Version 7.2.15

PVsyst - Simulation report

Grid-Connected System

Project: Kopellis_1

Variant: 100KW|JKM525-545M-72HL4-BDVP-F3.1-EN|SG250HX-IN-20

Tracking system with backtracking

System power: 100 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
Tracking system with backtracking

PV Field Orientation

Orientation	
Tracking plane, horizontal N-S axis	
Axis azimuth	0 °

Tracking algorithm	
Astronomic calculation	
Backtracking activated	

Near Shadings
According to strings
Electrical effect 100 %

System information

PV Array		**Inverters**	
Nb. of modules	189 units	Nb. of units	1 unit
Pnom total	100 kWp	Pnom total	111 kWac
		Pnom ratio	0.902

User's needs
Unlimited load (grid)

Results summary

Produced Energy	159.4 MWh/year	Specific production	1592 kWh/kWp/year	Perf. Ratio PR	83.25 %

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General parameters

Grid-Connected System

Tracking system with backtracking

PV Field Orientation

Orientation
Tracking plane, horizontal N-S axis
Axis azimuth 0 °

Tracking algorithm
Astronomic calculation
Backtracking activated

Backtracking array
Nb. of trackers 5 units

Sizes
Tracker Spacing 7.27 m
Collector width 4.24 m
Ground Cov. Ratio (GCR) 58.3 %
Phi min / max. -/+ 60.0 °

Models used
Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Horizon
Average Height 7.4 °

Near Shadings
According to strings
Electrical effect 100 %

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module
Manufacturer Generic
Model JKM530M-72HL4-BDVP
(Custom parameters definition)
Unit Nom. Power 530 Wp
Number of PV modules 189 units
Nominal (STC) 100 kWp
Modules 7 Strings x 27 In series
At operating cond. (50°C)
Pmpp 91.5 kWp
U mpp 995 V
I mpp 92 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) 0.90

Total PV power
Nominal (STC) 100 kWp
Total 189 modules
Module area 487 m²
Cell area 449 m²

Total inverter power
Total power 111 kWac
Number of inverters 1 unit
Pnom ratio 0.90

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. 119 mΩ
Loss Fraction 1.0 % at STC

Module Quality Loss
Loss Fraction 0.0 %

Module mismatch losses
Loss Fraction 0.6 % at MPP

IAM loss factor
Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	1.000	0.989	0.967	0.924	0.729	0.000

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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	0.19 % 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	99 kVA
Iron loss (24/24 Connexion)	0.10 kW
Loss Fraction	0.10 % at STC
Coils equivalent resistance	3 x 29.43 mΩ
Loss Fraction	1.00 % at STC

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Horizon definition

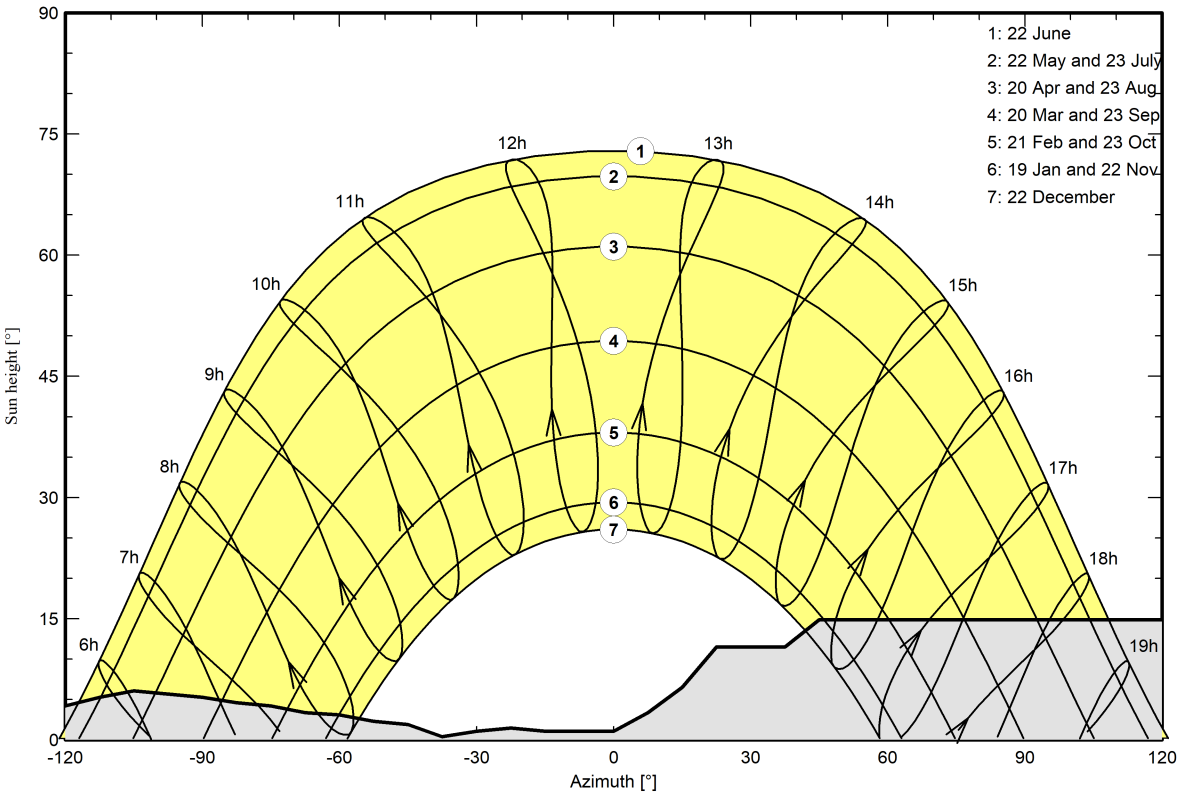
Horizon from PVGIS website API, Lat=39°37"58', Long=22°13"41', Alt=153m

Average Height	7.4 °	Albedo Factor	0.31
Diffuse Factor	0.82	Albedo Fraction	100 %

Horizon profile

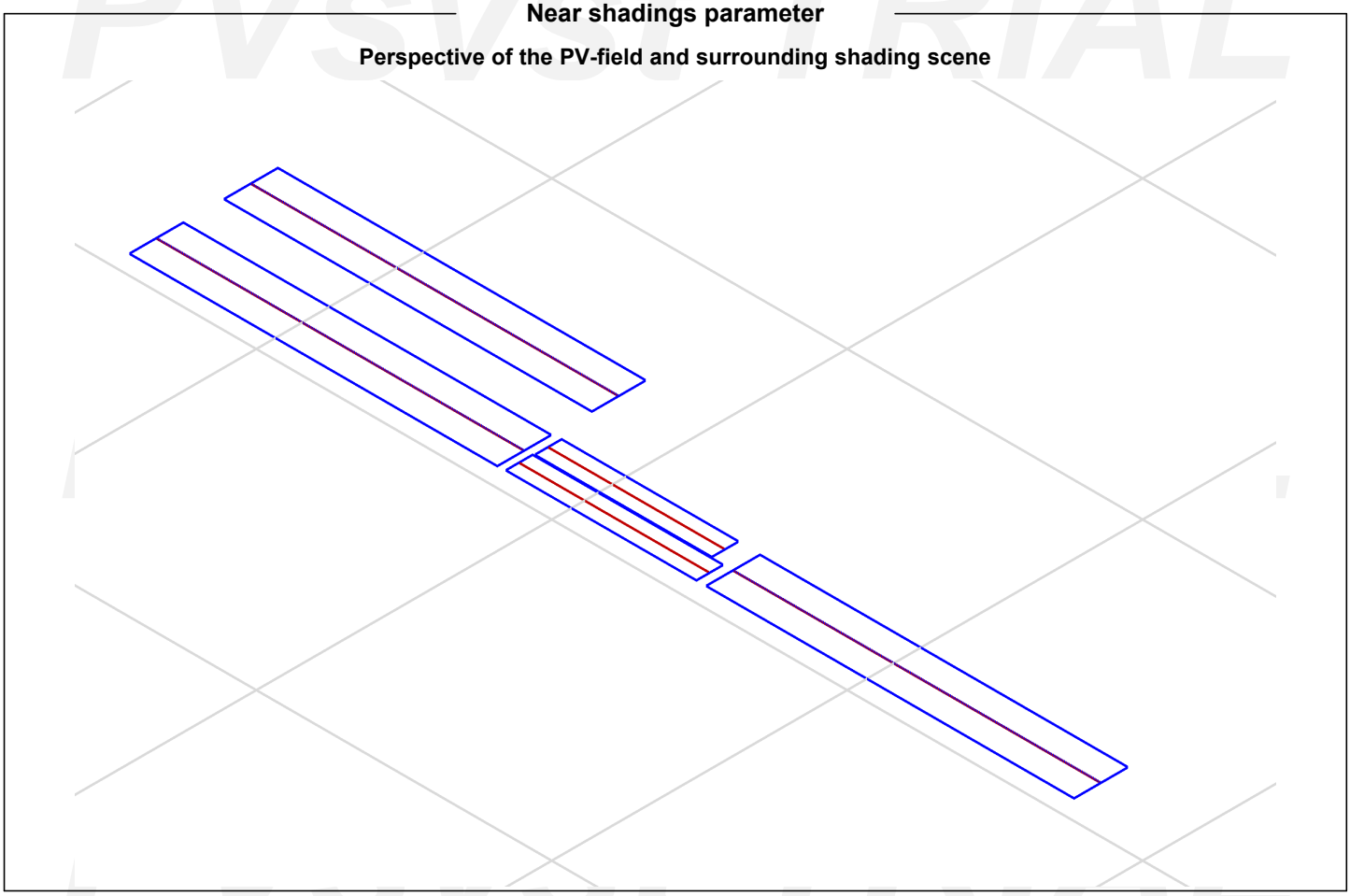
Azimuth [°]	-180	-173	-165	-158	-143	-135	-128	-120	-113	-105	-98	-90
Height [°]	1.9	3.4	4.6	5.7	7.3	6.5	4.6	4.2	5.3	6.1	5.7	5.3
Azimuth [°]	-83	-75	-68	-60	-53	-45	-38	-30	-23	-15	0	8
Height [°]	4.6	4.2	3.4	3.1	2.3	1.9	0.4	1.1	1.5	1.1	1.1	3.4
Azimuth [°]	15	23	38	45	135	143	150	158	165	173	180	
Height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



Near shadings parameter

Perspective of the PV-field and surrounding shading scene



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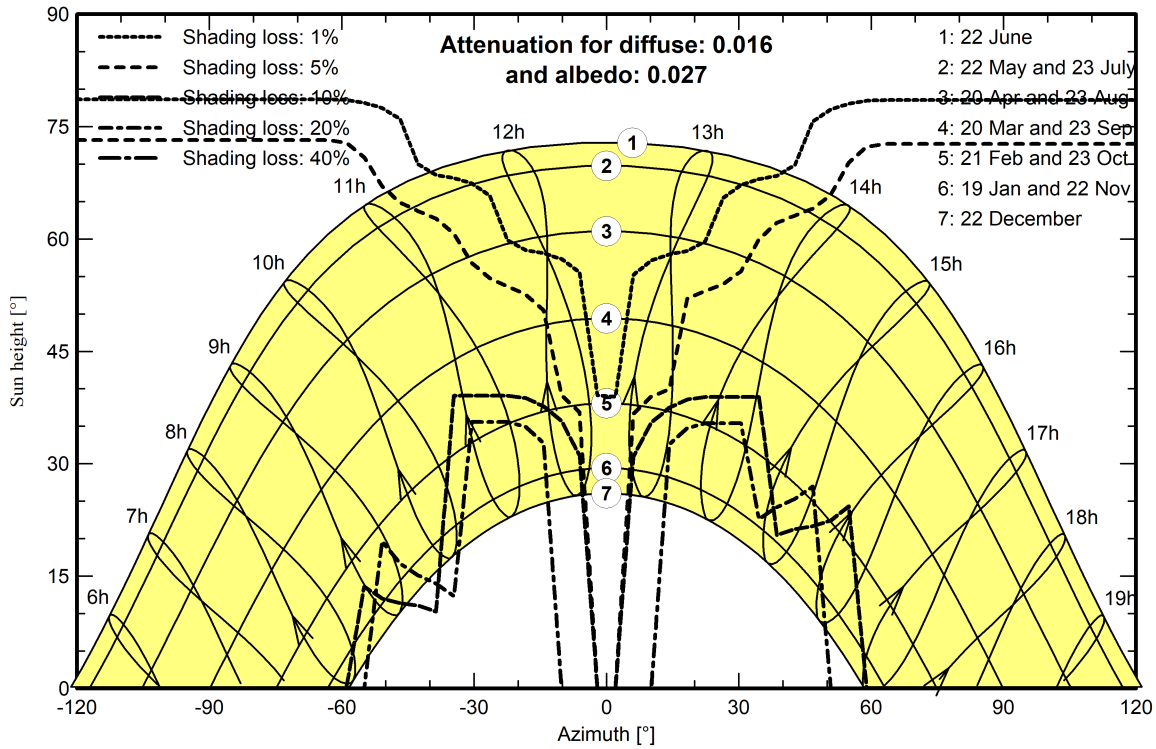
Iso-shadings diagram

Orientation #1



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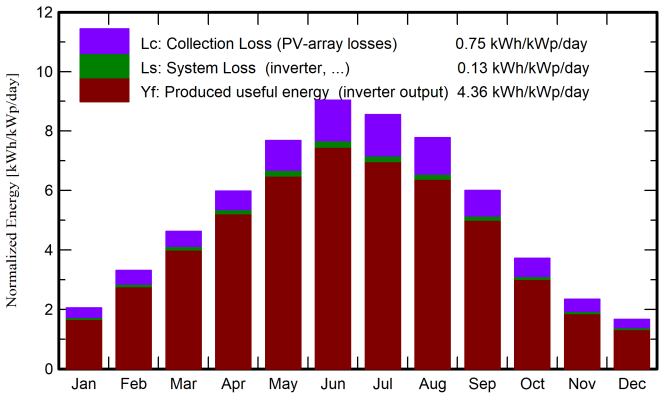
Main results

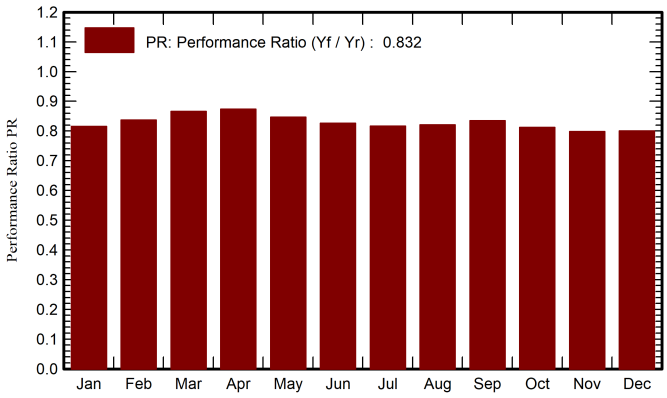
System Production

Produced Energy	159.4 MWh/year	Specific production	1592 kWh/kWp/year
		Performance Ratio PR	83.25 %

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	63.4	56.6	5.39	5.18	0.816
February	76.4	39.36	6.71	92.7	85.0	8.03	7.78	0.837
March	118.0	57.36	9.91	143.4	133.4	12.81	12.44	0.866
April	150.3	77.02	13.73	179.2	168.2	16.14	15.69	0.874
May	195.0	84.41	19.52	238.1	224.1	20.76	20.19	0.846
June	218.4	75.24	24.54	271.2	256.7	23.07	22.43	0.826
July	214.7	82.15	27.83	265.2	250.2	22.30	21.69	0.816
August	194.0	76.29	27.71	241.2	227.0	20.38	19.84	0.821
September	144.2	53.93	21.67	180.0	168.3	15.49	15.05	0.835
October	94.1	43.87	16.53	115.4	106.2	9.69	9.39	0.812
November	57.9	29.79	11.46	70.2	63.7	5.83	5.61	0.798
December	43.4	24.96	6.66	51.6	46.3	4.33	4.14	0.800
Year	1559.1	673.58	15.99	1911.9	1785.9	164.22	159.43	0.832

Legends

GlobHor	Global horizontal irradiation
DiffHor	Horizontal diffuse 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
PR	Performance Ratio

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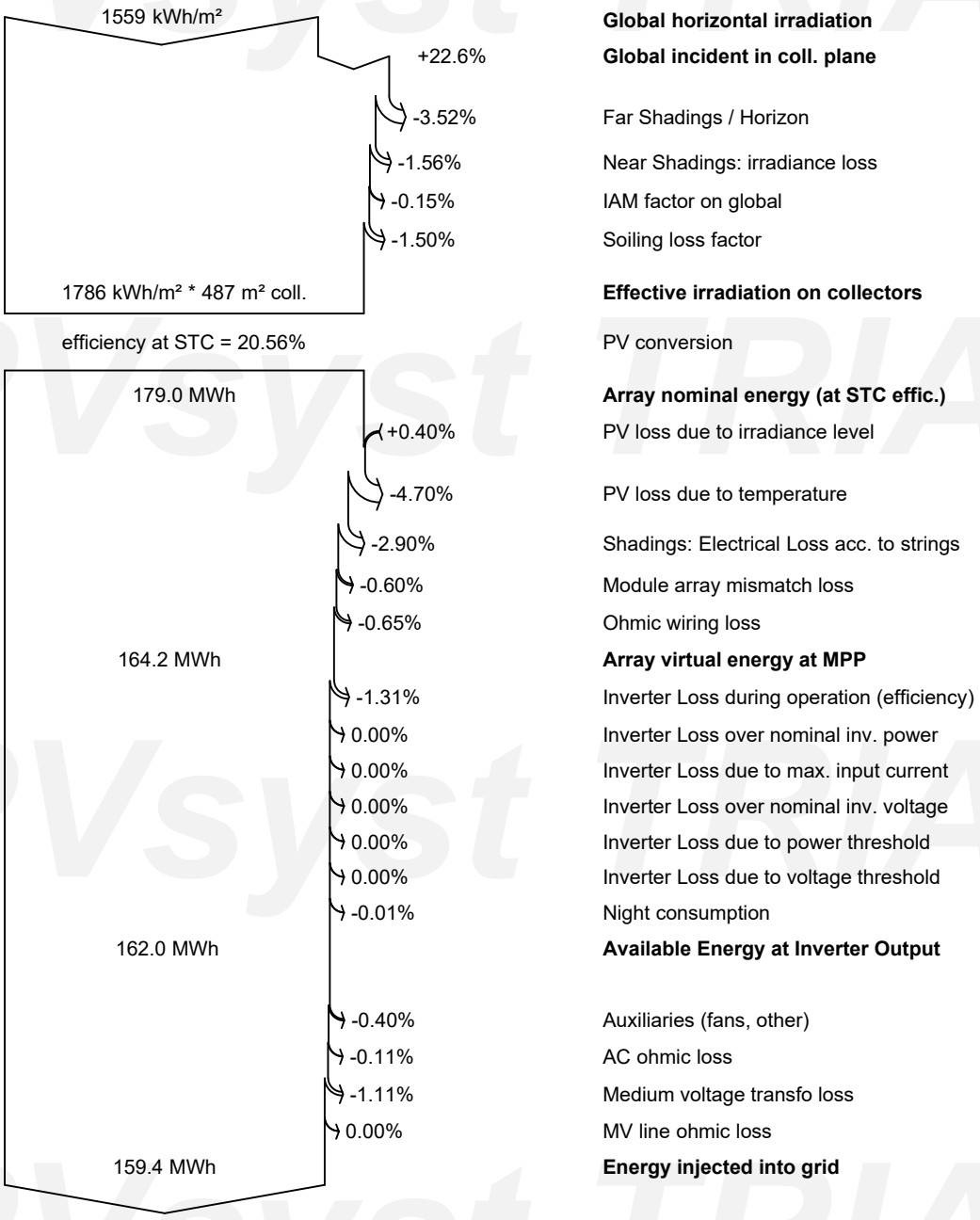
Loss diagram



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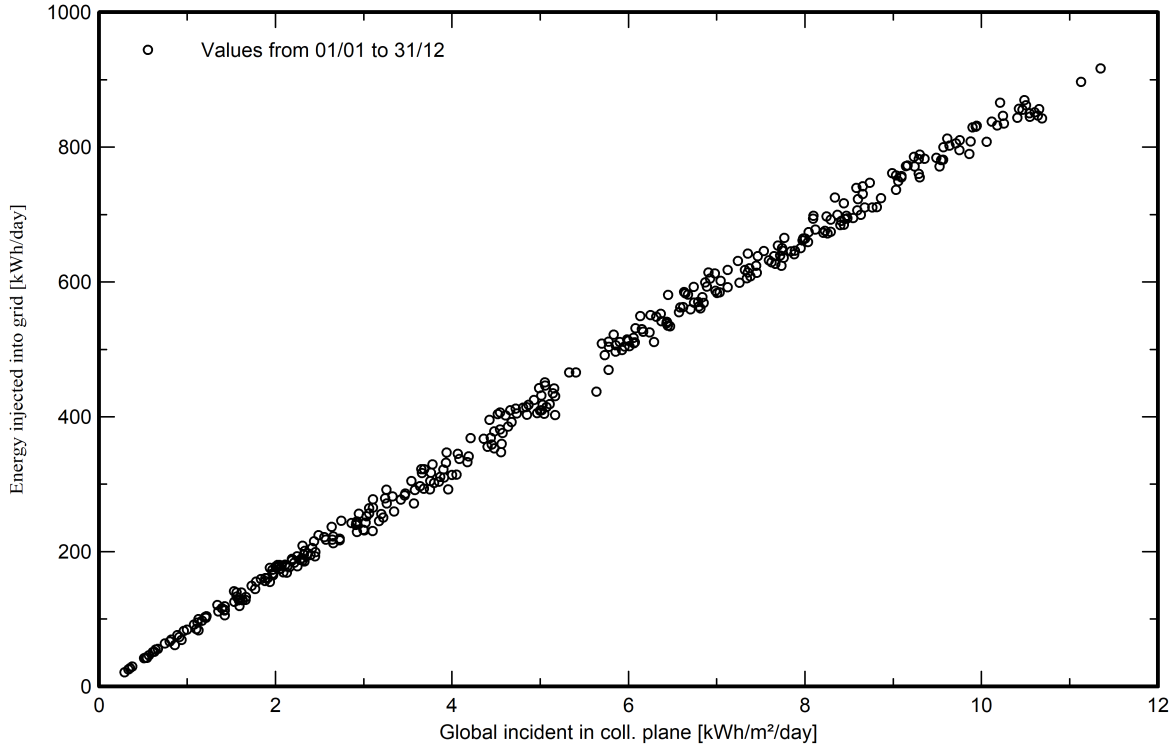
Special graphs

Daily Input/Output diagram



System Output Power Distribution