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NOME COMMESSA:

COSTRUZIONE ED ESERCIZIO IMPIANTO AGROVOLTAICO AVENTE POTENZA NOMINALE PARI A 7.500kW E POTENZA MODULI PARI A 10.124,4kWp, CON RELATIVO COLLEGAMENTO ALLA RETE ELETTRICA, SITO IN BRINDISI (BR) AL FG.187 PART.N.9-128-182-184-246 -38-176-177-44-63-124-127 IMPIANTO 13B

STATO DI AVANZAMENTO COMMESSA:

PROGETTO DEFINITIVO PER AUTORIZZAZIONE UNICA

CODICE COMMESSA:

HE.19.0092

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dott. ing. ALBERTO ALBUZZI
ISCRIZIONE ALBO N° 2435

Firmato digitalmente da: ALBUZZI ALBERTO
Data: 17/12/2021 09:24:27

COLLABORATORE:

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STUDIO LEGALE PATRUNO
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OGGETTO:

Analisi della risorsa solare e stima di produzione energia

SCALA:

-

DATA:

SETTEMBRE 2021

NOME FILE:

QEL3745_AnalisiRisorsaSolare.PDF

TAVOLA:

DPE.RE01

N. REV.	DATA	REVISIONE	ELABORATO	VERIFICATO responsabile commessa	VALIDATO direttore tecnico
0	09.2021	Emissione	A.Albuzzi	A.Albuzzi	N.Zuech

Version 7.2.6

PVsyst - Simulation report

Grid-Connected System

Project: HE.19.0024 HEPV SV 13B

Variant: SV 13B PVGYS SARAH 2005-2016

Tracking system with backtracking

System power: 10.12 MWp

Brindisi Sv. 13 PVGYS SARAH 2005-2016 - Italy

Author

Heliopolis spa (Italy)

PVsyst V7.2.6
VC0, Simulation date:
12/10/21 13:06
with v7.2.6

Project summary

Geographical Site
Brindisi Sv. 13 PVGYS SARAH 2005-2016
Italy

Situation

Latitude	40.51 °N
Longitude	17.91 °E
Altitude	68 m
Time zone	UTC+1

Project settings
Albedo 0.20

Meteo data
Brindisi Sv. 13 PVGYS SARAH 2005-2016
PVGIS TMY: SARAH, COSMO or NSRDB - Synthetic

System summary

Grid-Connected System
Simulation for year no 1

Tracking system with backtracking

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

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array		Inverters	
Nb. of modules	18408 units	Nb. of units	22 units
Pnom total	10.12 MWp	Pnom total	6850 kWac
		Pnom ratio	1.478

Results summary

Produced Energy	18423 MWh/year	Specific production	1820 kWh/kWp/year	Perf. Ratio PR	82.51 %

Table of contents

PVsyst V7.2.6
VC0, Simulation date:
12/10/21 13:06
with v7.2.6

General parameters

Grid-Connected System

Tracking system with backtracking

PV Field Orientation

Orientation		Backtracking strategy		Models used	
Tracking plane, horizontal N-S axis		Nb. of trackers	416 units	Transposition	Perez
Axis azimuth	0 °	**Sizes**		Diffuse	Perez, Meteonorm
		Tracker Spacing	5.50 m	Circumsolar	separate
		Collector width	2.28 m		
		Ground Cov. Ratio (GCR)	41.4 %		
		Phi min / max.	-/+ 60.0 °		
		Backtracking limit angle			
		Phi limits	+/- 65.4 °		

Horizon
Free Horizon

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

PV Array Characteristics

Array #1 - Inv. 250kW

PV module		Inverter	
Manufacturer	Phono Solar	Manufacturer	Sungrow
Model	PS550M6H-24/TH	Model	SG250HX
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	550 Wp	Unit Nom. Power	225 kWac
Number of PV modules	1248 units	Number of inverters	24 * MPPT 8% 2 units
Nominal (STC)	686 kWp	Total power	450 kWac
Modules	48 Strings x 26 In series	Operating voltage	600-1500 V
At operating cond. (50°C)		Max. power (=>30°C)	250 kWac
Pmpp	621 kWp	Pnom ratio (DC:AC)	1.53
U mpp	973 V		
I mpp	638 A		

Array #2 - Inv. 350kW

PV module		Inverter	
Manufacturer	Phono Solar	Manufacturer	Sungrow
Model	PS550M6H-24/TH	Model	SG350HX-20A-Preliminary
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	550 Wp	Unit Nom. Power	320 kWac
Number of PV modules	17160 units	Number of inverters	240 * MPPT 8% 20 units
Nominal (STC)	9438 kWp	Total power	6400 kWac
Modules	660 Strings x 26 In series	Operating voltage	500-1500 V
At operating cond. (50°C)		Max. power (=>30°C)	352 kWac
Pmpp	8539 kWp	Pnom ratio (DC:AC)	1.47
U mpp	973 V		
I mpp	8776 A		

Total PV power		Total inverter power	
Nominal (STC)	10124 kWp	Total power	6850 kWac
Total	18408 modules	Nb. of inverters	22 units
Module area	47573 m²	Pnom ratio	1.48
Cell area	43737 m²		

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VC0, Simulation date:
12/10/21 13:06
with v7.2.6

Array losses

Array Soiling Losses
Loss Fraction 1.0 %

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

LID - Light Induced Degradation
Loss Fraction 1.0 %

Module Quality Loss
Loss Fraction -0.3 %

Module mismatch losses
Loss Fraction 0.7 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

Module average degradation
Year no 1
Loss factor 0.5 %/year
Mismatch due to degradation
Imp RMS dispersion 0.4 %/year
Vmp RMS dispersion 0.4 %/year

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

0°	20°	40°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.970	0.910	0.850	0.740	0.440	0.000

DC wiring losses

Global wiring resistance 1.6 mΩ
Loss Fraction 1.4 % at STC

Array #1 - Inv. 250kW
Global array res. 24 mΩ
Loss Fraction 1.4 % at STC

Array #2 - Inv. 350kW
Global array res. 1.7 mΩ
Loss Fraction 1.4 % at STC

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 800 Vac tri
Loss Fraction 0.40 % at STC
Inverters: SG250HX, SG350HX-20A-Preliminary
Wire section (22 Inv.) Alu 22 x 3 x 2500 mm²
Average wires length 450 m

AC losses in transformers

MV transfo
Grid voltage 20 kV
Operating losses at STC
Nominal power at STC 9972 kVA
Iron loss (24/24 Connexion) 9.97 kW
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 0.64 mΩ
Loss Fraction 1.00 % at STC

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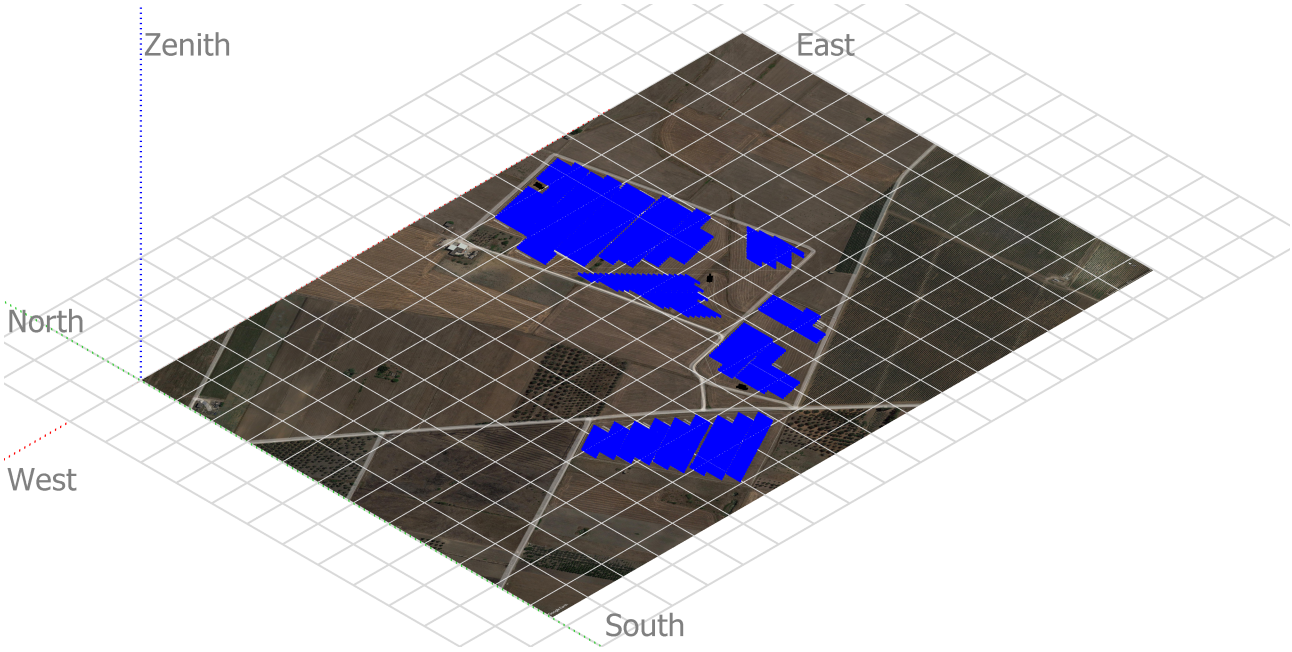
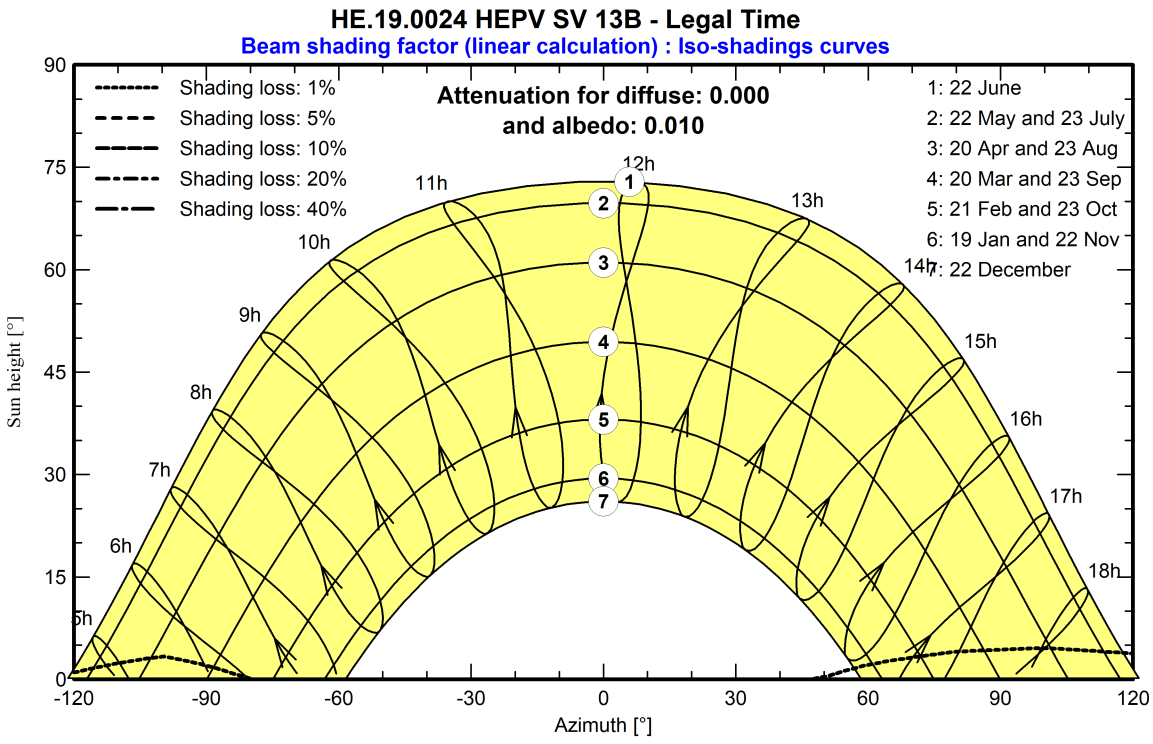
VC0, Simulation date:
12/10/21 13:06
with v7.2.6

Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram



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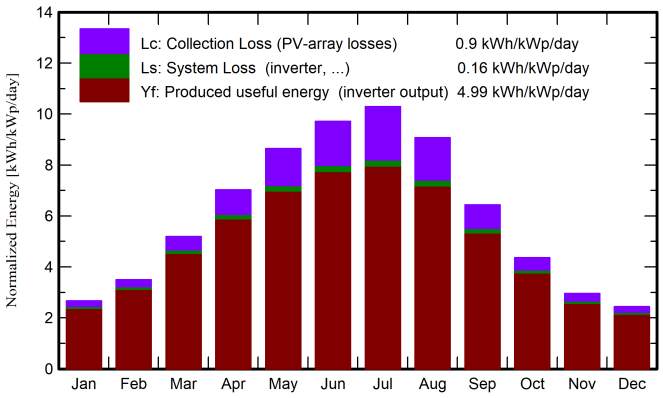
VC0, Simulation date:
12/10/21 13:06
with v7.2.6

Main results

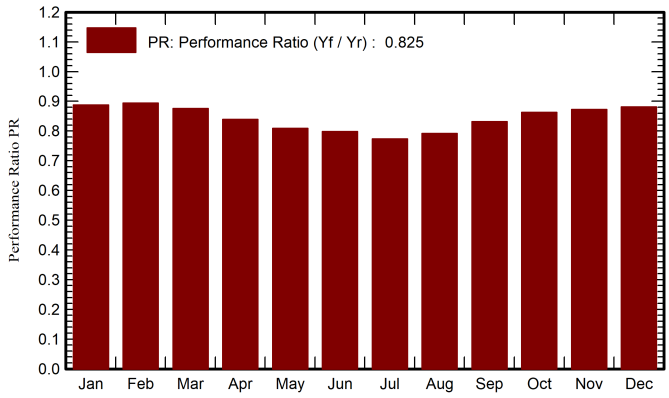
System Production

Produced Energy	18423 MWh/year	Specific production	1820 kWh/kWp/year
		Performance Ratio PR	82.51 %

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	62.1	28.70	10.20	82.9	78.0	770	745	0.888
February	75.4	36.20	10.20	98.0	92.9	916	888	0.894
March	124.1	53.10	12.10	160.8	154.3	1470	1425	0.875
April	161.9	64.90	14.80	210.7	203.1	1846	1791	0.839
May	205.1	70.50	18.60	268.1	259.2	2262	2195	0.809
June	221.2	70.80	22.60	291.4	282.2	2427	2354	0.798
July	237.9	62.70	25.70	319.0	309.4	2577	2499	0.774
August	208.7	59.70	25.70	281.3	272.5	2328	2256	0.792
September	145.4	54.80	22.40	193.1	186.0	1676	1625	0.831
October	102.9	45.00	18.40	135.4	129.3	1222	1184	0.863
November	66.5	31.40	14.70	88.9	83.7	811	785	0.872
December	56.1	25.50	11.10	75.9	71.0	700	677	0.881
Year	1667.3	603.30	17.25	2205.5	2121.8	19004	18423	0.825

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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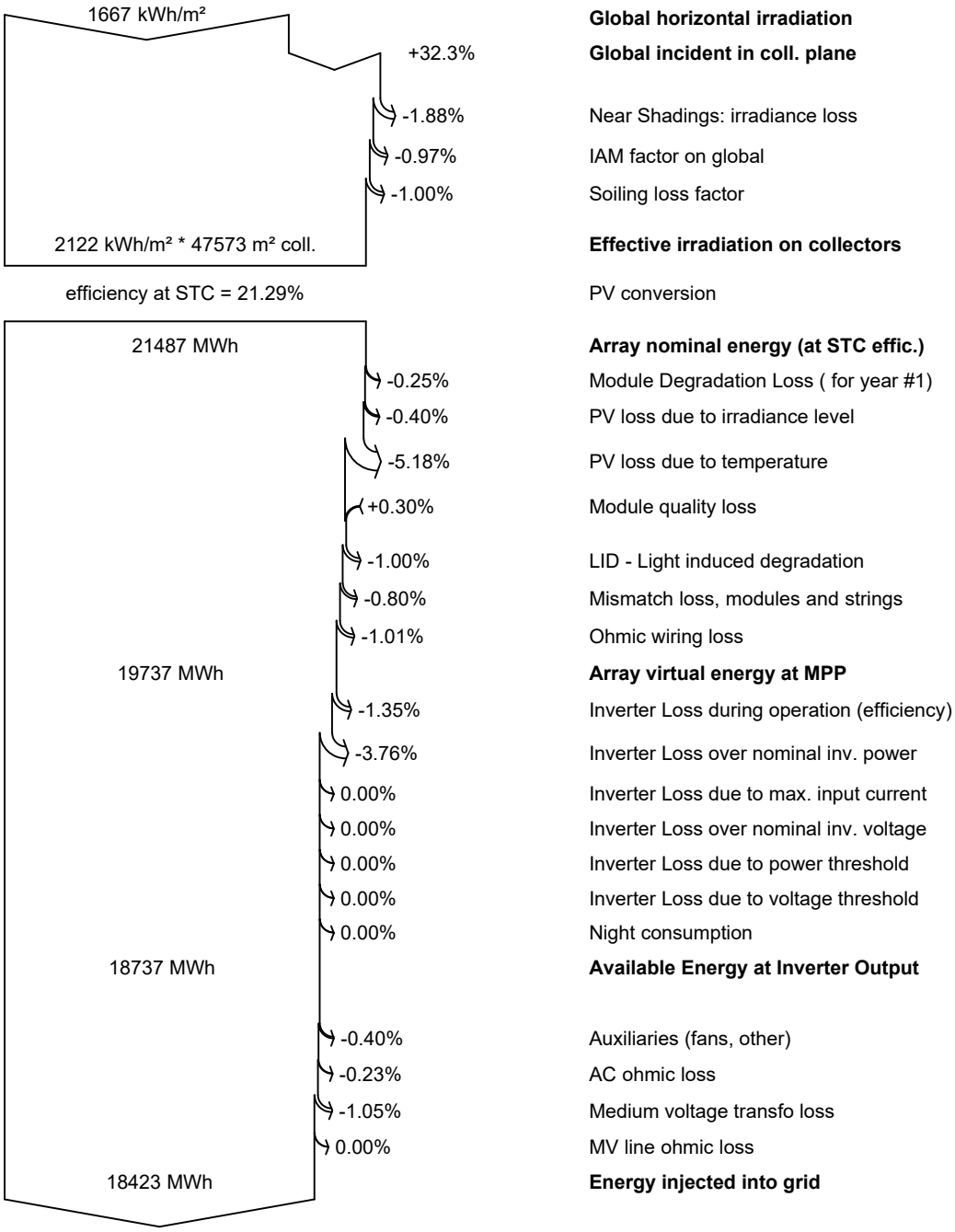
VC0, Simulation date:
12/10/21 13:06
with v7.2.6

Loss diagram



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12/10/21 13:06
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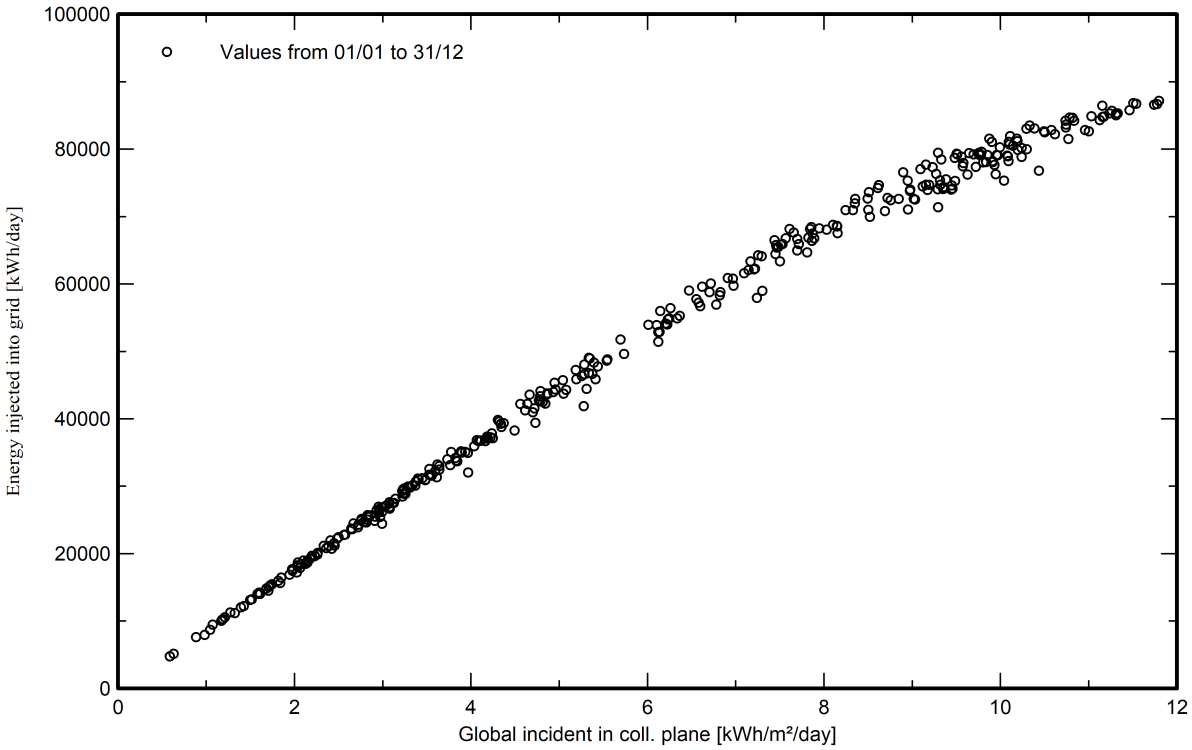
Special graphs

Daily Input/Output diagram



System Output Power Distribution