

PVsyst - Simulation report

Grid-Connected System

Project: Altamura

Variant: Central Inverter Fixed South No Topo No Tree

Sheds on ground

System power: 1573 kWp

Altamura - Italy

Autor

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VC0, Simulation date:
26/04/22 10:02
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Project summary

Geographical Site Altamura Italy	Situation Latitude 40.78 °N Longitude 16.52 °E Altitude 369 m Time zone UTC+1	Project settings Albedo 0.20
Meteo data Altamura Meteonorm 8.0 (1986-2005), Sat=100% - Synthetic		

System summary

Grid-Connected System Simulation for year no 1	Sheds on ground	
PV Field Orientation Fixed plane Tilt/Azimuth 30 / 0 °	Near Shadings Linear shadings	User's needs Unlimited load (grid)
System information		
PV Array		Inverters
Nb. of modules 13680 units		Nb. of units 2 units
Pnom total 1573 kWp		Pnom total 1600 kWac
		Pnom ratio 0.983

Results summary

Produced Energy 2258 MWh/year	Specific production 1435 kWh/kWp/year	Perf. Ratio PR 84.51 %
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General parameters

Grid-Connected System		Sheds on ground			
PV Field Orientation		Sheds configuration		Models used	
Orientation		Nb. of sheds	760 units	Transposition	Perez
Fixed plane		Sizes		Diffuse	Perez, Meteonorm
Tilt/Azimuth	30 / 0 °	Sheds spacing	10.00 m	Circumsolar	separate
		Collector width	2.40 m		
		Ground Cov. Ratio (GCR)	24.0 %		
		Shading limit angle			
		Limit profile angle	8.6 °		
Horizon		Near Shadings		User's needs	
Average Height	1.5 °	Linear shadings		Unlimited load (grid)	

PV Array Characteristics

PV module		Inverter	
Manufacturer	Q-Cells SE	Manufacturer	SMA
Model	Q.SMART UF L 115 (G1)	Model	Sunny Central 800CP-JP
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	115 Wp	Unit Nom. Power	800 kWac
Number of PV modules	13680 units	Number of inverters	2 units
Nominal (STC)	1573 kWp	Total power	1600 kWac
Modules	1520 Strings x 9 In series	Operating voltage	530-950 V
At operating cond. (50°C)		Max. power (=>25°C)	880 kWac
Pmpp	1424 kWp	Pnom ratio (DC:AC)	0.98
U mpp	613 V		
I mpp	2322 A		
Total PV power		Total inverter power	
Nominal (STC)	1573 kWp	Total power	1600 kWac
Total	13680 modules	Number of inverters	2 units
Module area	12861 m ²	Pnom ratio	0.98

Array losses

Array Soiling Losses		Thermal Loss factor		DC wiring losses	
Loss Fraction	2.0 %	Module temperature according to irradiance		Global array res.	1.1 mΩ
		Uc (const)	29.0 W/m ² K	Loss Fraction	0.4 % at STC
		Uv (wind)	0.0 W/m ² K/m/s		
Module Quality Loss		Module mismatch losses		Strings Mismatch loss	
Loss Fraction	-0.4 %	Loss Fraction	1.0 % at MPP	Loss Fraction	0.1 %
Module average degradation		IAM loss factor			
Year no	1	ASHRAE Param: IAM = 1 - bo(1/cosi -1)			
Loss factor	0.45 %/year	bo Param.	0.05		
Mismatch due to degradation					
Imp RMS dispersion	0 %/year				
Vmp RMS dispersion	0 %/year				

System losses

Auxiliaries loss	
Proportionnal to Power	3.0 W/kW
0.0 kW from Power thresh.	



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AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 360 Vac tri
Loss Fraction 0.00 % at STC

Inverter: Sunny Central 800CP-JP

Wire section (2 Inv.) Copper 2 x 3 x 4000 mm²
Average wires length 1 m

MV line up to Injection

MV Voltage 20 kV
Wires Alu 3 x 95 mm²
Length 1311 m
Loss Fraction 0.17 % at STC

AC losses in transformers

MV transfo

Grid voltage 20 kV

Operating losses at STC

Nominal power at STC 1545 kVA
Iron loss (24/24 Connexion) 1.31 kW
Loss Fraction 0.08 % at STC
Coils equivalent resistance 3 x 0.98 mΩ
Loss Fraction 1.17 % at STC



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Horizon definition

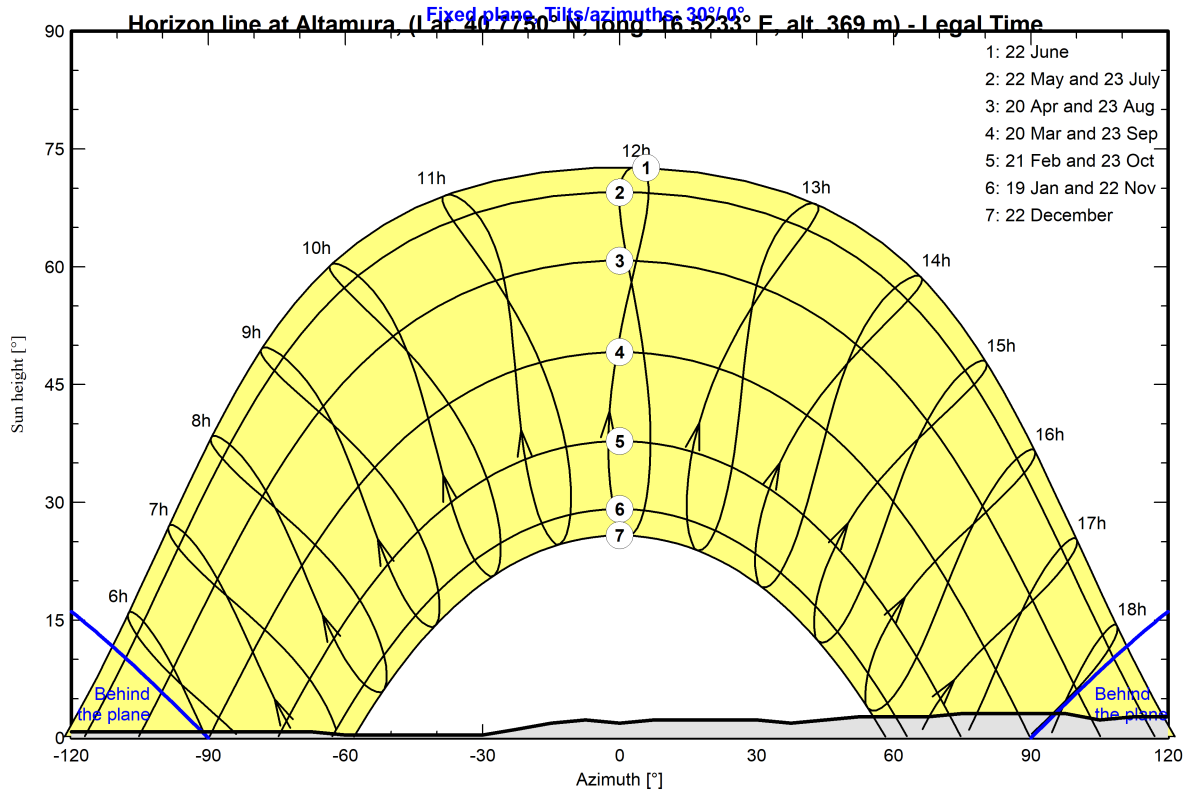
Horizon from PVGIS website API, Lat=40°46'30', Long=16°31'23', Alt=m

Average Height	1.5 °	Albedo Factor	0.91
Diffuse Factor	0.99	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-165	-158	-128	-120	-68	-60	-30	-23	-15
Height [°]	0.8	0.8	1.1	1.1	0.8	0.8	0.4	0.4	1.1	1.9
Azimuth [°]	-8	0	8	30	38	45	53	68	75	98
Height [°]	2.3	1.9	2.3	2.3	1.9	2.3	2.7	2.7	3.1	3.1
Azimuth [°]	105	113	120	128	135	143	158	165	173	180
Height [°]	2.3	2.7	2.7	1.5	1.5	1.1	1.1	0.4	0.4	0.8

Sun Paths (Height / Azimuth diagram)





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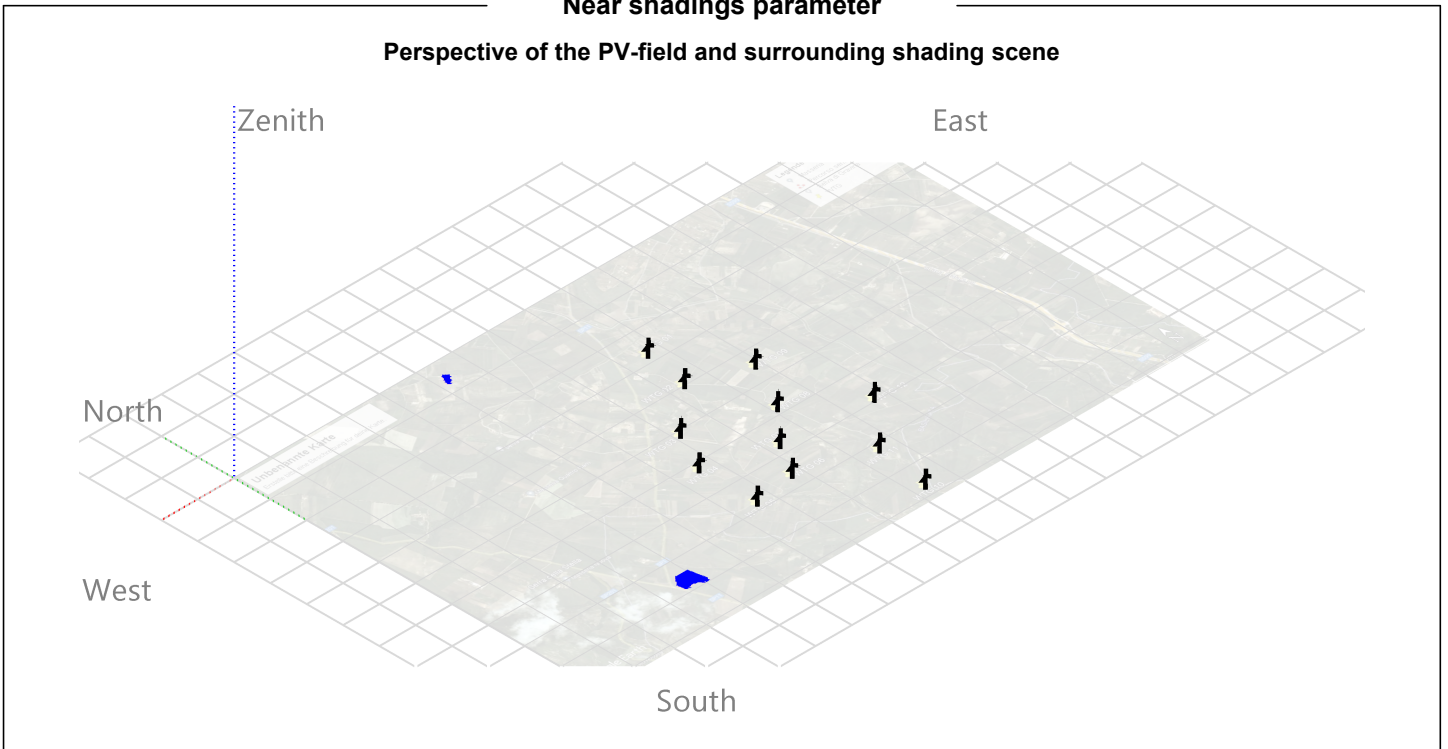
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Near shadings parameter

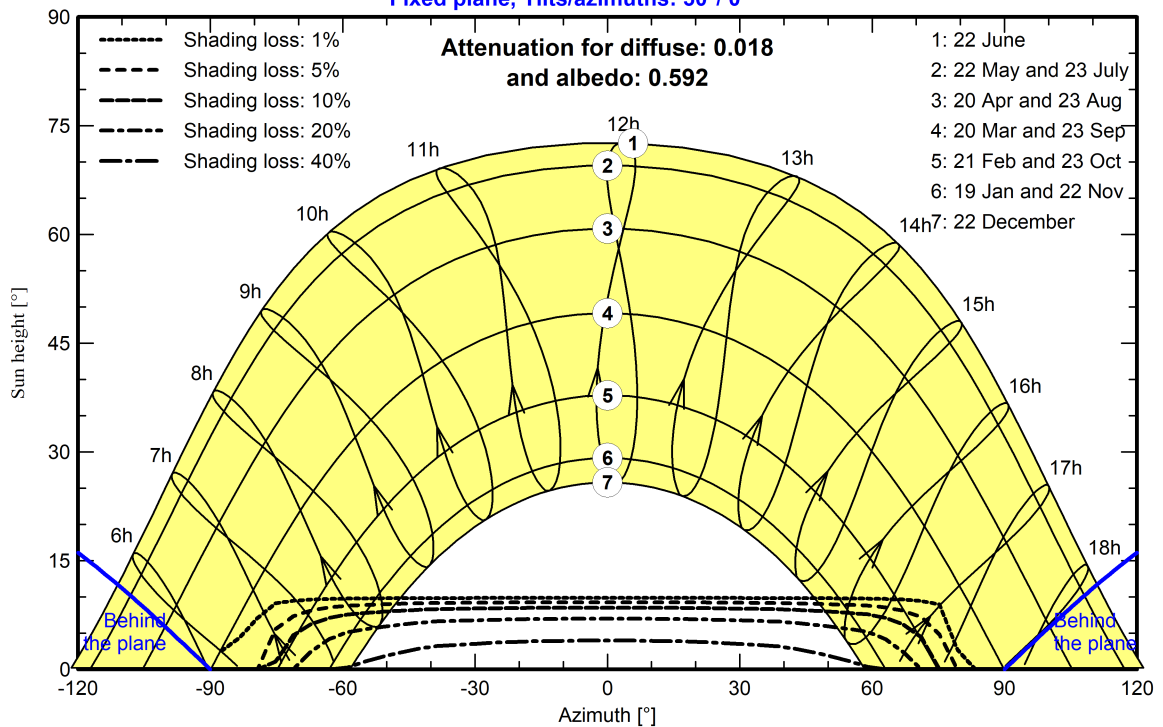
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 30°/ 0°





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Main results

System Production

Produced Energy

2258 MWh/year

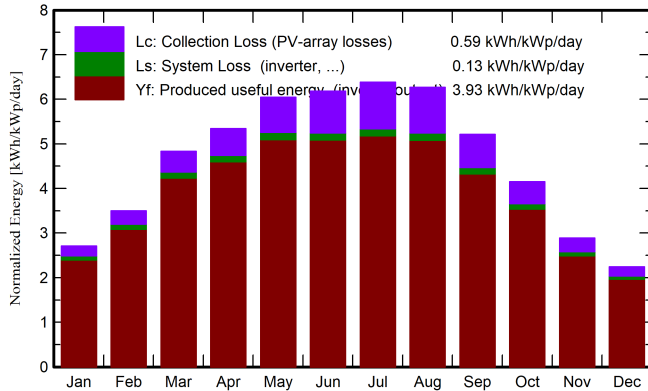
Specific production

1435 kWh/kWp/year

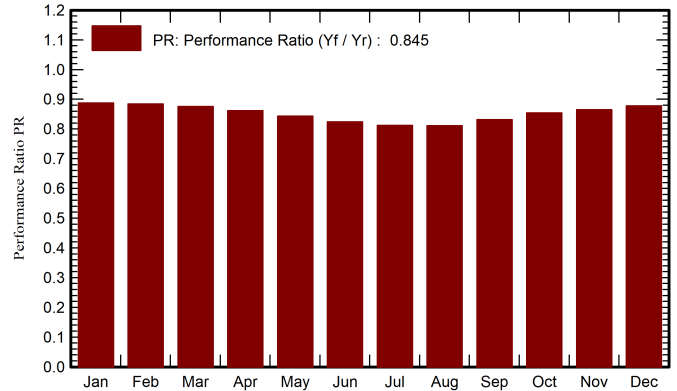
Performance Ratio PR

84.51 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

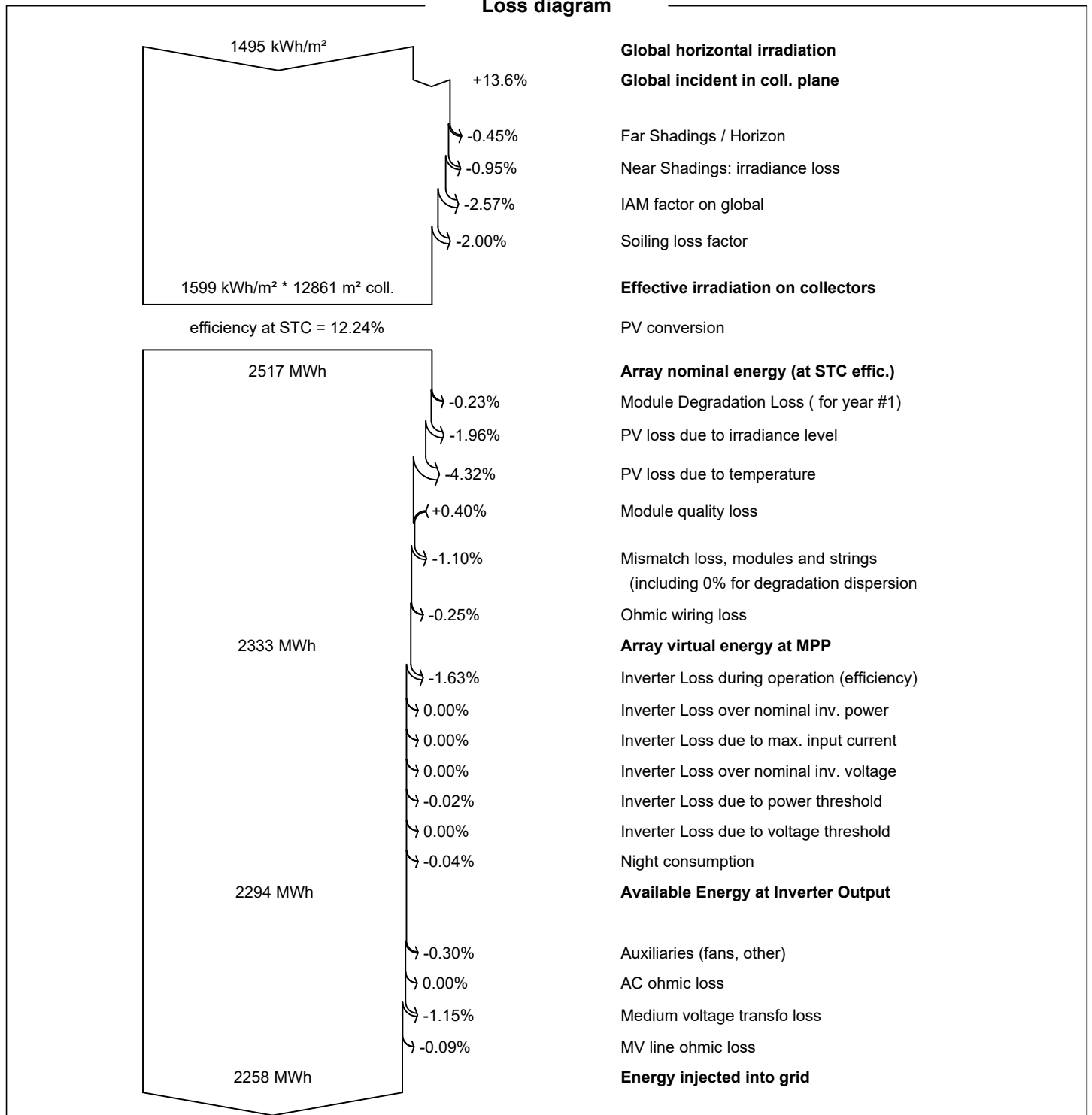
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	MWh	MWh	ratio
January	53.1	26.21	5.74	83.9	79.2	121.5	117.2	0.888
February	69.9	32.88	6.15	98.0	92.4	141.0	136.2	0.884
March	121.9	57.59	9.08	150.0	141.6	213.4	206.6	0.876
April	146.1	67.98	12.13	160.3	150.8	224.2	217.3	0.862
May	188.6	88.87	16.89	187.5	176.1	256.6	248.7	0.843
June	194.9	81.66	21.95	185.4	174.1	247.9	240.3	0.824
July	203.5	80.45	25.50	197.9	186.1	260.7	252.8	0.812
August	183.8	68.39	25.23	194.4	183.2	256.0	248.1	0.811
September	133.6	50.79	19.54	156.3	147.3	211.2	204.5	0.831
October	96.6	48.28	15.73	128.7	121.5	178.6	172.9	0.854
November	57.5	27.42	11.28	86.6	81.6	122.1	117.8	0.864
December	45.4	27.82	7.25	69.5	65.1	99.6	96.0	0.878
Year	1494.9	658.35	14.76	1698.5	1599.1	2332.8	2258.3	0.845

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		



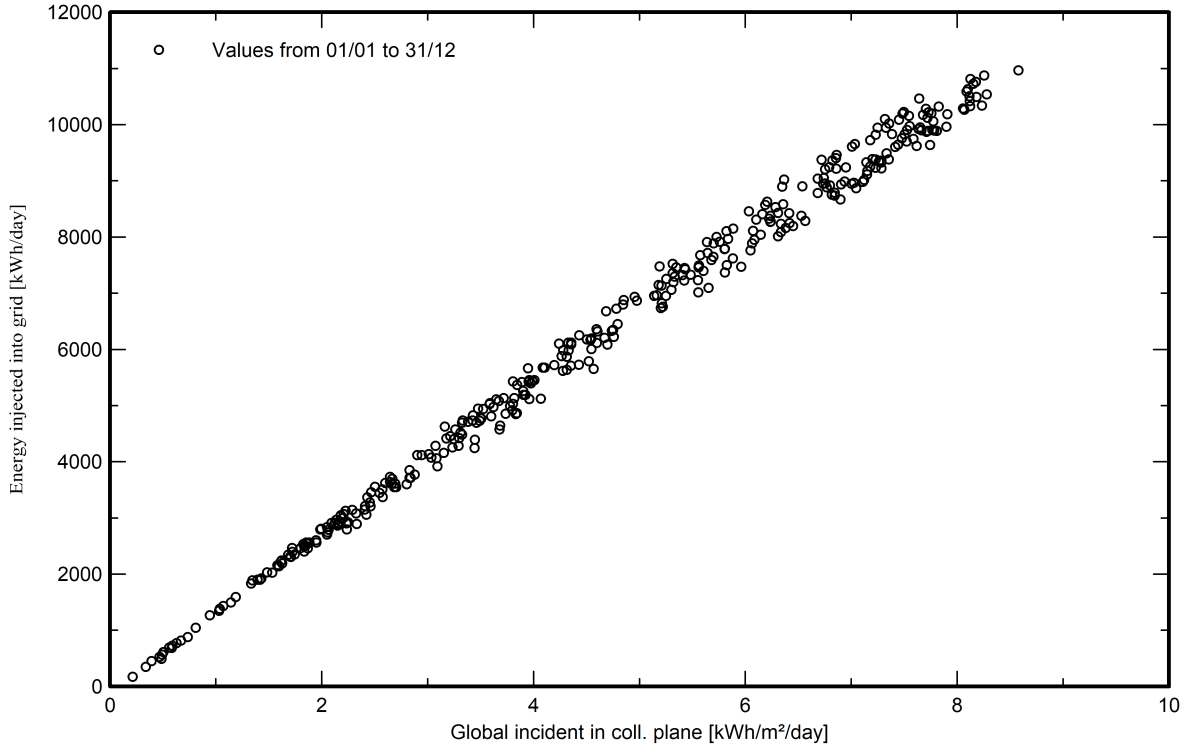
Loss diagram





Special graphs

Daily Input/Output diagram



System-Ausgangsleistungverteilung

