IMPIANTO AGRO-FOTOVOLTAICO DA 33,91 MWp (30 MW in immissione) Comune di Castellaneta (TA)

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Aspetti ambientali e paesaggisitici:

Arch. Nicola F. Fuzio: coordinamento generale e paesaggistico
Dott. Biologo Michele Bux: aspetti naturalistici flora, fauna, habitat ed ecosistemi
Dott. Geologo Vito Pellegrini: geologia e geomorfologia
Dott. Geologo Francesco Pezzati: idrologia e compatibilità idraulica
Società CAST: archeologia
Dott. Agronomo Vito N. Mancino: aspetti agronomici

Rev.	Data	Descrizione	Dis.	Contr.	App.
0	Mar.2022	Progetto definitivo	F.M.	R.M.	G.S.

Nome Progetto:	Codice Documento:
Impianto Agro-Fotovoltaico Castellaneta	FU000721-G009
Nome Documento:	**Scala:**
Calcolo producibilità e bilanci energetici	-

Version 7.2.12

PVsyst - Simulation report

Grid-Connected System

Project: Castellaneta_Kenergia_definitivo

Variant: Nuovo Layout_Pannelli 570 Wp_Con pale eoliche 3MW_inverter distribuiti

Tracking system with backtracking

System power: 33.91 MWp

Castellaneta - Italy

Author

FULL SERVICE COMPANY SRL (Italy)

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Project summary

Geographical Site
Castellaneta
Italy

Situation
Latitude 40.69 °N
Longitude 16.90 °E
Altitude 287 m
Time zone UTC+1

Project settings
Albedo 0.20

Meteo data
Castellaneta
SolarGIS Monthly aver. , period not spec. - 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
According to strings
Electrical effect 100 %

User's needs
Unlimited load (grid)

System information

PV Array
Nb. of modules 59488 units
Pnom total 33.91 MWp

Inverters
Nb. of units 120 units
Pnom total 27.00 MWac
Pnom ratio 1.256

Results summary

Produced Energy	59 GWh/year	Specific production	1735 kWh/kWp/year	Perf. Ratio PR	84.09 %

Table of contents

General parameters

Grid-Connected System

Tracking system with backtracking

PV Field Orientation

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

Backtracking strategy
Nb. of trackers 2288 units
Identical arrays

Sizes
Tracker Spacing 10.5 m
Collector width 5.12 m
Ground Cov. Ratio (GCR) 48.8 %
Phi min / max. -/+ 55.0 °

Backtracking limit angle
Phi limits +/- 60.7 °

Models used
Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Horizon
Free Horizon

Near Shadings
According to strings
Electrical effect 100 %

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module
Manufacturer Canadian Solar Inc.
Model CS6Y-570MS 1500V
(Original PVsyst database)
Unit Nom. Power 570 Wp
Number of PV modules 59488 units
Nominal (STC) 33.91 MWp
Modules 2288 Strings x 26 In series
At operating cond. (50°C)
Pmpp 30.95 MWp
U mpp 1027 V
I mpp 30134 A

Inverter
Manufacturer Sungrow
Model SG250HX
(Original PVsyst database)
Unit Nom. Power 225 kWac
Number of inverters 1440 * MPPT 8% 120 units
Total power 27000 kWac
Operating voltage 600-1500 V
Max. power (=>30°C) 250 kWac
Pnom ratio (DC:AC) 1.26

Total PV power
Nominal (STC) 33908 kWp
Total 59488 modules
Module area 164611 m²

Total inverter power
Total power 27000 kWac
Number of inverters 120 units
Pnom ratio 1.26

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. 0.56 mΩ
Loss Fraction 1.5 % at STC

LID - Light Induced Degradation
Loss Fraction 1.0 %

Module Quality Loss
Loss Fraction -0.9 %

Module mismatch losses
Loss Fraction 0.7 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

Module average degradation
Year no 1
Loss factor 0.4 %/year
Mismatch due to degradation
Imp RMS dispersion 0 %/year
Vmp RMS dispersion 0 %/year

Array losses

IAM loss factor

Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

System losses

Unavailability of the system
Time fraction 1.0 %
3.7 days,
3 periods

Auxiliaries loss
Proportionnal to Power 10.0 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 0.74 % at STC

Inverter: SG250HX

Wire section (120 Inv.) Alu 120 x 3 x 185 mm²
Average wires length 100 m

MV line up to Injection

MV Voltage 30 kV
Average each inverter
Wires Alu 3 x 240 mm²
Length 500 m
Loss Fraction 0.02 % at STC

AC losses in transformers

MV transfo

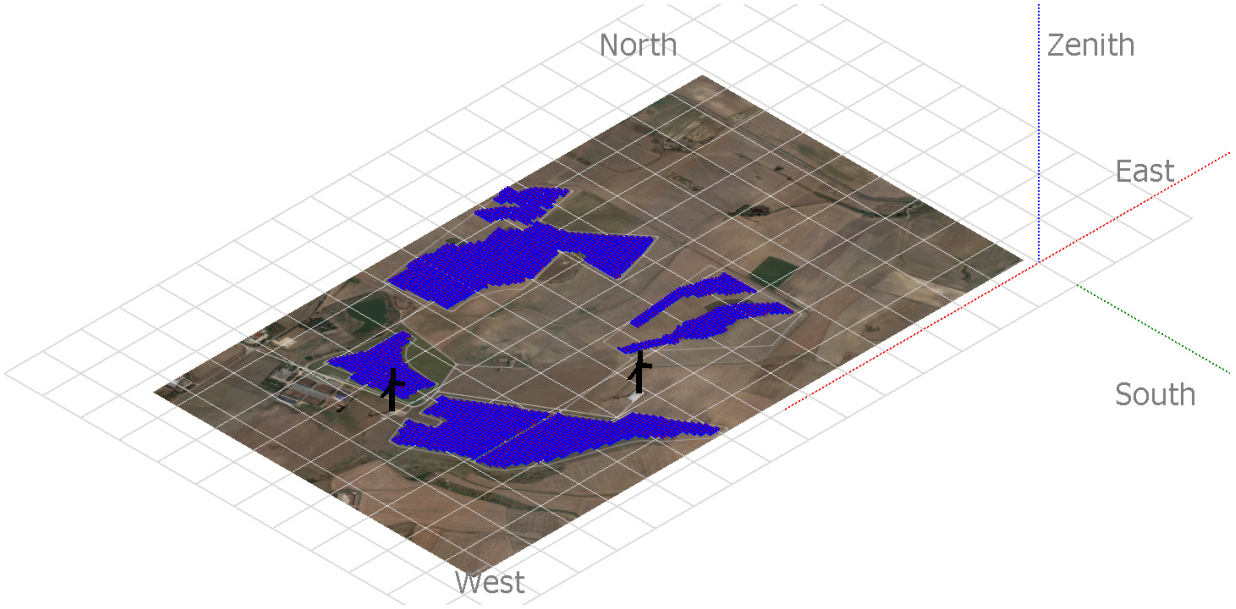
Grid voltage 30 kV

Operating losses at STC

Nominal power at STC 33409 kVA
Iron loss (24/24 Connexion) 3.04 kW/Inv.
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 2.11 mΩ/inv.
Loss Fraction 1.00 % at STC

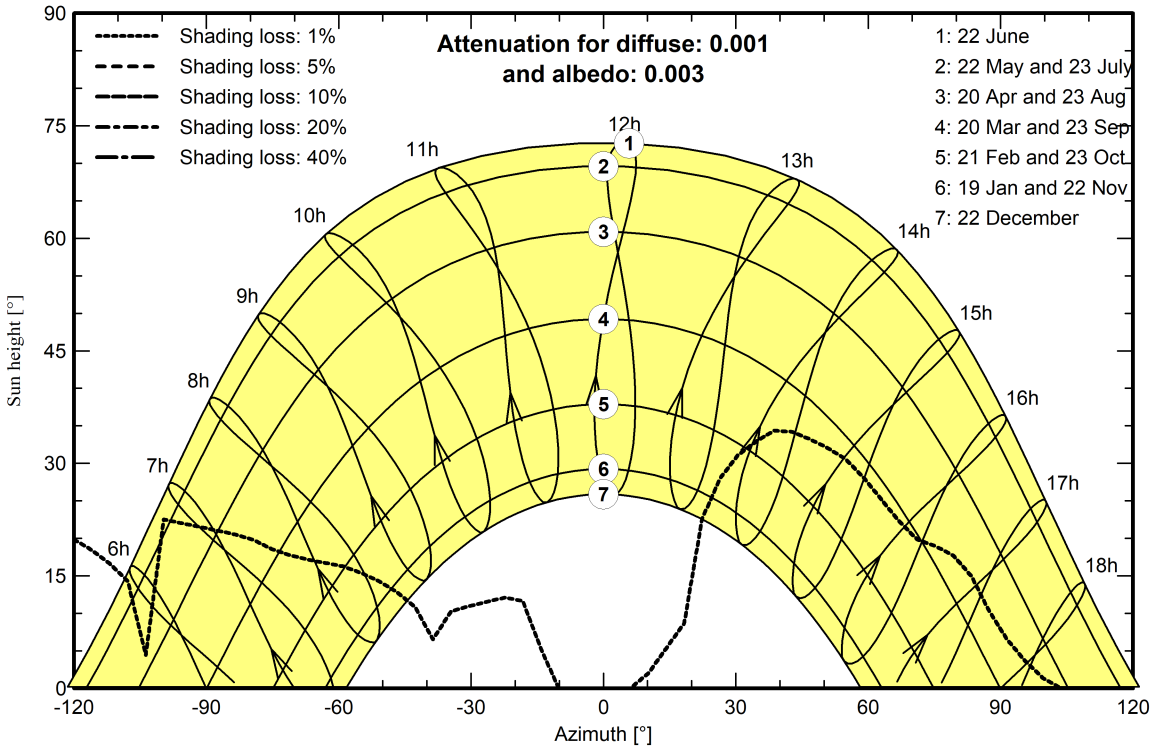
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1



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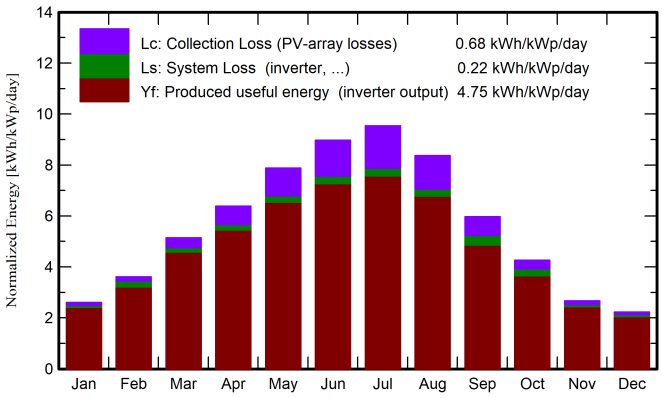
Main results

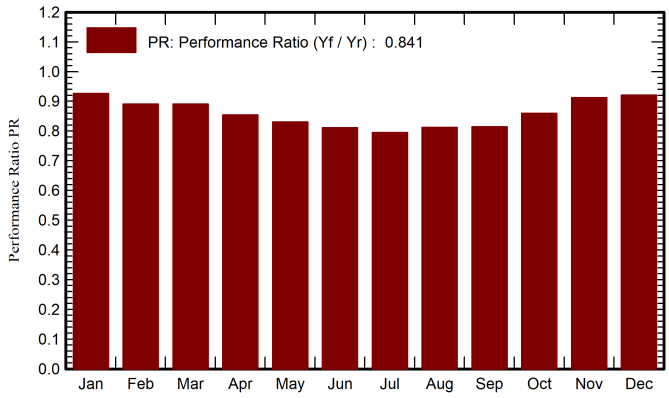
System Production

Produced Energy (P50)	59 GWh/year	Specific production (P50)	1735 kWh/kWp/year	Performance Ratio PR	84.09 %
Produced Energy (P90)	54.6 GWh/year	Specific production (P90)	1610 kWh/kWp/year		
Produced Energy (P99)	51.1 GWh/year	Specific production (P99)	1508 kWh/kWp/year		

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 GWh	E_Grid GWh	PR ratio
January	61.4	27.30	7.60	80.7	78.1	2.639	2.536	0.927
February	78.0	33.20	8.10	101.2	98.1	3.285	3.058	0.891
March	125.2	51.20	10.40	159.6	155.0	5.009	4.822	0.891
April	152.3	64.20	13.40	191.5	186.1	5.765	5.551	0.855
May	192.9	77.00	18.10	244.3	237.5	7.148	6.882	0.831
June	211.7	74.80	22.90	269.4	262.1	7.696	7.408	0.811
July	227.3	68.60	25.50	295.8	287.8	8.284	7.973	0.795
August	199.5	64.10	25.40	259.4	252.6	7.427	7.142	0.812
September	140.4	56.10	20.90	179.2	174.0	5.350	4.950	0.814
October	102.9	44.10	16.80	132.3	128.3	4.142	3.855	0.860
November	63.2	29.90	12.50	80.2	77.5	2.580	2.480	0.912
December	53.3	24.40	8.80	69.3	66.9	2.255	2.163	0.920
Year	1608.1	614.90	15.91	2062.9	2004.1	61.581	58.820	0.841

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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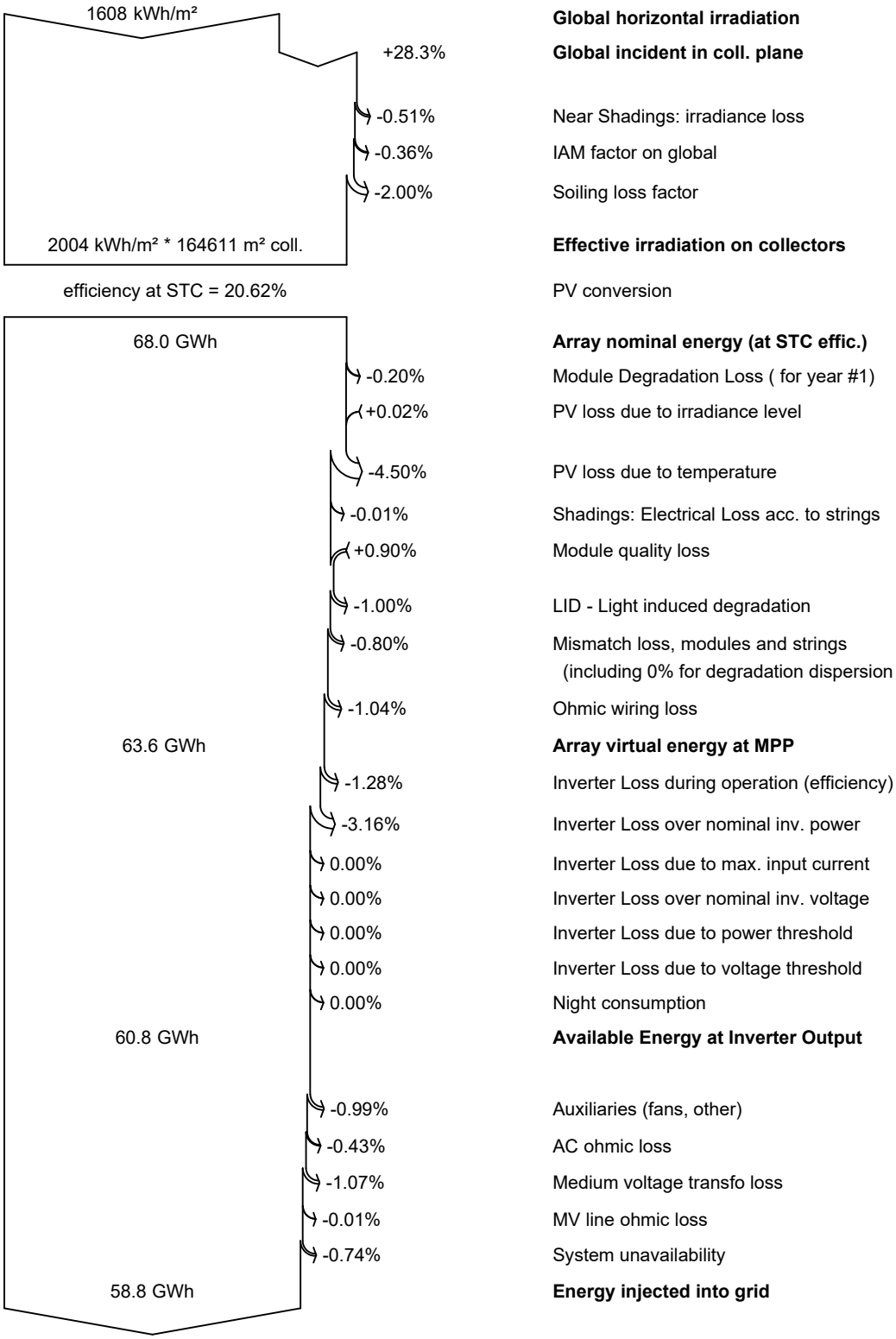
Loss diagram



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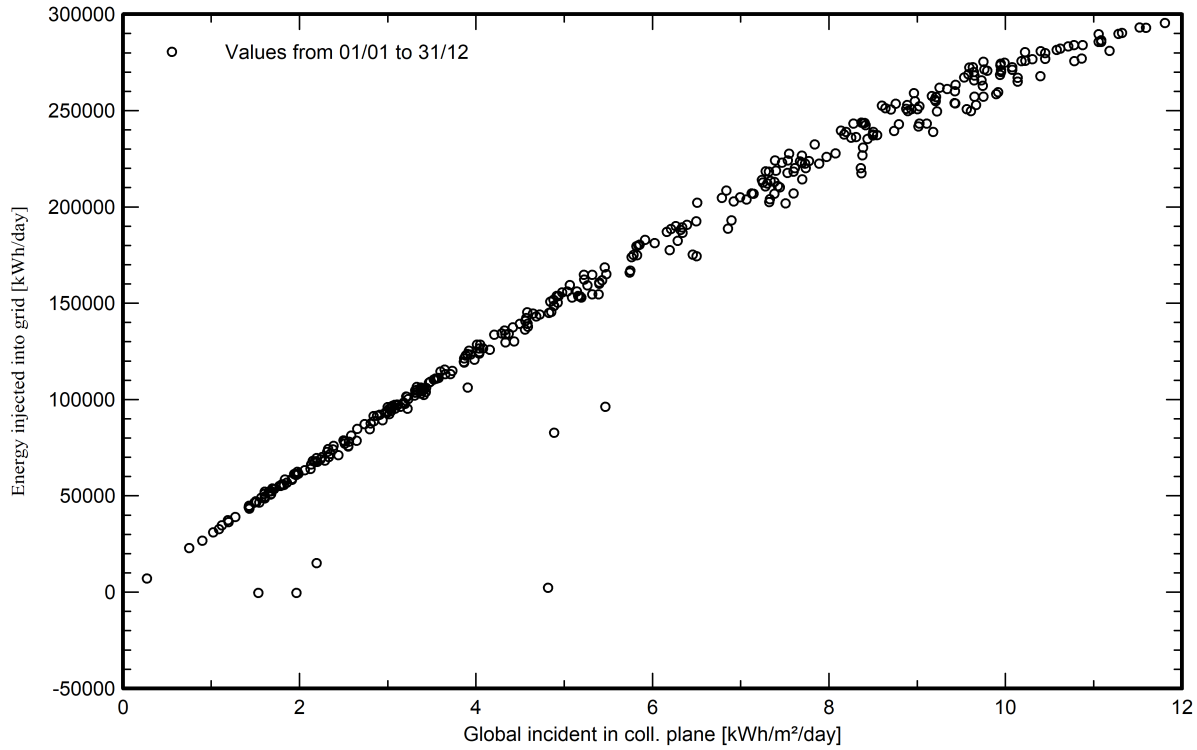
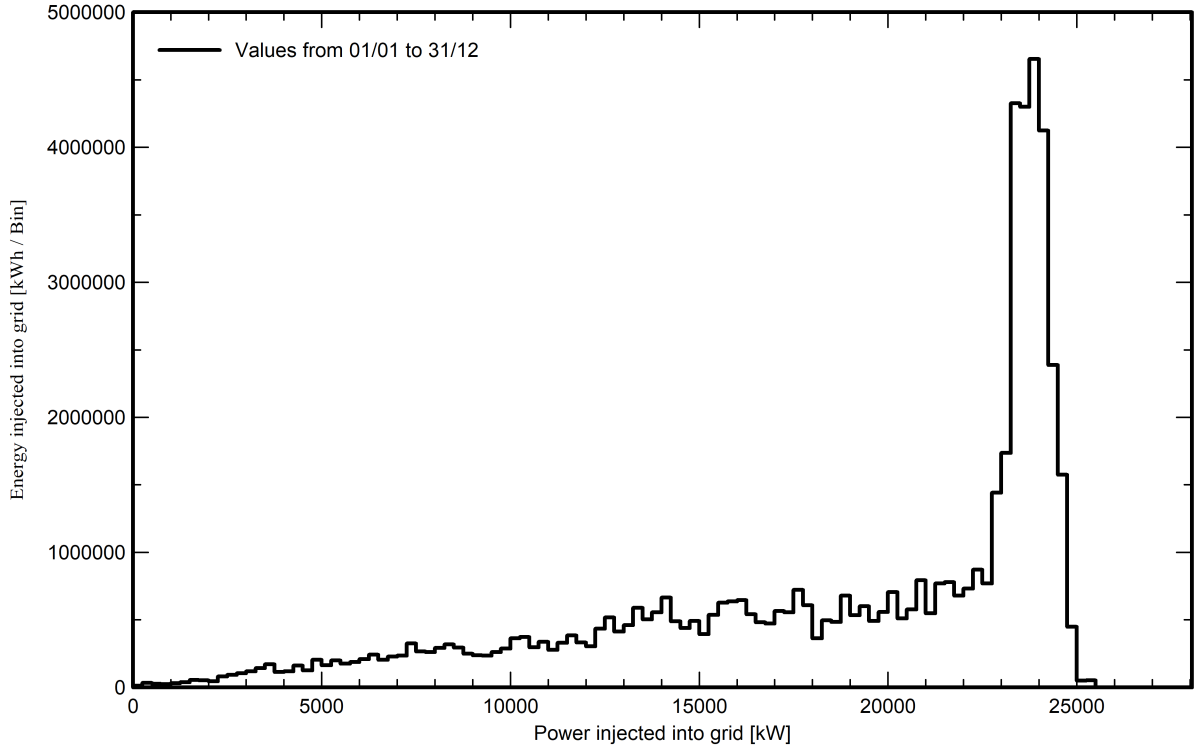
Special graphs

Daily Input/Output diagram



System Output Power Distribution



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P50 - P90 evaluation

Meteo data

Source	SolarGIS Monthly aver. , period not spec.
Kind	Not defined
Year-to-year variability(Variance)	4.0 %
Specified Deviation	

Simulation and parameters uncertainties

PV module modelling/parameters	1.0 %
Inverter efficiency uncertainty	0.5 %
Soiling and mismatch uncertainties	1.0 %
Degradation uncertainty	1.0 %
Custom variability	3.5 %

Global variability (meteo + system)

Variability (Quadratic sum)	5.6 %

Annual production probability

Variability	3.30 GWh
P50	58.82 GWh
P90	54.59 GWh
P99	51.14 GWh

Probability distribution