Version 7.2.16

PVsyst - Simulation report

Grid-Connected System

Project: Kopellis_ 1 Axis

Variant: 114 kW 1 axis E-W

Trackers single array, with backtracking

System power: 114 kWp

Thessaloniki/Livadákion - Greece

Author

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Project summary

Geographical Site
Thessaloniki/Livadákion
Greece

Situation

Latitude	40.52 °N
Longitude	22.97 °E
Altitude	4 m
Time zone	UTC+2

Project settings
Albedo 0.20

Meteo data
Thessaloniki/Livadákion
Meteonorm 8.0 (1994-2006), Sat=14% - Synthetic

System summary

Grid-Connected System

Trackers single array, with backtracking

PV Field Orientation
Orientation
Tracking plane, horizontal E-W axis
Normal azimuth to axis 0 °

Tracking algorithm
Astronomic calculation
Backtracking activated

Near Shadings
Linear shadings

System information

PV Array

Nb. of modules	216 units
Pnom total	114 kWp

Inverters

Nb. of units	1 unit
Pnom total	111 kWac
Pnom ratio	1.031

User's needs
Unlimited load (grid)

Results summary

Produced Energy	178.6 MWh/year	Specific production	1560 kWh/kWp/year	Perf. Ratio PR	85.50 %

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General parameters

Grid-Connected System — **Trackers single array, with backtracking**

PV Field Orientation

Orientation
Tracking plane, horizontal E-W axis
Normal azimuth to axis 0 °

Tracking algorithm
Astronomic calculation
Backtracking activated

Backtracking array
Nb. of trackers 4 units
Single array

Sizes
Tracker Spacing 10.00 m
Collector width 4.57 m
Ground Cov. Ratio (GCR) 45.7 %
Tilt min / max. 20.0 / 50.0 °

Backtracking strategy
Phi limits +/- 62.7 °
Backtracking pitch 10.00 m
Backtracking width 4.57 m

Models used
Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Horizon
Average Height 7.4 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module
Manufacturer Generic
Model JKM-530M-72HL4-V
(Custom parameters definition)
Unit Nom. Power 530 Wp
Number of PV modules 216 units
Nominal (STC) 114 kWp
Modules 8 Strings x 27 In series
At operating cond. (50°C)
Pmpp 104 kWp
U mpp 1002 V
I mpp 104 A

Inverter
Manufacturer Generic
Model SG111-HV
(Original PVsyst database)
Unit Nom. Power 111 kWac
Number of inverters 1 unit
Total power 111 kWac
Operating voltage 780-1450 V
Pnom ratio (DC:AC) 1.03

Total PV power
Nominal (STC) 114 kWp
Total 216 modules
Module area 557 m²

Total inverter power
Total power 111 kWac
Number of inverters 1 unit
Pnom ratio 1.03

Array losses

Array Soiling Losses
Loss Fraction 1.5 %

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 29.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses
Global array res. 106 mΩ
Loss Fraction 1.0 % at STC

Module Quality Loss
Loss Fraction 0.0 %

Module mismatch losses
Loss Fraction 0.6 % at MPP

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Array losses

IAM loss factor

Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.816	0.681	0.440	0.000

System losses

Auxiliaries loss

Proportionnal to Power 4.0 W/kW
0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 540 Vac tri
Loss Fraction 0.21 % at STC

Inverter: SG111-HV

Wire section (1 Inv.) Copper 1 x 3 x 240 mm²
Wires length 70 m

AC losses in transformers

MV transfo

Grid voltage 20 kV

Operating losses at STC

Nominal power at STC 113 kVA
Iron loss (24/24 Connexion) 0.11 kW
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 25.76 mΩ
Loss Fraction 1.00 % at STC

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Horizon definition

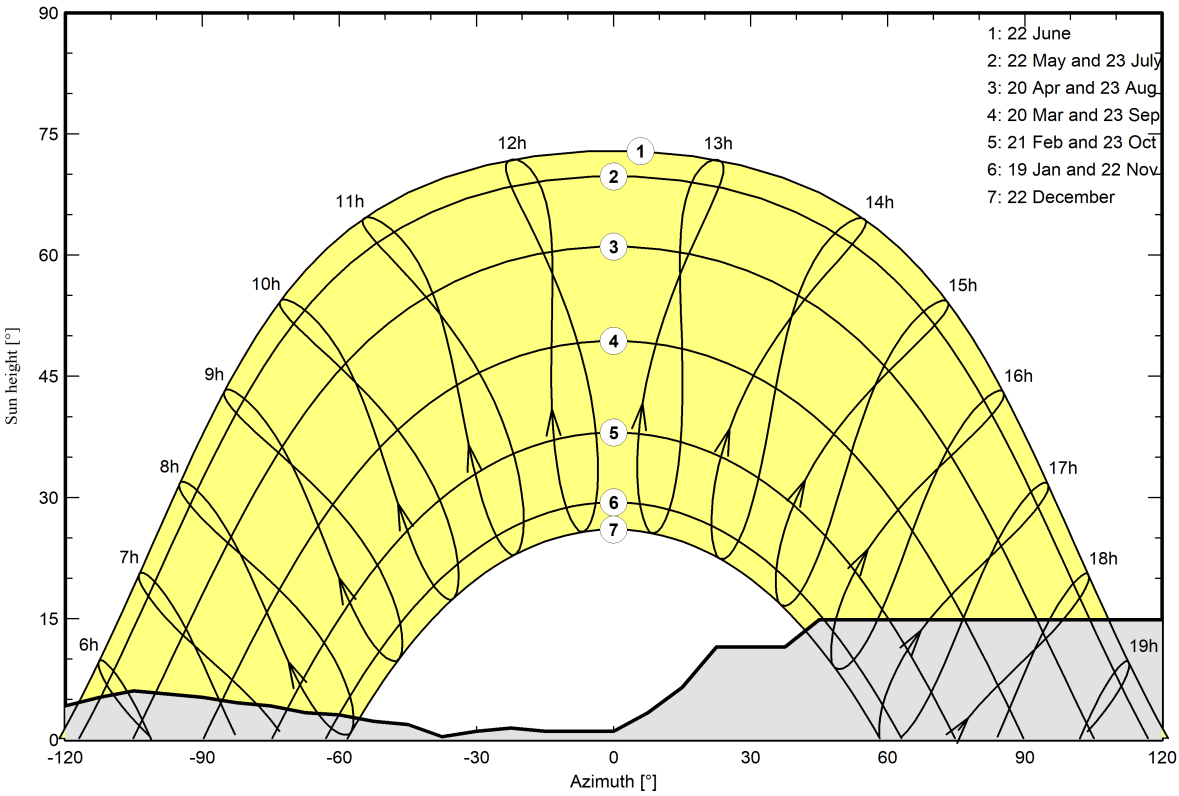
Horizon from PVGIS website API, Lat=39°37"58', Long=22°13"41', Alt=153m

Average Height	7.4 °	Albedo Factor	0.72
Diffuse Factor	0.93	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-173	-165	-158	-143	-135	-128	-120	-113	-105	-98	-90
Height [°]	1.9	3.4	4.6	5.7	7.3	6.5	4.6	4.2	5.3	6.1	5.7	5.3
Azimuth [°]	-83	-75	-68	-60	-53	-45	-38	-30	-23	-15	0	8
Height [°]	4.6	4.2	3.4	3.1	2.3	1.9	0.4	1.1	1.5	1.1	1.1	3.4
Azimuth [°]	15	23	38	45	135	143	150	158	165	173	180	
Height [°]	6.5	11.5	11.5	14.9	14.9	8.0	8.0	5.3	1.9	1.5	1.9	

Sun Paths (Height / Azimuth diagram)



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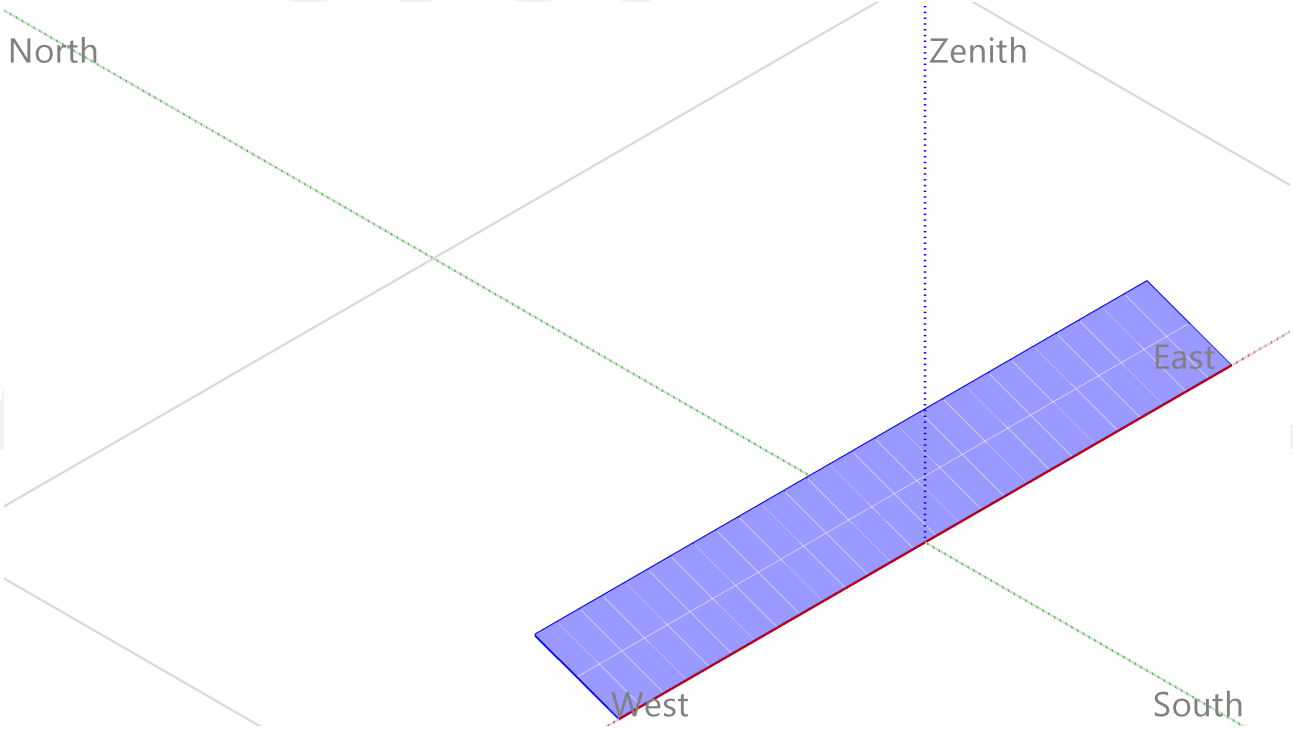
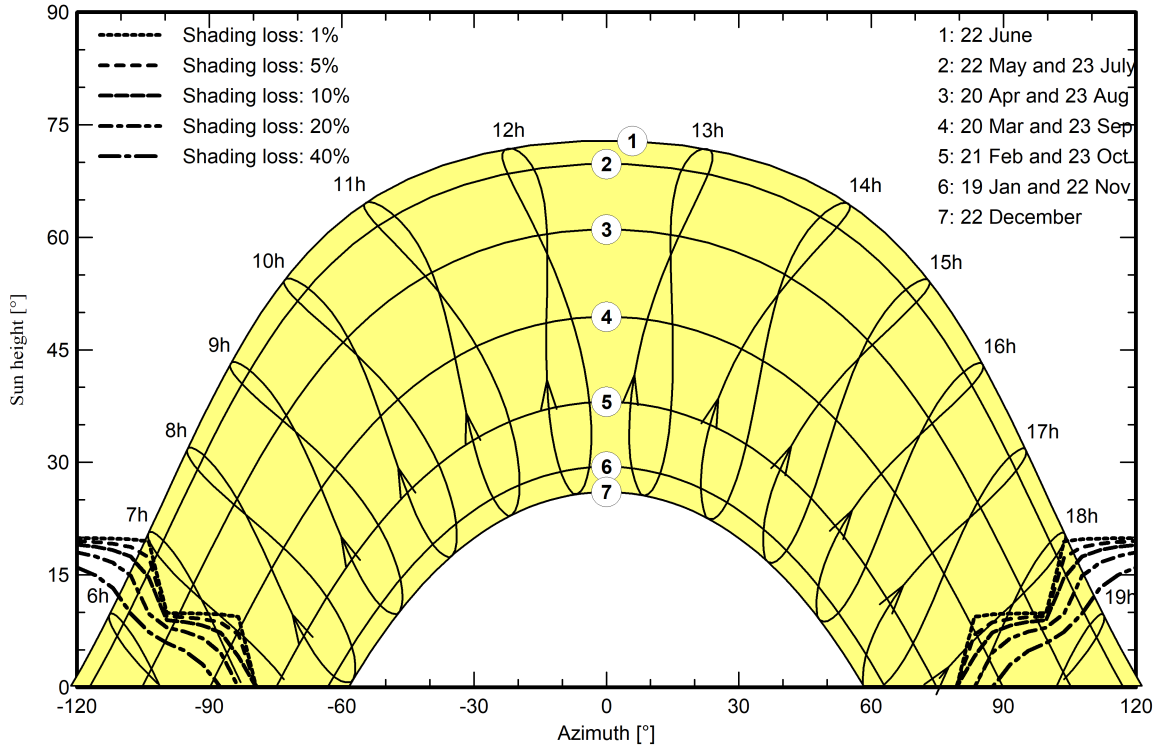
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1



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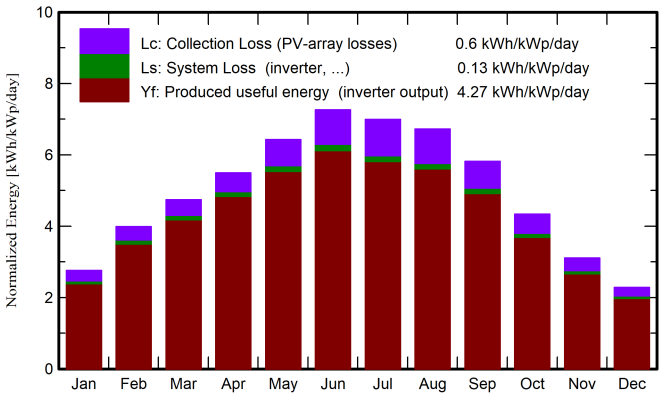
Main results

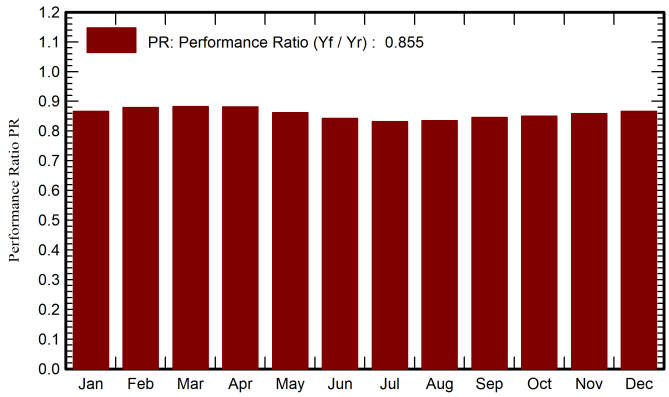
System Production

Produced Energy	178.6 MWh/year	Specific production	1560 kWh/kWp/year
		Performance Ratio PR	85.50 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR ratio
January	52.6	29.21	4.95	85.5	77.4	8.78	8.48	0.867
February	76.4	39.36	6.71	111.7	103.1	11.60	11.24	0.879
March	118.0	57.36	9.91	147.0	137.6	15.29	14.84	0.882
April	150.3	77.02	13.73	164.8	156.0	17.10	16.61	0.881
May	195.0	84.41	19.52	199.3	189.3	20.22	19.66	0.862
June	218.4	75.24	24.54	218.0	207.4	21.63	21.02	0.843
July	214.7	82.15	27.83	216.8	205.9	21.23	20.64	0.832
August	194.0	76.29	27.71	208.4	198.2	20.47	19.91	0.835
September	144.2	53.93	21.67	174.7	164.7	17.41	16.91	0.846
October	94.1	43.87	16.53	134.5	124.4	13.50	13.09	0.850
November	57.9	29.79	11.46	93.3	85.8	9.49	9.17	0.858
December	43.4	24.96	6.66	70.8	64.7	7.29	7.02	0.866
Year	1559.1	673.58	15.99	1824.7	1714.5	183.99	178.60	0.855

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		

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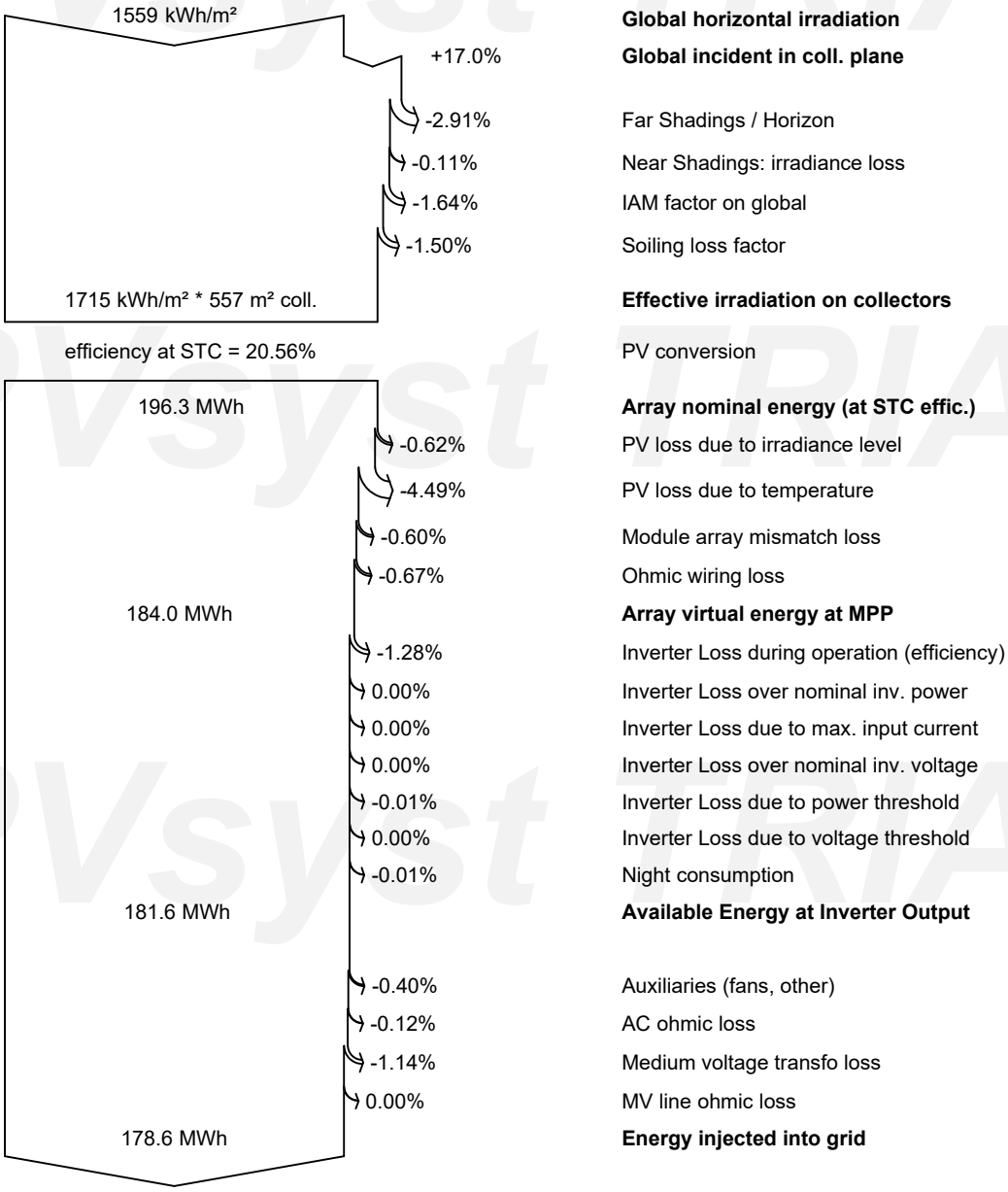
Loss diagram



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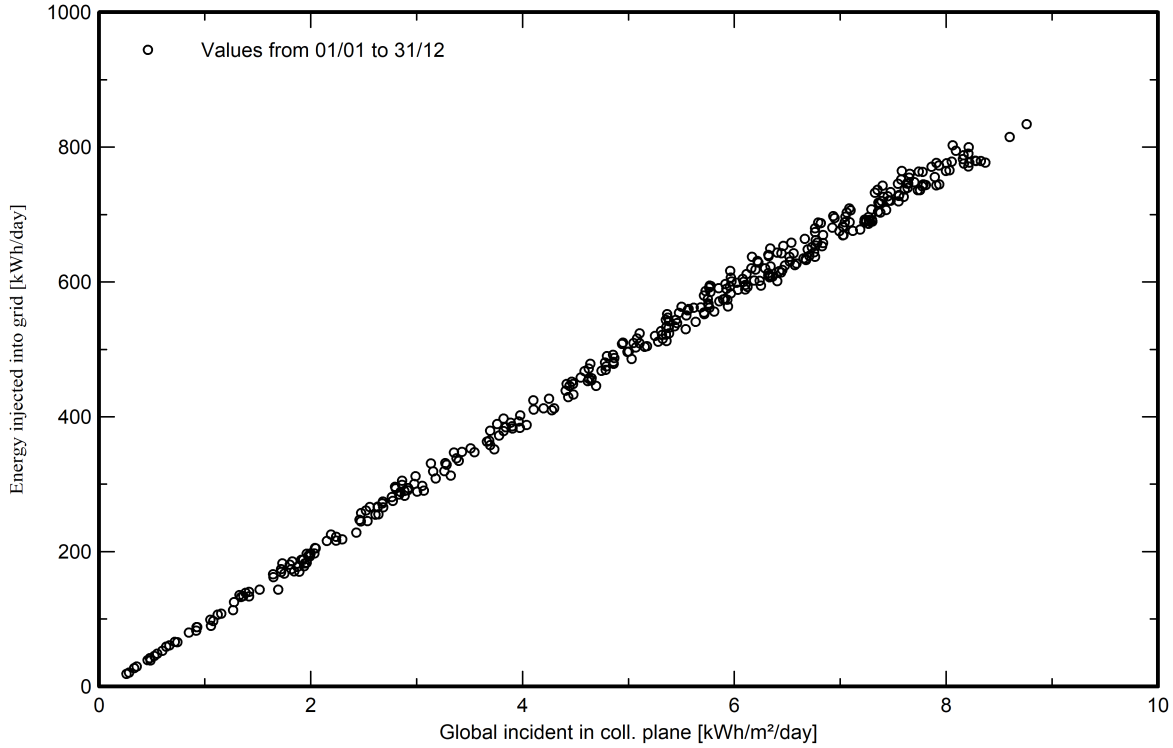
Special graphs

Daily Input/Output diagram



System Output Power Distribution