

PVsyst - Simulation report

Grid-Connected System



Project summary

Geographical Site	Situation	Project settings	
	Latitude	Albedo	0.20
	Longitude		
	Altitude		
	Time zone		
Weather data			

System summary

Grid-Connected System	Tables on a building		
Orientation #1	Orientation #2	Near Shadings	
Fixed plane	Fixed plane	Linear shadings : Fast (table)	
Tilt/Azimuth	Tilt/Azimuth		
6 / 90 °	6 / -90 °		
System information		Inverters	
PV Array		Nb. of units	4 units
Nb. of modules	720 units	Total power	320 kWac
Pnom total	396 kWp	Pnom ratio	1.24
User's needs			
Unlimited load (grid)			

Results summary

Produced Energy	555.01 MWh/year	Specific production	1402 kWh/kWp/year	Perf. Ratio PR	84.24 %
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PV Array Characteristics

Total PV power

Nominal (STC) 396 kWp
 Total 720 modules
 Module area 1860 m²
 Cell area 1727 m²

Total inverter power

Total power 320 kWac
 Number of inverters 4 units
 Pnom ratio 1.24

Array losses

Array Soiling Losses

Loss Fraction 2.0 %

Thermal Loss factor

Module temperature according to irradiance
 U_c (const) 29.0 W/m²K
 U_v (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 52 mΩ
 Global wiring resistance 26 mΩ
 Loss Fraction 1.50 % at STC

Serie Diode Loss

Voltage drop 0.7 V
 Loss Fraction 0.1 % at STC

LID - Light Induced Degradation

Loss Fraction 1.0 %

Module Quality Loss

Loss Fraction 0.00 %

Module mismatch losses

Loss Fraction 1.00 % at MPP

IAM loss factor

Incidence effect (IAM): User defined profile

0°	25°	45°	60°	65°	70°	75°	80°	90°
1.000	1.000	0.995	0.962	0.936	0.903	0.851	0.754	0.000

AC wiring losses

Inv. output line up to injection point

Inverter voltage 400 Vac tri
 Loss Fraction 1.00 % at STC

Inverter: MAX 80KTL3 LV

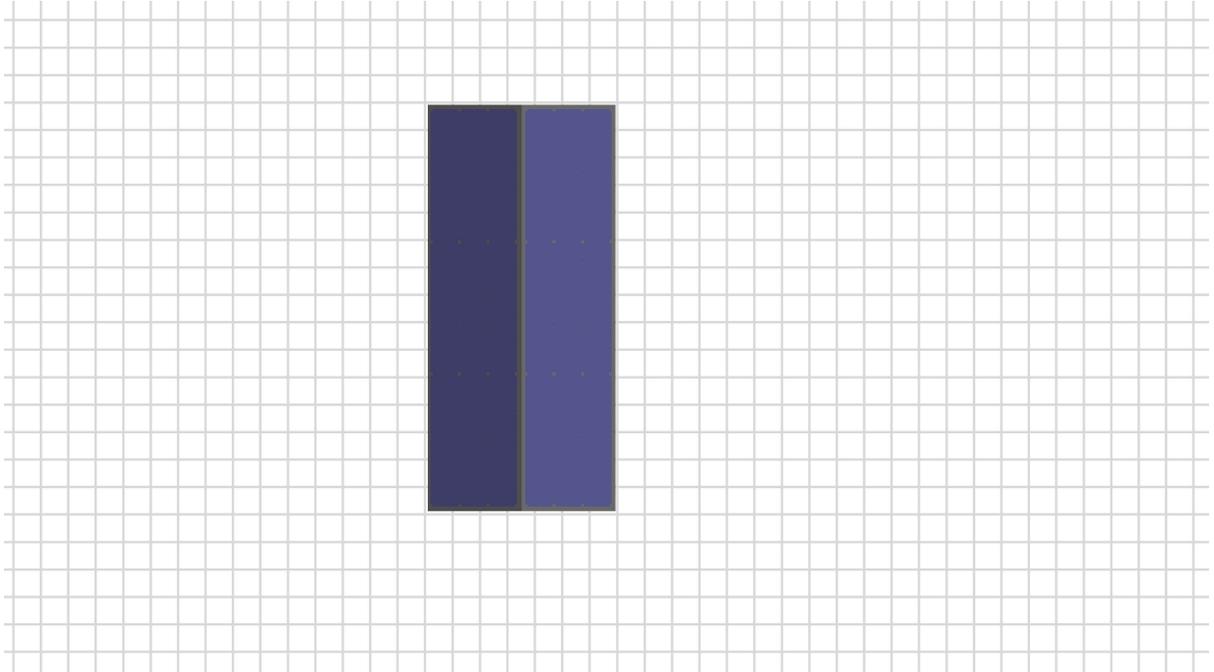
Wire section (4 Inv.) Alu 4 x 3 x 70 mm²
 Average wires length 36 m



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Near shadings parameter

Perspective of the PV-field and surrounding shading scene

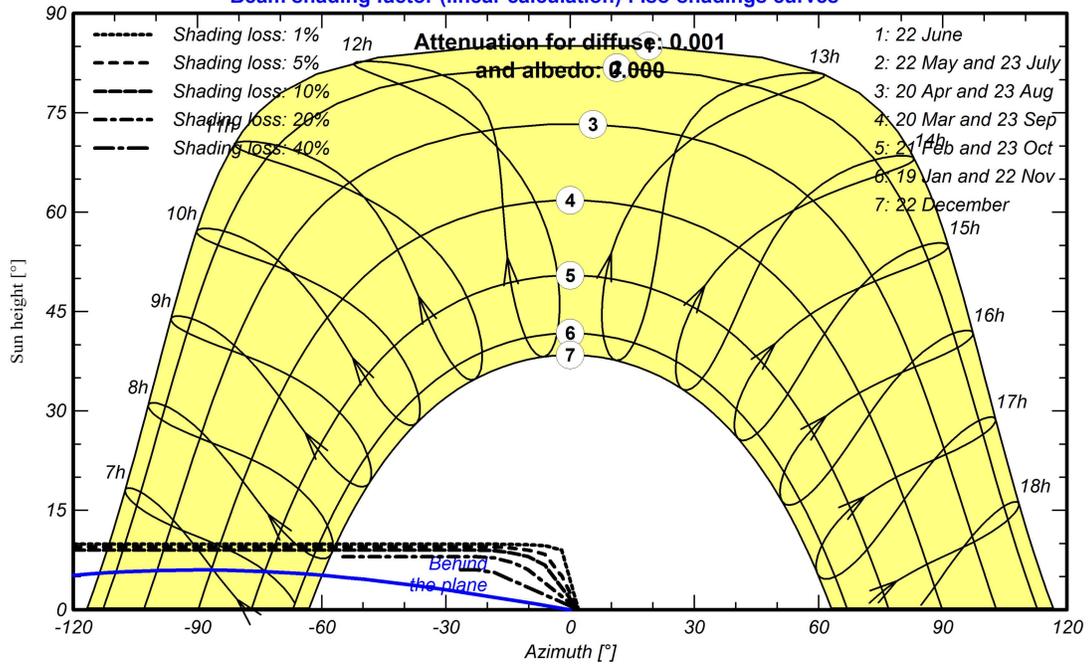




Iso-shadings diagram

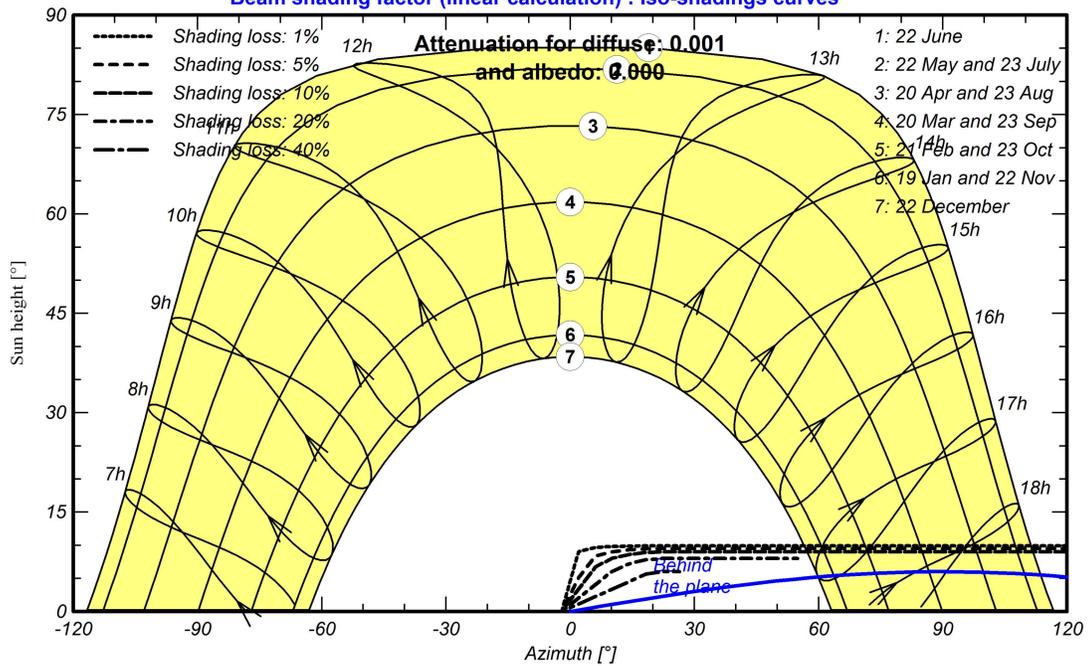
Orientation #1 - Fixed plane, Tilts/azimuths: 6°/ 90°

Beam shading factor (linear calculation) : Iso-shadings curves



Orientation #2 - Fixed plane, Tilts/azimuths: 6°/ -90°

Beam shading factor (linear calculation) : Iso-shadings curves



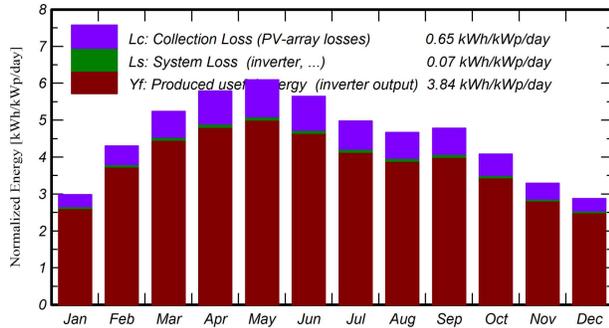


Main results

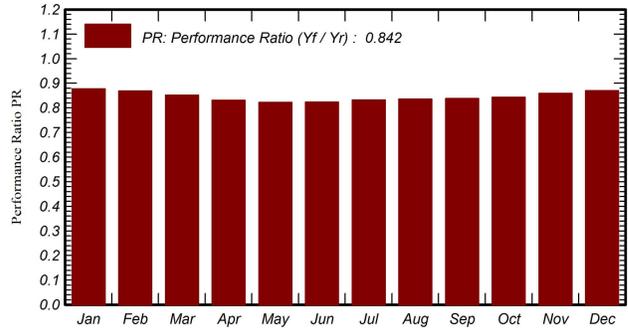
System Production

Produced Energy (P50)	555.01 MWh/year	Specific production (P50)	1402 kWh/kWp/year	Perf. Ratio PR	84.24 %
Produced Energy (P90)	533.07 MWh/year	Specific production (P90)	1346 kWh/kWp/year		
Produced Energy (P75)	543.48 MWh/year	Specific production (P75)	1372 kWh/kWp/year		

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	PR ratio
January	92.6	46.2	13.41	92.4	87.2	32.69	32.09	0.877
February	120.5	50.6	17.61	120.4	114.7	42.18	41.43	0.869
March	162.7	70.1	23.72	162.5	155.6	55.76	54.76	0.851
April	173.9	83.6	29.75	173.8	167.0	58.26	57.17	0.831
May	189.0	101.1	33.60	188.8	181.5	62.59	61.46	0.822
June	169.7	99.9	33.13	169.3	162.8	56.26	55.23	0.824
July	154.6	96.1	31.44	154.2	147.9	51.79	50.84	0.833
August	144.9	86.7	30.42	144.6	138.6	48.77	47.85	0.836
September	143.6	71.5	29.16	143.4	137.3	48.46	47.57	0.838
October	126.9	69.4	26.61	126.6	120.9	43.07	42.31	0.844
November	98.9	54.3	20.42	98.7	93.2	34.11	33.54	0.859
December	89.4	46.7	15.13	89.3	83.9	31.31	30.76	0.870
Year	1666.9	876.1	25.40	1663.8	1590.5	565.26	555.01	0.842

Legends

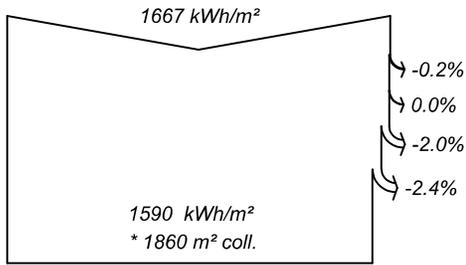
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		



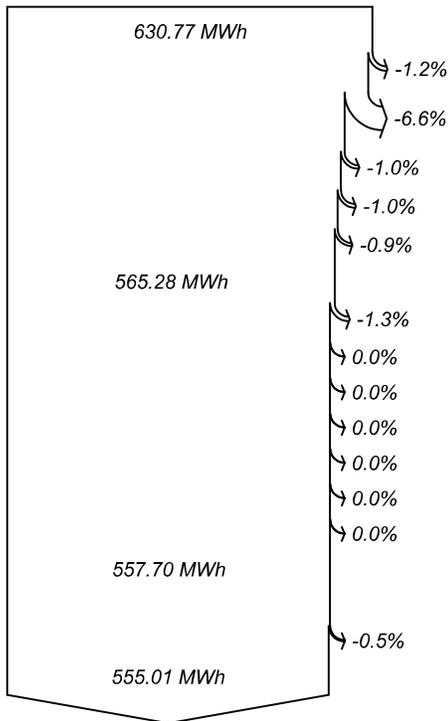
PVsyst V8.0.14

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Loss diagram



efficiency at STC = 21.32%



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

Soiling loss factor

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

LID - Light induced degradation

Module array mismatch loss

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

Available Energy at Inverter Output

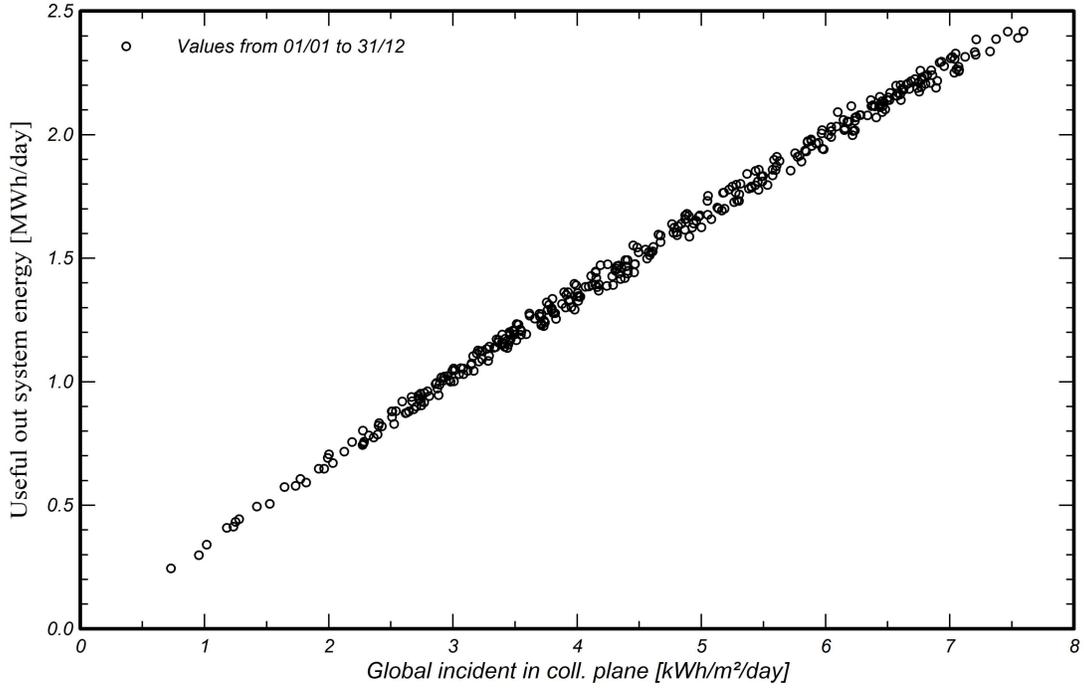
AC ohmic loss

Energy injected into grid

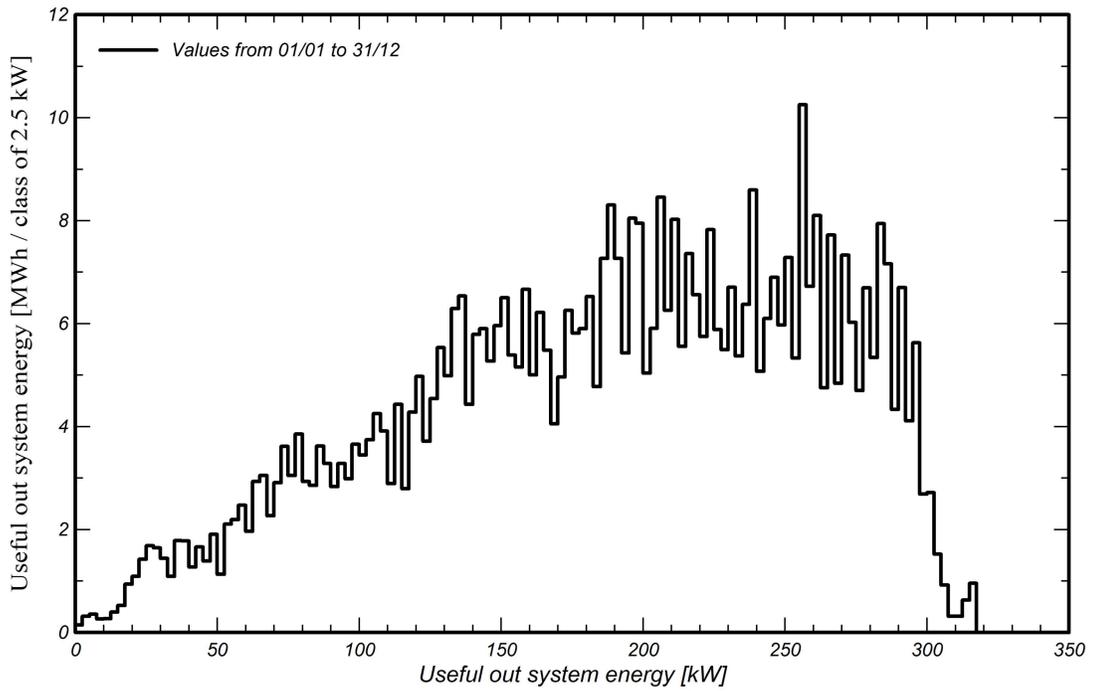


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution





P50 - P90 evaluation

Weather data

Source Meteornorm 8.2 (1996-2015), Sat=100%
Kind TMY, multi-year
Year-to-year variability(Variance) 2.5 %

Specified Deviation

Climate change 0.0 %

Global variability (weather data + system)

Variability (Quadratic sum) 3.1 %

Simulation and parameters uncertainties

PV module modelling/parameters 1.0 %
Inverter efficiency uncertainty 0.5 %
Soiling and mismatch uncertainties 1.0 %
Degradation uncertainty 1.0 %

Annual production probability

Variability 17.1 MWh
P50 555.0 MWh
P90 533.1 MWh
P75 543.5 MWh

Probability distribution

