.7	5.745	5.354	14.00	13.04

Legends:
GlobHor Horizontal global irradiation
T Amb Ambient Temperature
GlobInc Global incident in coll. plane
GlobEff Effective Global, corr. for IAM and shadings
EArray Effective energy at the output of the array
E_Grid Energy injected into grid
EffArrR Effic. Eout array / rough area
EffSysR Effic. Eout system / rough area

Grid-Connected System: Loss diagram

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Simulation variant : **New simulation variant**

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User's needs	Unlimited load (grid)				

Loss diagram over the whole year