

IMPIANTO AGRIVOLTAICO "e-VerGREEN" E OPERE CONNESSE

COMUNI DI SANTHIÀ (VC) E CARISIO (VC)

Potenza energetica impianto: 76.6 MWp

Proponente

EG EDO S.R.L.

VIA DEI PELLEGRINI 22 - 20122 MILANO (MI) - P.IVA: 11616350960 - PEC: egedo@pec.it

EG Edo S.R.L.

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Progettazione

ING. NICODEMO AGOSTINO

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Collaboratori

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Coordinamento progettuale

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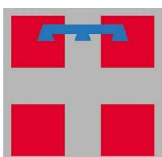
Titolo Elaborato

Stima di producibilità dell'impianto

LIVELLO PROGETTAZIONE	CODICE ELABORATO	FILENAME	RIFERIMENTO	DATA	SCALA
--	FTV22CP05-TEC-R-09	--	--	15/04/2022	--

Revisioni

REV.	DATA	DESCRIZIONE	ESEGUITO	VERIFICATO	APPROVATO
00	15/04/2022	--	INA	INA	ENF



PVsyst - Simulation report

Grid-Connected System

Project: Santhià

Variant: Santhià PVSyst_TS600W 8.8m 2VT 76.6MWp - 1645_con árboles_2D&backtracking

Tracking system with backtracking

System power: 76.63 MWp

IT_Santhia - Italy

Author

Enfinity Iberia SLU (Spain)



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PVsyst V7.2.12

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Enfinity Iberia SLU (Spain)

Project summary

Geographical Site		Situation		Project settings	
IT_Santhia		Latitude	45.40 °N	Albedo	0.20
Italy		Longitude	8.17 °E		
		Altitude	205 m		
		Time zone	UTC		
Meteo data					
IT_Santhia					
SolarGIS Monthly aver. , period not spec. - Synthetic					

System summary

Grid-Connected System		Tracking system with backtracking			
PV Field Orientation		Near Shadings		User's needs	
Tracking plane, horizontal N-S axis		Linear shadings		Unlimited load (grid)	
Axis azimuth 0 °					
System information					
PV Array					
Nb. of modules	127712 units	Inverters		Nb. of units 342 units	
Pnom total	76.63 MWp	Pnom total		68.40 MWac	
		Grid power limit		64.51 MVA	
		Grid lim. Pnom ratio		1.188	

Results summary

Produced Energy	126 GWh/year	Specific production	1645 kWh/kWp/year	Perf. Ratio PR	89.24 %
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General parameters

Grid-Connected System

PV Field Orientation

Orientation

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

Horizon

Free Horizon

Bifacial system

Model 2D Calculation
unlimited trackers

Bifacial model geometry

Tracker Spacing 8.80 m
Tracker width 4.49 m
GCR 51.1 %
Axis height above ground 2.10 m

Tracking system with backtracking

Backtracking strategy

Nb. of trackers 1613 units

Sizes

Tracker Spacing 8.80 m
Collector width 4.49 m
Ground Cov. Ratio (GCR) 51.1 %
Phi min / max. +/- 60.0 °

Backtracking limit angle

Phi limits +/- 59.1 °

Near Shadings

Linear shadings

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

User's needs

Unlimited load (grid)

Bifacial model definitions

Ground albedo average 0.15
Bifaciality factor 70 %
Rear shading factor 4.0 %
Rear mismatch loss 3.5 %
Shed transparent fraction 4.0 %

Monthly ground albedo values

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
0.14	0.15	0.13	0.13	0.13	0.15	0.18	0.18	0.18	0.16	0.13	0.13	0.15

Grid power limitation

Apparent power 64.51 MVA
Pnom ratio 1.188

Power factor

Cos(phi) (leading)

PV Array Characteristics

PV module

Manufacturer Trina Solar
Model TSM-600DEG20C.20
(Custom parameters definition)

Unit Nom. Power 600 Wp
Number of PV modules 127712 units
Nominal (STC) 76.63 MWp
Modules 3991 Strings x 32 In series

At operating cond. (50°C)

Pmpp 70.15 MWp
U mpp 1000 V
I mpp 70127 A

Total PV power

Nominal (STC) 76627 kWp
Total 127712 modules
Module area 361440 m²
Cell area 337926 m²

Inverter

Manufacturer Huawei Technologies
Model SUN2000-215KTL-H3
(Custom parameters definition)

Unit Nom. Power 200 kWac
Number of inverters 342 units
Total power 68400 kWac
Operating voltage 500-1500 V
Max. power (=>33°C) 215 kWac
Pnom ratio (DC:AC) 1.12

Total inverter power

Total power 68400 kWac
Number of inverters 342 units
Pnom ratio 1.12



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Array losses

Array Soiling Losses

Loss Fraction 1.5 %

Thermal Loss factor

Module temperature according to irradiance

Uc (const) 30.0 W/m²K

Uv (wind) 1.2 W/m²K/m/s

DC wiring losses

Global array res. 0.12 mΩ

Loss Fraction 0.8 % at STC

LID - Light Induced Degradation

Loss Fraction 1.5 %

Module Quality Loss

Loss Fraction -0.8 %

Module mismatch losses

Loss Fraction 1.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

IAM loss factor

Incidence effect (IAM): User defined profile

0°	40°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	0.998	0.992	0.983	0.961	0.933	0.853	0.000

System losses

Auxiliaries loss

Proportionnal to Power 4.0 W/kW

20.0 kW from Power thresh.

Night aux. cons. 5.00 kW

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 800 Vac tri

Loss Fraction 1.75 % at STC

Inverter: SUN2000-215KTL-H3

Wire section (342 Inv.) Copper 342 x 3 x 70 mm²

Average wires length 189 m

MV line up to Injection

MV Voltage 30 kV

Wires Alu 3 x 2500 mm²

Length 9850 m

Loss Fraction 1.04 % at STC

AC losses in transformers

MV transfo

Grid voltage 30 kV

Operating losses at STC

Nominal power at STC 75241 kVA

Iron loss (24/24 Connexion) 112.86 kW

Loss Fraction 0.15 % at STC

Coils equivalent resistance 3 x 0.14 mΩ

Loss Fraction 1.65 % at STC



Project: Santhià

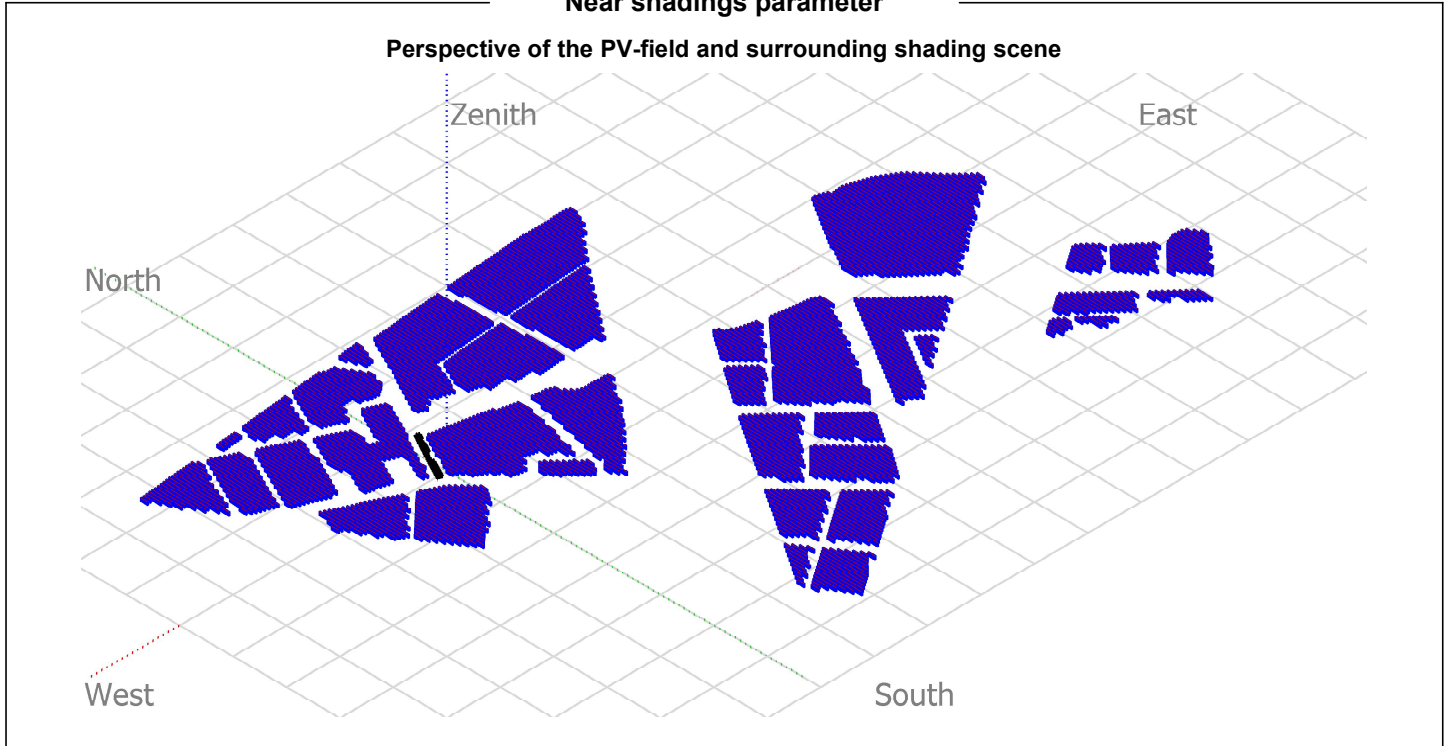
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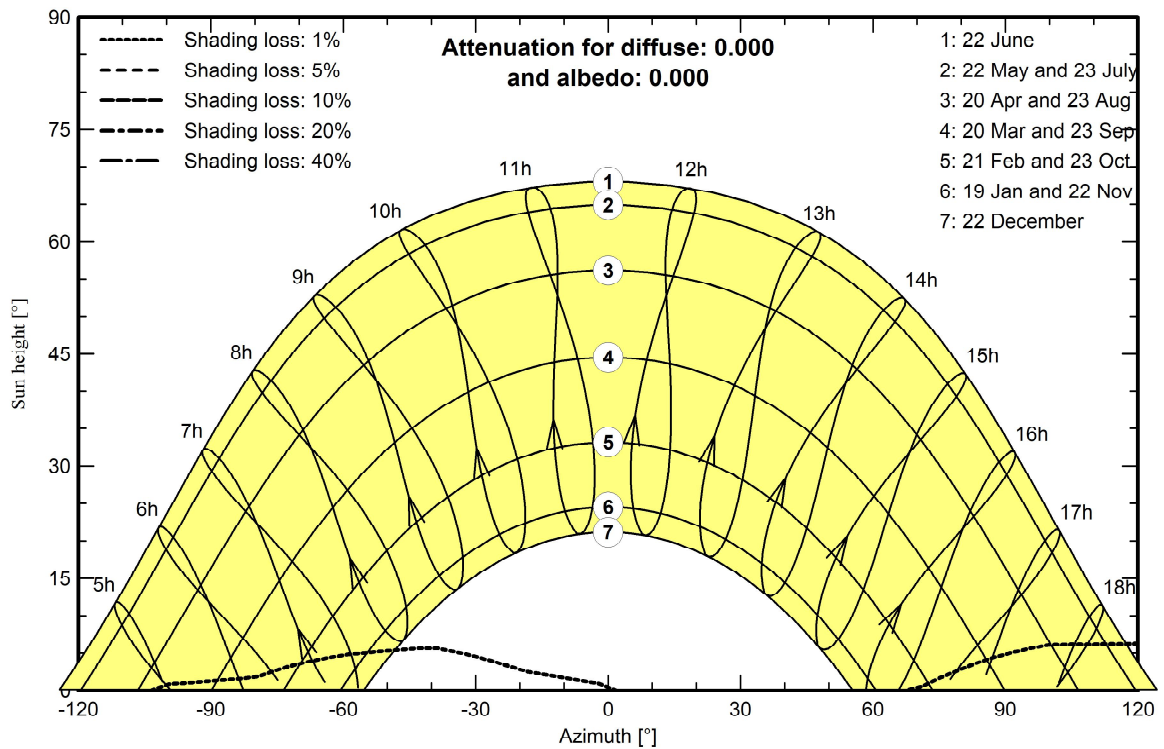
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Near shadings parameter



Iso-shadings diagram

Orientation #1





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Main results

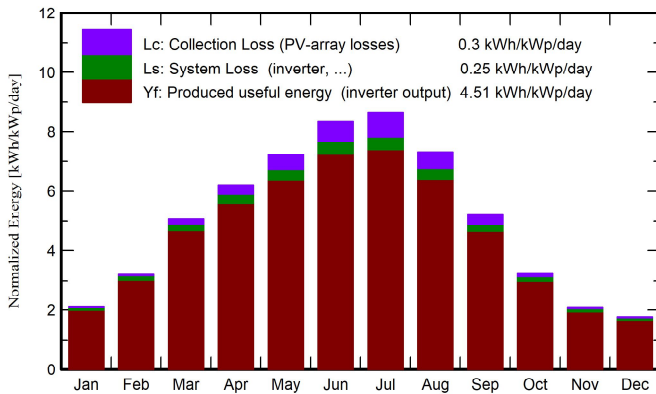
System Production

Produced Energy 126 GWh/year

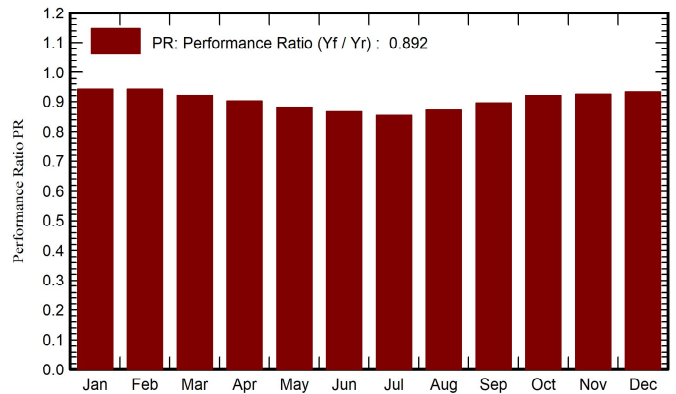
Specific production
Performance Ratio PR

1645 kWh/kWp/year
89.24 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray GWh	E_Grid GWh	PR ratio
January	49.0	20.00	3.30	65.6	63.2	4.99	4.74	0.943
February	68.0	27.00	4.80	90.1	87.3	6.83	6.51	0.943
March	121.0	44.00	9.10	157.2	152.9	11.68	11.10	0.922
April	145.0	57.00	13.00	186.3	181.4	13.59	12.88	0.903
May	179.0	76.00	17.40	224.0	218.1	16.00	15.15	0.883
June	198.0	80.00	21.30	250.6	244.1	17.60	16.67	0.868
July	210.0	77.00	23.40	268.3	261.6	18.63	17.61	0.856
August	177.0	68.00	22.80	227.2	221.4	16.06	15.21	0.874
September	123.0	54.00	18.50	155.8	151.6	11.28	10.70	0.896
October	79.0	38.00	13.60	100.8	97.6	7.47	7.11	0.920
November	48.0	22.00	8.10	62.9	60.8	4.71	4.46	0.926
December	41.0	17.00	3.60	55.0	52.9	4.15	3.93	0.934
Year	1438.0	580.00	13.29	1843.8	1792.9	132.99	126.08	0.892

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		



Project: Santhià

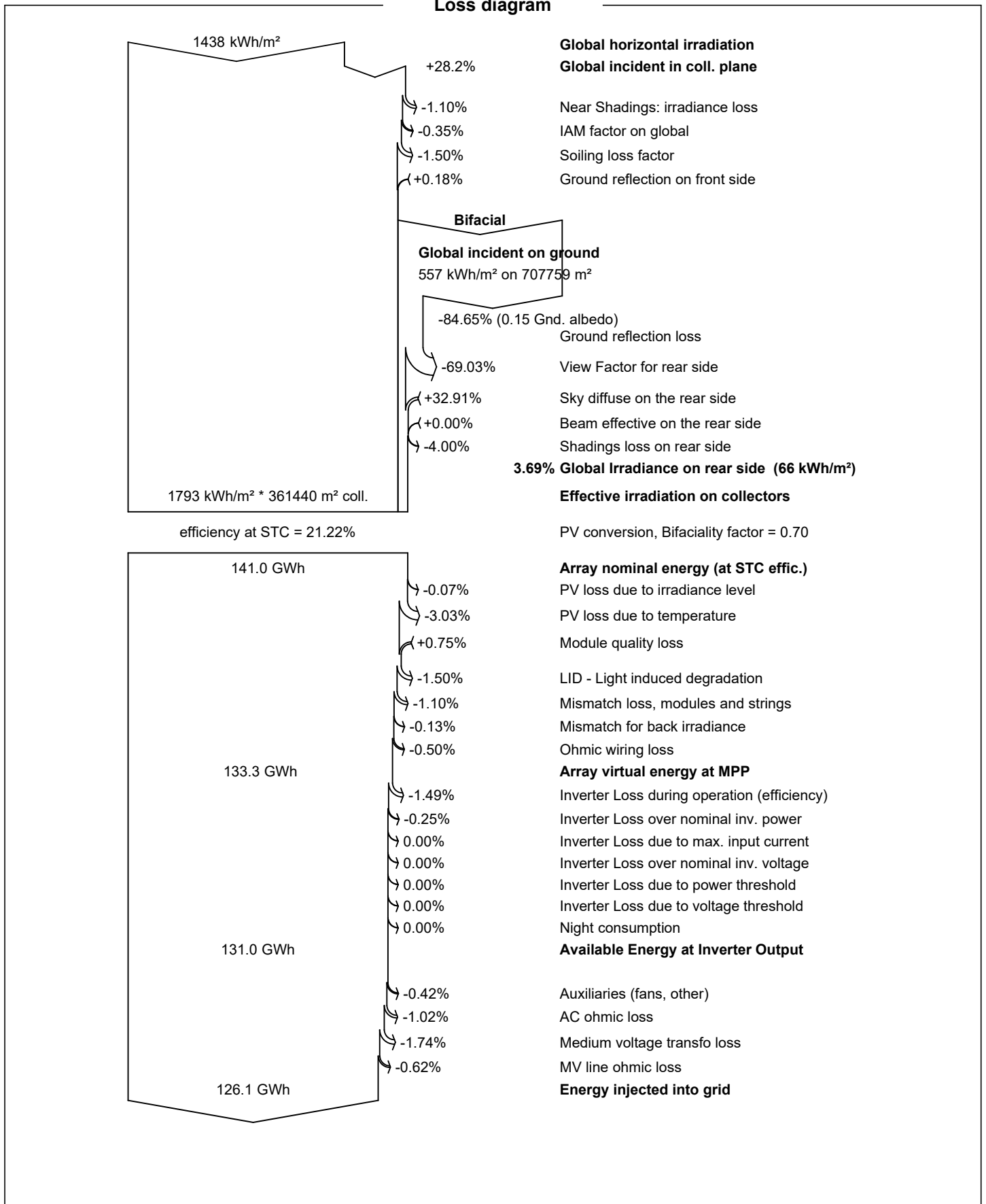
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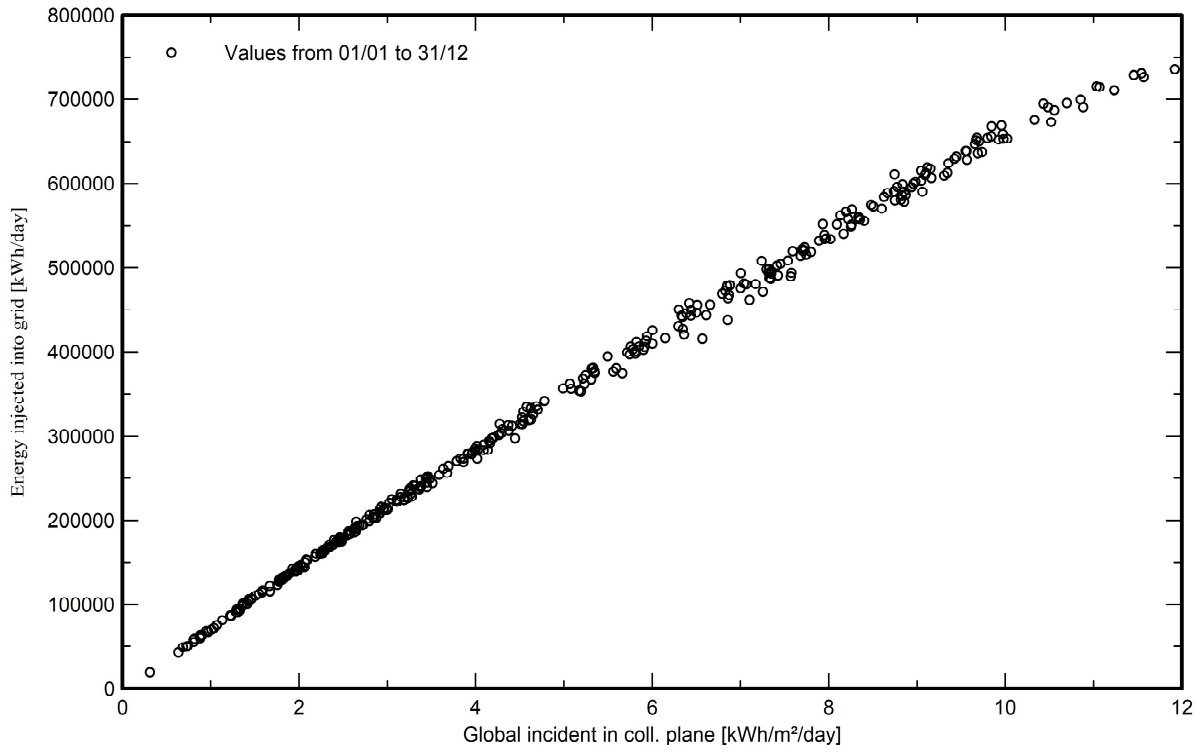
Loss diagram





Special graphs

Daily Input/Output diagram



System Output Power Distribution

