

PVsyst - Simulation report

Grid-Connected System

Project: Folkendange

Variant: Folkendange-tracker

Tracking system

System power: 5011 kWp

Folkendange - Luxembourg

Author

Tecnica y Proyectos SA (Spain)

**PVsyst V7.2.12**

VC1, Simulation date:
17/08/22 11:37
with v7.2.12

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Project summary**Geographical Site**

Folkendange
Luxembourg

Situation

Latitude 49.83 °N
Longitude 6.20 °E
Altitude 304 m
Time zone UTC+1

Project settings

Albedo 0.16

Meteo data

Folkendange
SolarGIS Monthly aver. , period not spec. - Synthetic

System summary**Grid-Connected System**

Simulation for year no 1

Tracking system**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**

Nb. of modules 8792 units
Pnom total 5011 kWp

Inverters

Nb. of units 20 units
Pnom total 4000 kWac
Pnom ratio 1.253

Results summary

Produced Energy 7 GWh/year Specific production 1341 kWh/kWp/year Perf. Ratio PR 88.63 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Horizon definition	5
Near shading definition - Iso-shadings diagram	6
Main results	7
Loss diagram	8
Special graphs	9

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General parameters**Grid-Connected System****PV Field Orientation****Orientation**

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

Horizon

Average Height 3.7 °

Bifacial system

Model 2D Calculation
unlimited trackers

Bifacial model geometry

Tracker Spacing 6.00 m
Tracker width 2.28 m
GCR 38.0 %
Axis height above ground 2.10 m

Tracking system**Trackers configuration**

Nb. of trackers 127 units

Sizes

Tracker Spacing 6.00 m
Collector width 2.28 m
Ground Cov. Ratio (GCR) 38.0 %
Phi min / max. +/- 60.0 °

Shading limit angles

Phi limits +/- 67.5 °

Near Shadings

Linear shadings

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

User's needs

Unlimited load (grid)

Bifacial model definitions

Ground albedo 0.16
Bifaciality factor 80 %
Rear shading factor 5.0 %
Rear mismatch loss 10.0 %
Shed transparent fraction 0.0 %

PV Array Characteristics**PV module**

Manufacturer Jolywood
Model JW-HD144N-570(Full Frame 182)
(Custom parameters definition)

Unit Nom. Power 570 Wp
Number of PV modules 8792 units
Nominal (STC) 5011 kWp
Modules 314 Strings x 28 In series

At operating cond. (50°C)

Pmpp 4613 kWp
U mpp 1088 V
I mpp 4242 A

Total PV power

Nominal (STC) 5011 kWp
Total 8792 modules
Module area 22732 m²
Cell area 20966 m²

Inverter

Manufacturer Huawei Technologies
Model SUN2000-215KTL-H0
(Custom parameters definition)

Unit Nom. Power 200 kWac
Number of inverters 20 units
Total power 4000 kWac
Operating voltage 500-1500 V
Max. power (=>33°C) 215 kWac
Pnom ratio (DC:AC) 1.25

Total inverter power

Total power 4000 kWac
Number of inverters 20 units
Pnom ratio 1.25

Array losses**Array Soiling Losses**

Loss Fraction 2.0 %

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. 0.84 mΩ
Loss Fraction 0.3 % at STC

Module Quality Loss

Loss Fraction -0.8 %

Module mismatch losses

Loss Fraction 1.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

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Array losses**Module average degradation**

Year no 1
Loss factor 0.56 %/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°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.990	0.990	0.970	0.960	0.930	0.850	0.000

System losses**Unavailability of the system**

Time fraction 1.0 %
3.7 days,
3 periods

Auxiliaries loss

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

AC wiring losses**Inv. output line up to injection point**

Inverter voltage 800 Vac tri
Loss Fraction 0.98 % at STC

Inverter: SUN2000-215KTL-H0

Wire section (20 Inv.) Copper 20 x 3 x 70 mm²
Average wires length 95 m



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Horizon definition

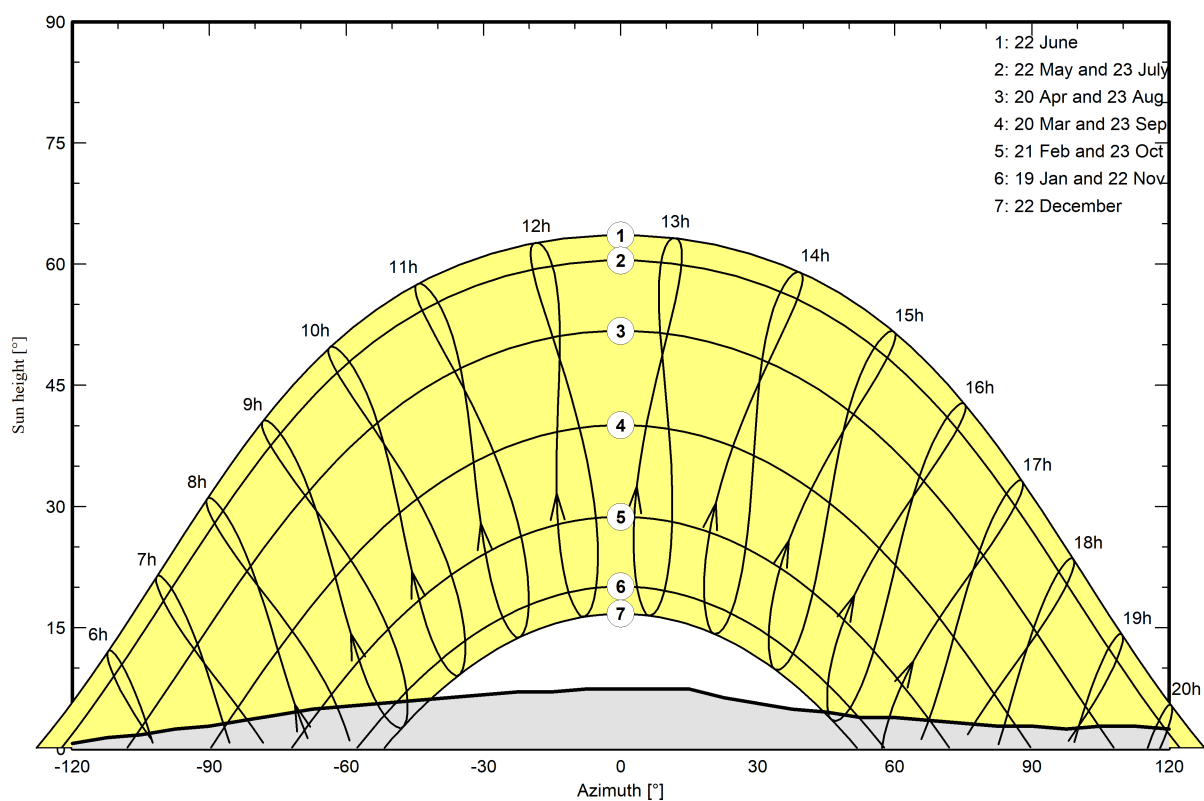
CSV horizon file, lat:49.83232190877928, lng:6.198660135269165, exported by sola

Average Height	3.7 °	Albedo Factor	0.84
Diffuse Factor	0.96	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-113	-105	-98
Height [°]	1.8	1.4	1.1	0.7	0.7	1.1	0.7	0.4	0.7	1.4	1.8	2.5
Azimuth [°]	-90	-83	-75	-68	-60	-53	-45	-38	-30	-23	-15	-8
Height [°]	2.8	3.5	4.2	4.9	5.3	5.6	6.0	6.4	6.7	7.1	7.1	7.4
Azimuth [°]	15	23	30	38	45	53	60	68	75	83	90	98
Height [°]	7.4	6.4	5.6	4.9	4.6	3.9	3.9	3.5	3.2	2.8	2.8	2.5
Azimuth [°]	105	113	120	128	135	143	150	158	165	173		
Height [°]	2.8	2.8	2.5	2.5	2.8	2.8	3.2	2.8	2.5	2.1		

Sun Paths (Height / Azimuth diagram)



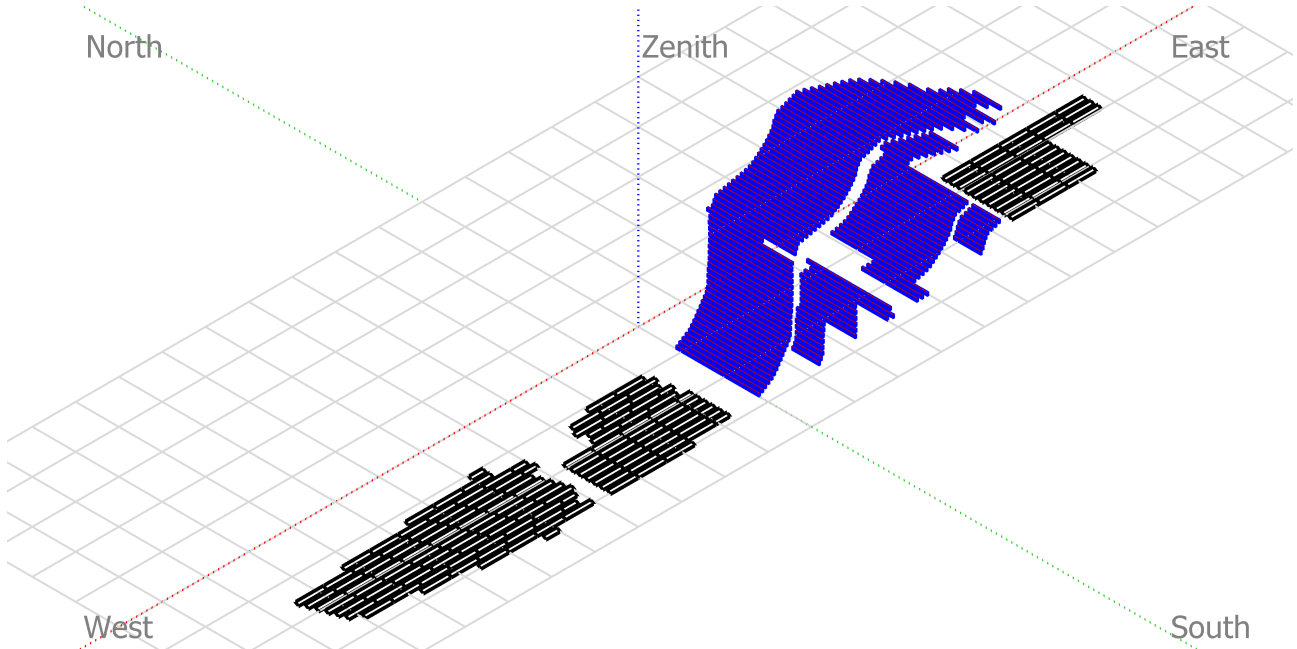


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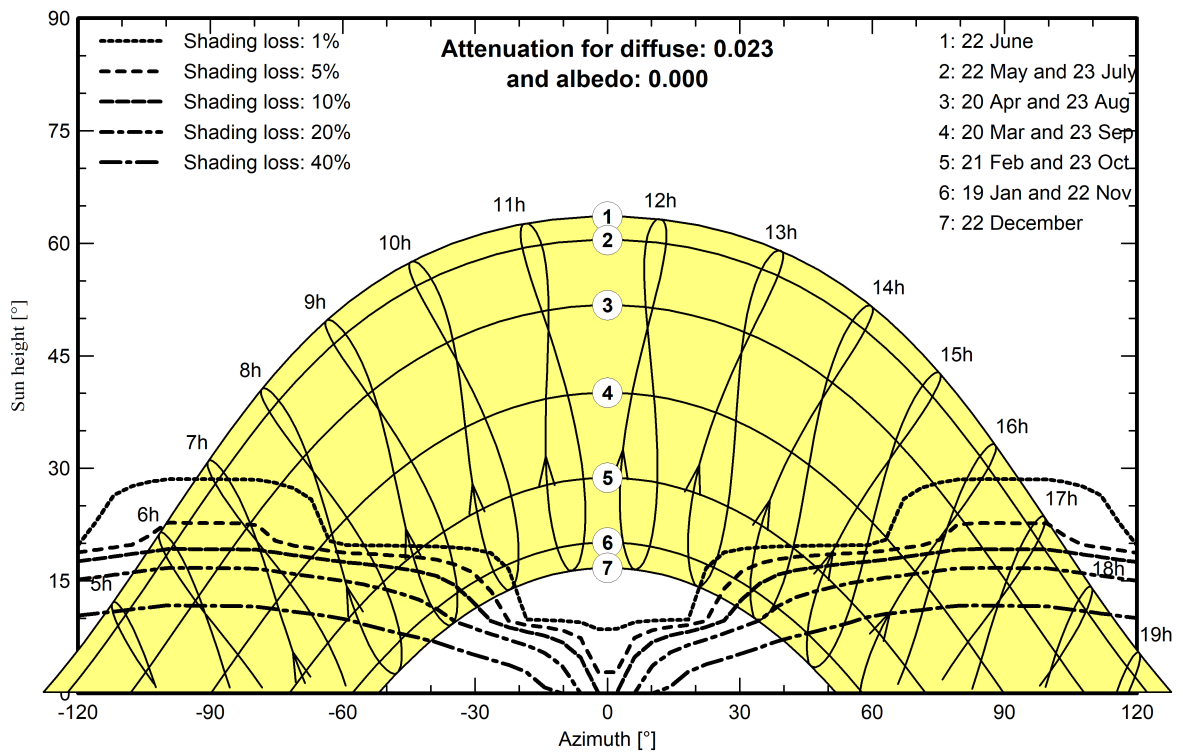
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1





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Main results

System Production

Produced Energy

7 GWh/year

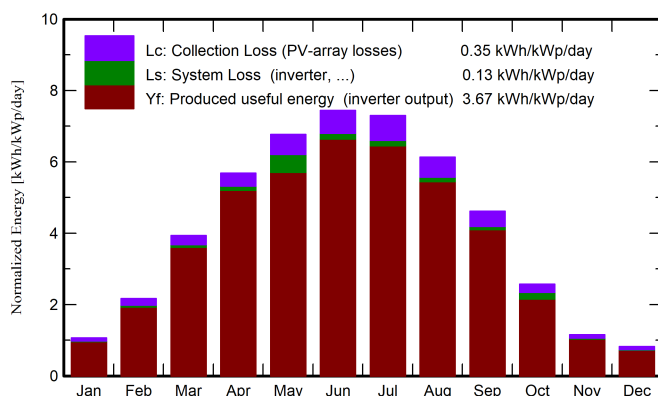
Specific production

1341 kWh/kWp/year

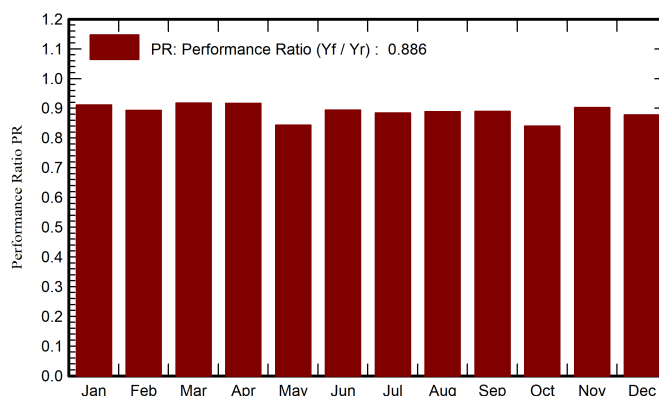
Performance Ratio PR

88.63 %

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	GWh	GWh	ratio
January	25.2	16.90	1.40	32.9	27.8	0.153	0.150	0.912
February	42.6	24.50	2.30	60.6	51.4	0.279	0.271	0.893
March	86.1	44.00	5.30	121.9	107.9	0.573	0.561	0.918
April	126.6	61.90	9.00	170.4	153.7	0.800	0.783	0.916
May	153.3	76.90	12.70	209.9	190.4	0.965	0.887	0.843
June	166.7	82.00	16.10	223.2	204.4	1.023	0.999	0.894
July	165.4	82.10	18.00	226.2	205.8	1.026	1.003	0.885
August	139.1	69.40	17.50	190.0	171.5	0.866	0.846	0.889
September	98.4	49.60	13.70	138.5	122.7	0.631	0.617	0.889
October	57.4	33.10	9.70	79.6	69.0	0.364	0.335	0.840
November	27.0	18.60	5.30	34.5	29.2	0.159	0.156	0.902
December	19.1	13.10	2.30	25.5	20.8	0.114	0.112	0.878
Year	1106.9	572.10	9.48	1513.2	1354.5	6.952	6.721	0.886

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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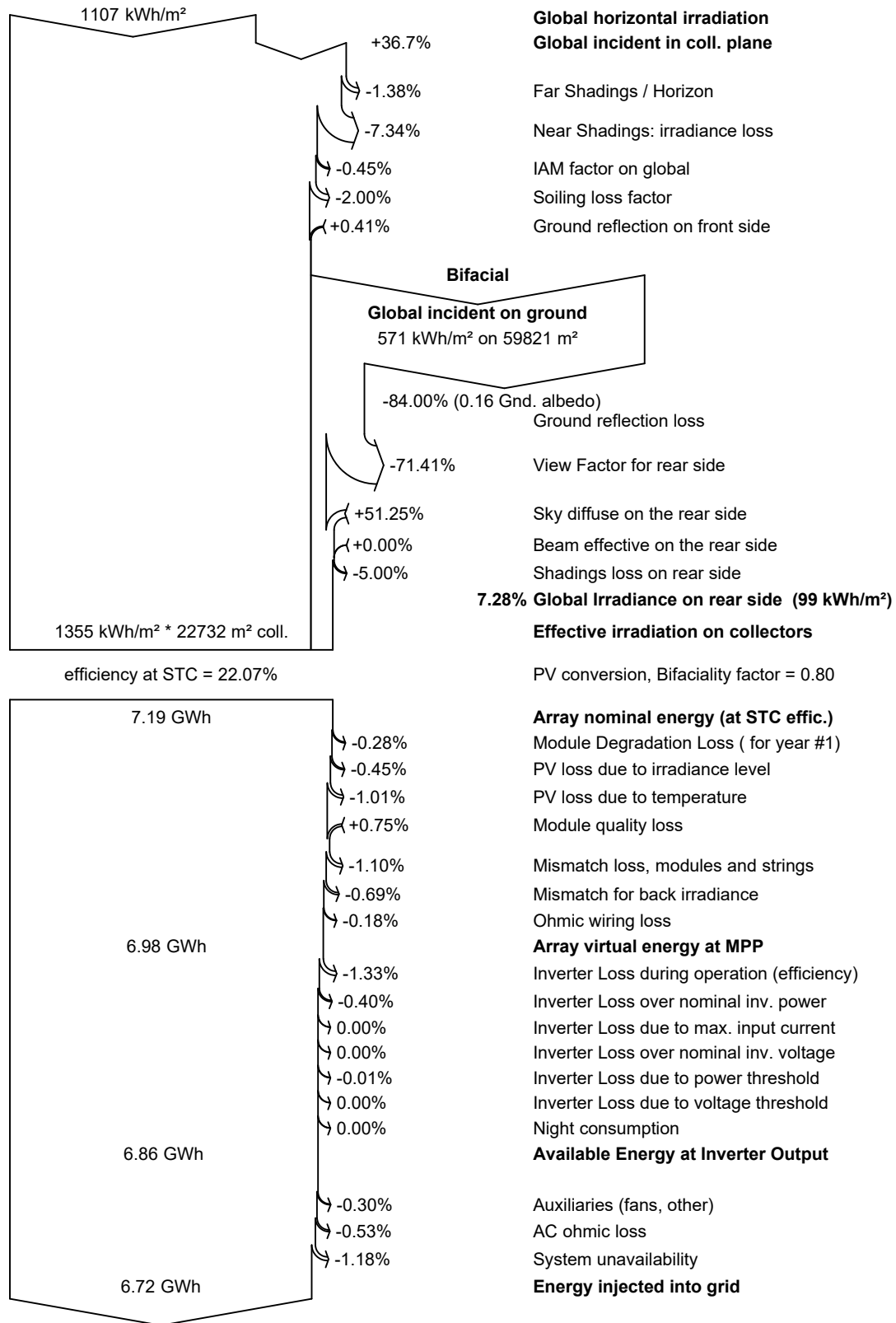
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Loss diagram





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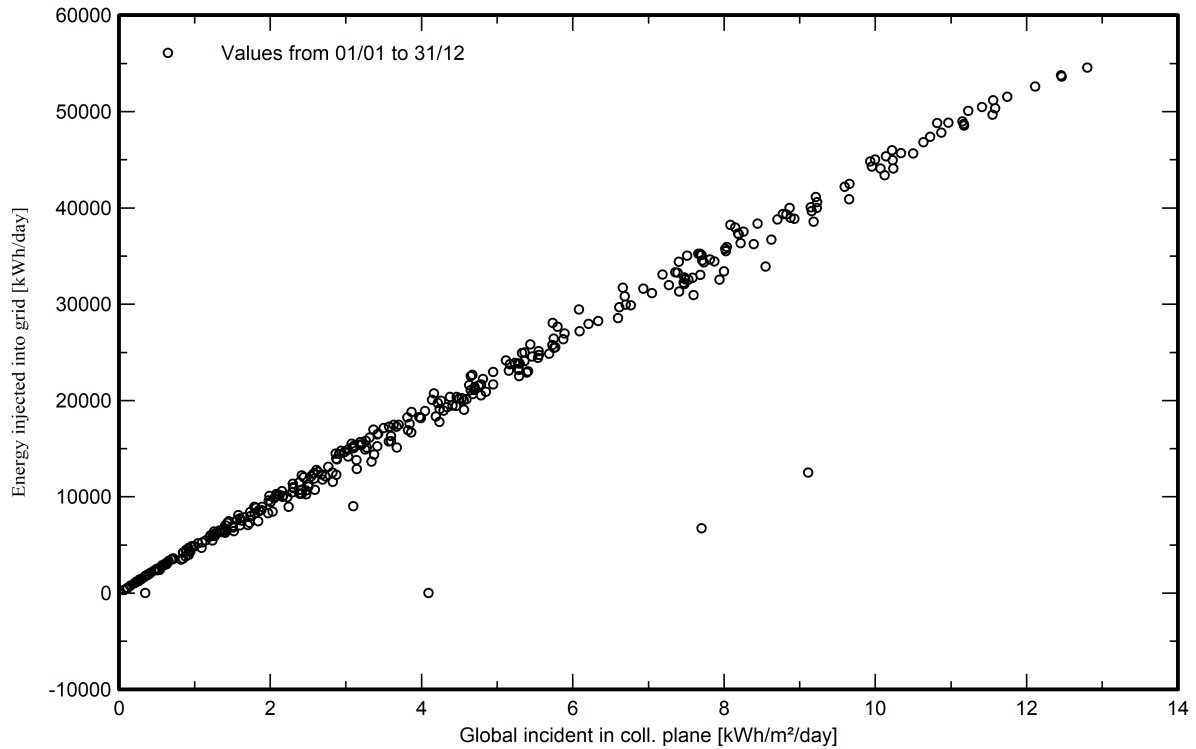
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Special graphs

Daily Input/Output diagram



System Output Power Distribution

