

PVsyst - Simulation report

Grid-Connected System

Project: Folkendange

Variant: Folkendange-fixed

Sheds on ground

System power: 4980 kWp

Folkendange - Luxembourg

Author

Tecnica y Proyectos SA (Spain)



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PVsyst V7.2.12

VC0, Simulation date:
17/08/22 10:25
with v7.2.12

Tecnica y Proyectos SA (Spain)

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

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

Nb. of modules

8736 units

Pnom total

4980 kWp

Inverters

Nb. of units

21 units

Pnom total

4200 kWac

Pnom ratio

1.186

Results summary

Produced Energy 6 GWh/year Specific production 1159 kWh/kWp/year Perf. Ratio PR 90.73 %

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

Fixed plane
Tilt/Azimuth 30 / 0 °

Horizon

Average Height 3.7 °

Bifacial system

Model 2D Calculation
unlimited sheds

Bifacial model geometry

Sheds spacing 8.50 m
Sheds width 4.58 m
Limit profile angle 26.8 °
GCR 53.9 %
Height above ground 1.50 m

Sheds on ground

Sheds configuration

Nb. of sheds 163 units

Sizes

Sheds spacing 8.50 m
Collector width 4.58 m
Ground Cov. Ratio (GCR) 53.9 %

Shading limit angle

Limit profile angle 26.8 °

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

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 8736 units
Nominal (STC) 4980 kWp

Array #1 - fixed tilt 1

Number of PV modules 6720 units
Nominal (STC) 3830 kWp
Modules 240 Strings x 28 In series

At operating cond. (50°C)

Pmpp 3526 kWp
U mpp 1088 V
I mpp 3242 A

Array #2 - fixed tilt 2

Number of PV modules 2016 units
Nominal (STC) 1149 kWp
Modules 72 Strings x 28 In series

At operating cond. (50°C)

Pmpp 1058 kWp
U mpp 1088 V
I mpp 973 A

Inverter

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

Unit Nom. Power 200 kWac
Number of inverters 21 units
Total power 4200 kWac

Number of inverters 15 units
Total power 3000 kWac

Operating voltage 500-1500 V
Max. power (=>33°C) 215 kWac
Pnom ratio (DC:AC) 1.28

Number of inverters 6 units
Total power 1200 kWac

Operating voltage 500-1500 V
Max. power (=>33°C) 215 kWac
Pnom ratio (DC:AC) 0.96

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PV Array Characteristics**Total PV power**

Nominal (STC) 4980 kWp
Total 8736 modules
Module area 22587 m²
Cell area 20832 m²

Total inverter power

Total power 4200 kWac
Number of inverters 21 units
Pnom ratio 1.19

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

Module Quality Loss

Loss Fraction -0.8 %

Module mismatch losses

Loss Fraction 1.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

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

DC wiring losses

Global wiring resistance 0.85 mΩ
Loss Fraction 0.3 % at STC

Array #1 - fixed tilt 1

Global array res. 1.1 mΩ
Loss Fraction 0.3 % at STC

Array #2 - fixed tilt 2

Global array res. 3.7 mΩ
Loss Fraction 0.3 % at STC

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 1.00 % at STC

Inverter: SUN2000-215KTL-H0

Wire section (21 Inv.) Copper 21 x 3 x 70 mm²
Average wires length 104 m



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Horizon definition

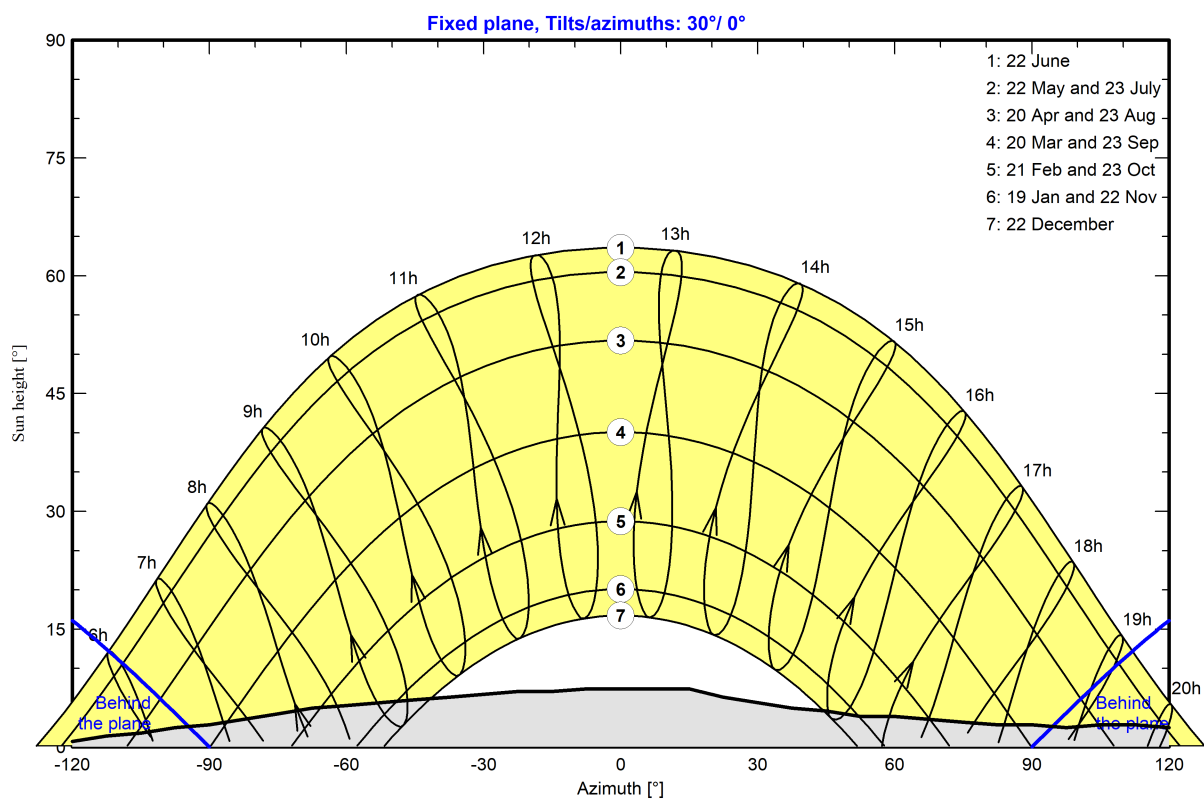
CSV horizon file, lat:49.83232190877928, lng:6.198660135269165, exported by sola

Average Height	3.7 °	Albedo Factor	0.68
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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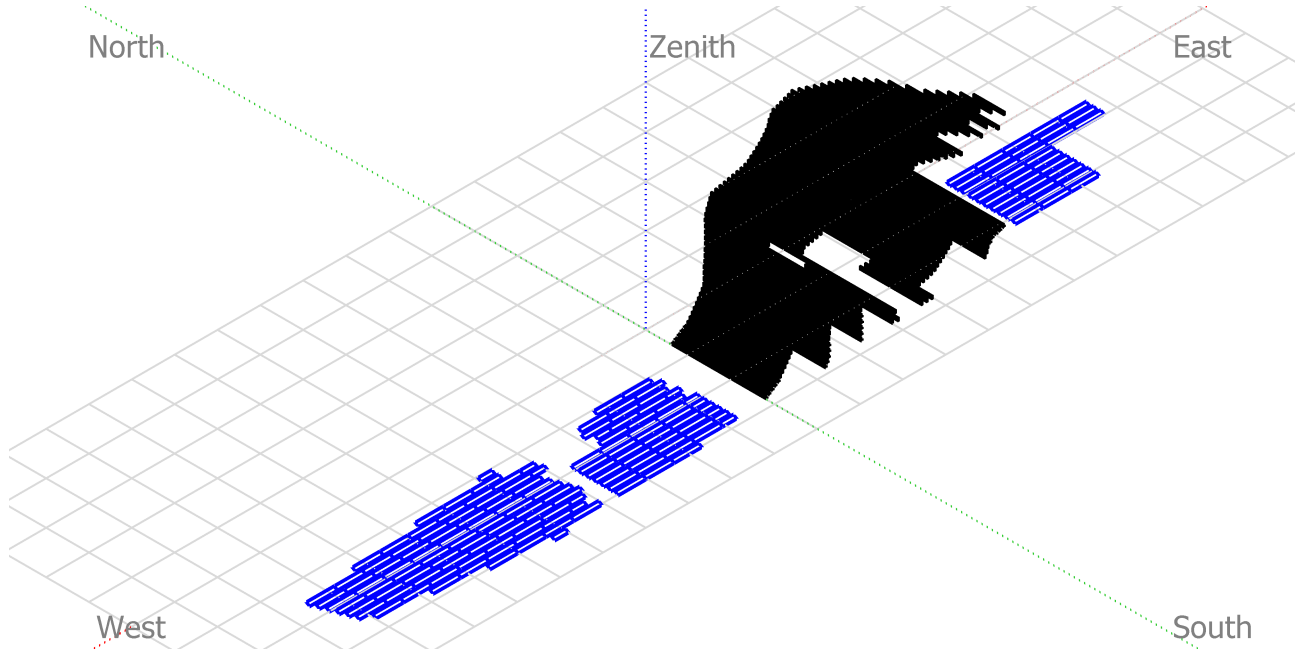
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Near shadings parameter

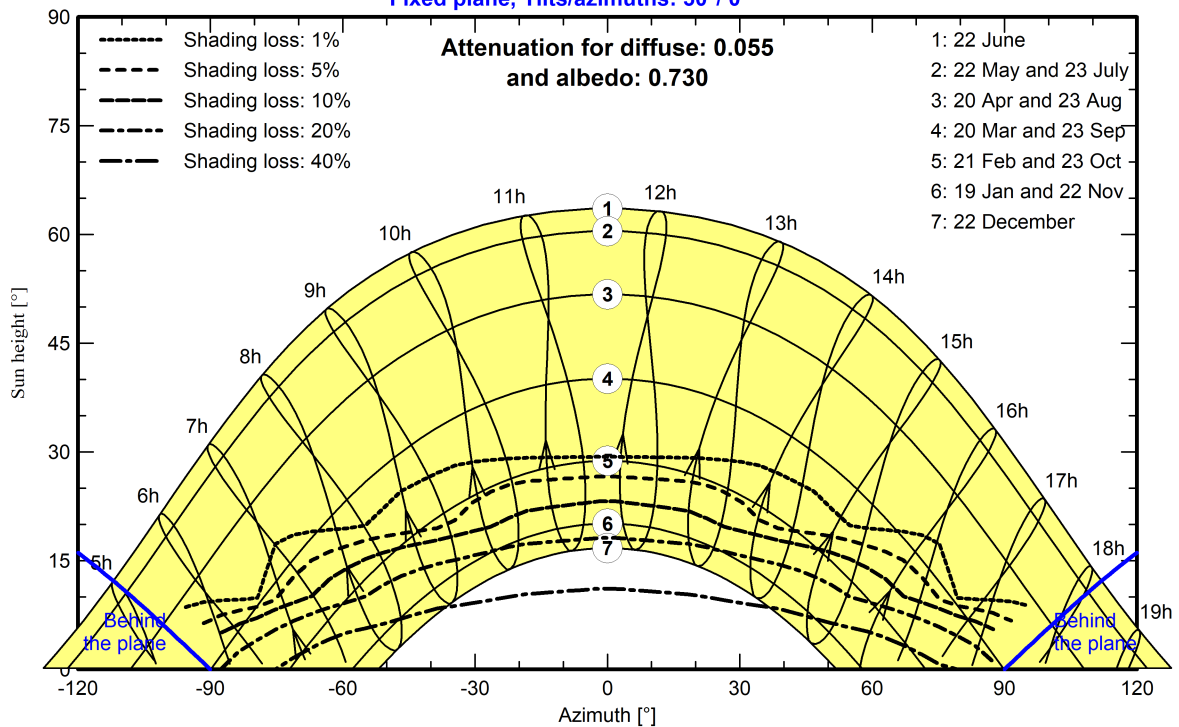
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 30°/ 0°





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Main results

System Production

Produced Energy

6 GWh/year

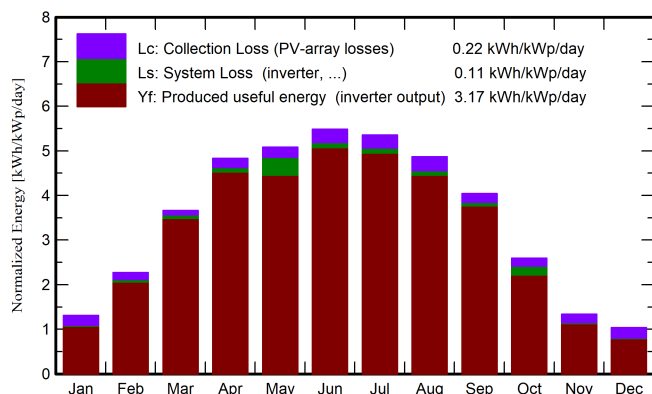
Specific production

1159 kWh/kWp/year

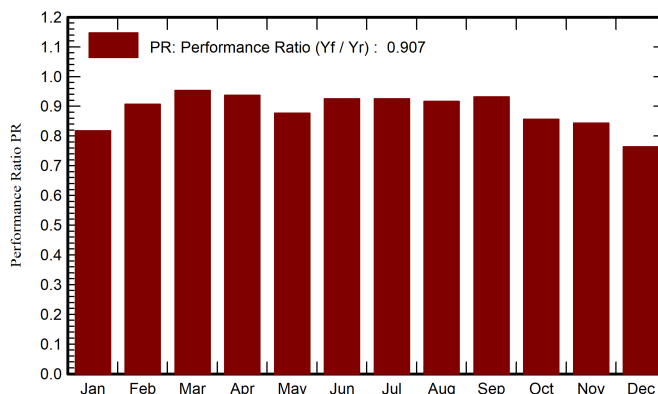
Performance Ratio PR

90.73 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m²	kWh/m²	°C	kWh/m²	kWh/m²	GWh	GWh	ratio
January	25.2	16.90	1.40	40.7	32.4	0.169	0.166	0.818
February	42.6	24.50	2.30	63.7	57.0	0.295	0.288	0.907
March	86.1	44.00	5.30	113.7	107.1	0.551	0.539	0.953
April	126.6	61.90	9.00	145.1	137.4	0.692	0.677	0.937
May	153.3	76.90	12.70	157.7	148.9	0.751	0.689	0.877
June	166.7	82.00	16.10	164.7	155.4	0.775	0.758	0.925
July	165.4	82.10	18.00	166.2	156.9	0.782	0.765	0.925
August	139.1	69.40	17.50	151.0	142.7	0.704	0.689	0.916
September	98.4	49.60	13.70	121.4	114.9	0.575	0.563	0.932
October	57.4	33.10	9.70	80.5	73.9	0.374	0.343	0.857
November	27.0	18.60	5.30	40.2	33.3	0.172	0.169	0.843
December	19.1	13.10	2.30	32.2	23.9	0.125	0.122	0.763
Year	1106.9	572.10	9.48	1276.9	1183.9	5.966	5.769	0.907

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

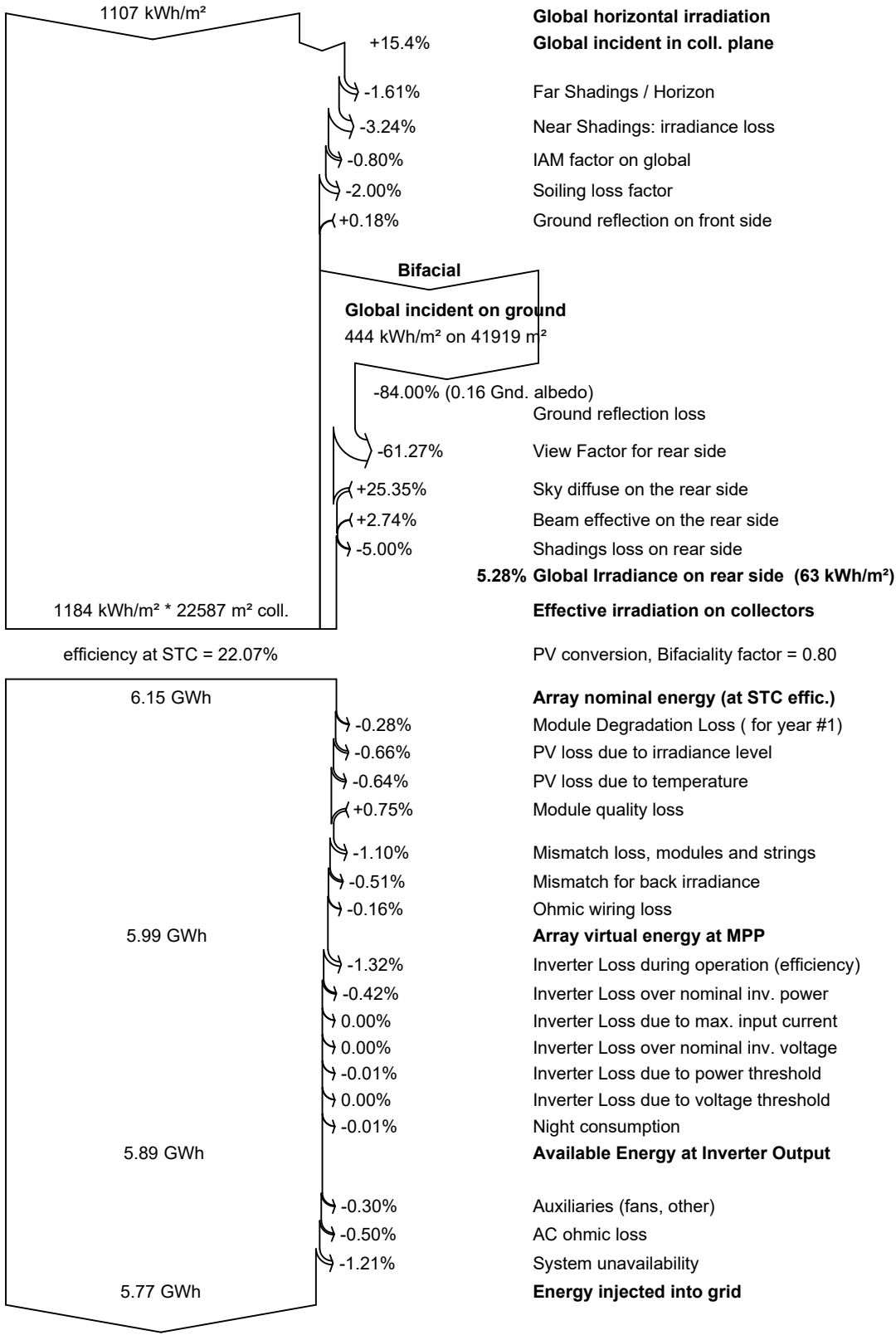
EArray Effective energy at the output of the array

E_Grid Energy injected into grid

PR Performance Ratio



Loss diagram





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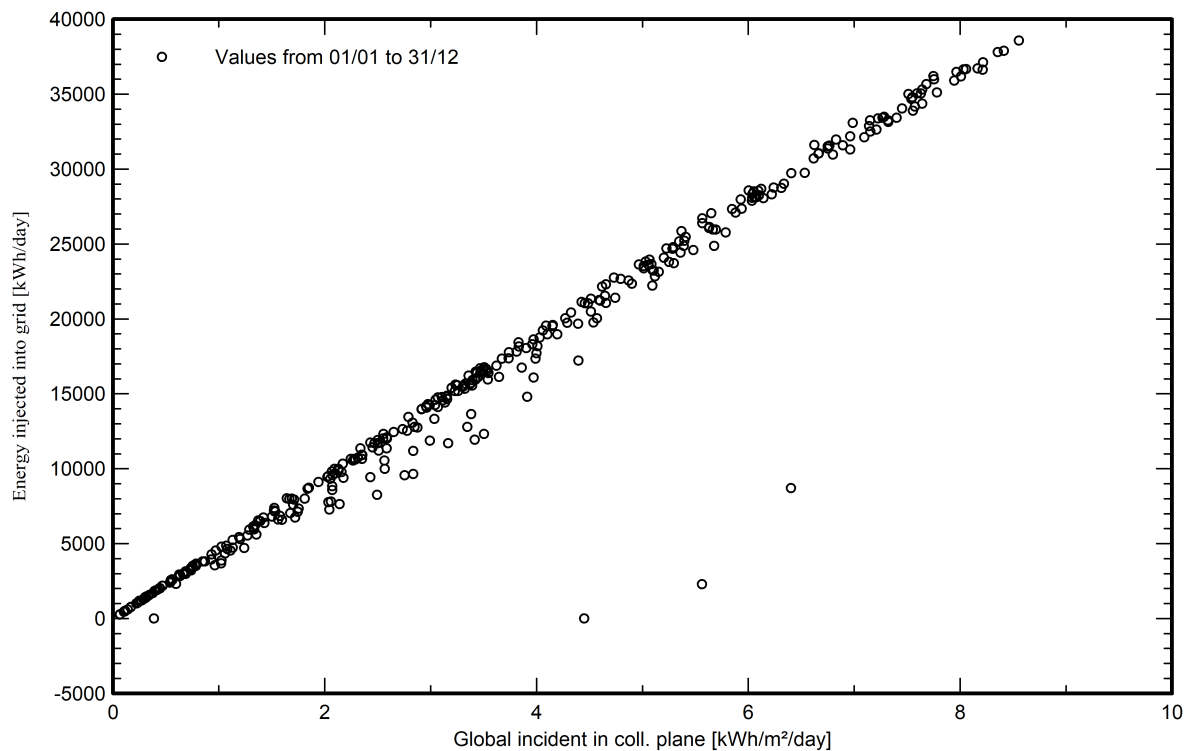
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Special graphs

Daily Input/Output diagram



System Output Power Distribution

