REGIONE PUGLIA | COMUNE DI POGGIO IMPERIALE | COMUNE DI LESINA | COMUNE DI SAN PAOLO CIVITATE | COMUNE DI APRICENA

Nome Progetto / Projet Name

IMPIANTO AGRIVOLTAICO, DENOMINATO POGGIO 1 POTENZA INSTALLATA 37,68 MW CON PANNELLI SU SUPPORTO TRACKER AD ASSE ORIZZONTALE IN AGRO DI POGGIO IMPERIALE, SAN PAOLO CIVITATE, APRICENA E RELATIVE OPERE DI CONNESSIONE

committente

GC POGGIO 1 S.R.L.

MILIO FABRIZIO
2023.03.16 18:16:21
Signer:
CN=MILIO FABRIZIO
C=IT
2.5.4.4=MILIO
2.5.4.42=FABRIZIO
Public key:
RSA/2048 bits

Titolo documento /Document title

Relazione sulla producibilità

Tavola /Pannel: 01

Codice elaborato /Code processed: PG1_REL_FV_PRD_005

N.	Data Revisione	Descrizione revisione	Preparato	Vagliato	Approvato
00	31/07/2022	PROGETTO DEFINITIVO	P.D.B.		

Specialista / Specialist

Ing. Pasquale DE BONIS

Sviluppatore / Developer

RENEWABLE CONSULTING

Progettisti / Planner

RENEWABLE CONSULTING S.R.L.

ORDINE DEGLI INGEGNERI DELLA PROVINCIA DI FOGGIA
Ing. JUNIOR
Pasquale
DE BONIS
N° 832
Sezione: B
Settore: b) Industriale

DE BONIS
PASQUALE
10.03.2023
07:00:02 UTC

Nome file	Dimensione cartiglio	Scala
.....	A4	---

SOMMARIO

ALLEGATI:

- REPORT PVSYST

1. PREMESSA

Il presente documento è parte integrante del progetto definitivo redatto per la realizzazione della connessione elettrica alla rete di Terna SpA, in riferimento all'impianto di produzione di energia elettrica da fonte fotovoltaica denominato **GC POGGIO IMP I**, da realizzarsi in agro dei comuni di Apricena e Poggio Imperiale (FG), caratterizzato da una potenza di 37,68 MWp.

2. CALCOLO PRODUCIBILITà IMPIANTO

La valutazione della producibilità è stata eseguita tramite simulazione software con l'inserimento dei dati geometrici ed elettrici dell'impianto, geolocalizzando il sito per i dati meteorologici annuali calcolando quindi puntualmente i diversi orientamenti ottenuti dal movimento delle strutture ad inseguimento durante la giornata.
Da tale report si evince che la producibilità attesa media annua dell'impianto è pari a **61956 MWh/anno** con una produzione specifica pari a **1612 kWh/kWp/a**.

Version 7.2.16

PVsyst - Simulation report

Grid-Connected System

Project: STMG 1

Variant: interasse 5m

Tracking system

System power: 37.69 MWp

Poggio Imperiale - Italy

Author

OFFICINE BOX-E srl (Italy)

PVsyst V7.2.16
VC4, Simulation date:
27/08/22 13:10
with v7.2.16

Project summary

Geographical Site
Poggio Imperiale
Italy

Situation

Latitude	41.83 °N
Longitude	15.37 °E
Altitude	68 m
Time zone	UTC+1

Project settings
Albedo 0.20

Meteo data
Poggio Imperiale
Meteonorm 7.3 (1991-2010), Sat=74% - Sintetico

System summary

Grid-Connected System

Tracking system

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

Tracking algorithm
Astronomic calculation

Near Shadings
Linear shadings

System information

PV Array		Inverters	
Nb. of modules	62296 units	Nb. of units	89 units
Pnom total	37.69 MWp	Pnom total	28.48 MWac
		Pnom ratio	1.323

User's needs
Unlimited load (grid)

Results summary

Produced Energy	61 GWh/year	Specific production	1612 kWh/kWp/year	Perf. Ratio PR	79.08 %

Table of contents

General parameters

Grid-Connected System

Tracking system

PV Field Orientation

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

Tracking algorithm
Astronomic calculation

Trackers configuration
Nb. of trackers 950 units

Sizes
Tracker Spacing 5.00 m
Collector width 2.26 m
Ground Cov. Ratio (GCR) 45.1 %
Phi min / max. -/+ 60.0 °

Shading limit angles
Phi limits +/- 63.0 °

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	Risen Energy Co., Ltd
Model	RSM120-8-605M
(Custom parameters definition)	
Unit Nom. Power	605 Wp
Number of PV modules	62296 units
Nominal (STC)	37.69 MWp

Inverter

Manufacturer	Sungrow
Model	SG350HX-20A-Preliminary
(Custom parameters definition)	
Unit Nom. Power	320 kWac
Number of inverters	89 units
Total power	28480 kWac

Array #1 - Sottocampo #1

Number of PV modules	45396 units	Number of inverters	64 units
Nominal (STC)	27.46 MWp	Total power	20480 kWac
Modules	1746 Strings x 26 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	25.15 MWp	Max. power (=>30°C)	352 kWac
U mpp	821 V	Pnom ratio (DC:AC)	1.34
I mpp	30643 A		

Array #2 - Sottocampo #2

Number of PV modules	8164 units	Number of inverters	12 units
Nominal (STC)	4939 kWp	Total power	3840 kWac
Modules	314 Strings x 26 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	4522 kWp	Max. power (=>30°C)	352 kWac
U mpp	821 V	Pnom ratio (DC:AC)	1.29
I mpp	5511 A		

Array #3 - Sottocampo #3

Number of PV modules	8736 units	Number of inverters	13 units
Nominal (STC)	5285 kWp	Total power	4160 kWac
Modules	336 Strings x 26 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	4839 kWp	Max. power (=>30°C)	352 kWac
U mpp	821 V	Pnom ratio (DC:AC)	1.27
I mpp	5897 A		

PVsyst V7.2.16
VC4, Simulation date:
27/08/22 13:10
with v7.2.16

PV Array Characteristics

Total PV power

Nominal (STC)	37689 kWp
Total	62296 modules
Module area	176305 m²
Cell area	165209 m²

Total inverter power

Total power	28480 kWac
Number of inverters	89 units
Pnom ratio	1.32

Array losses

Thermal Loss factor
Module temperature according to irradiance
Uc (const) 20.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

LID - Light Induced Degradation
Loss Fraction 1.6 %

Module Quality Loss
Loss Fraction -0.8 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

IAM loss factor
Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.816	0.681	0.440	0.000

DC wiring losses

Global wiring resistance 0.32 mΩ
Loss Fraction 1.5 % at STC

Array #1 - Sottocampo #1

Global array res.	0.44 mΩ
Loss Fraction	1.5 % at STC

Array #2 - Sottocampo #2

Global array res.	2.4 mΩ
Loss Fraction	1.5 % at STC

Array #3 - Sottocampo #3

Global array res.	2.3 mΩ
Loss Fraction	1.5 % at STC

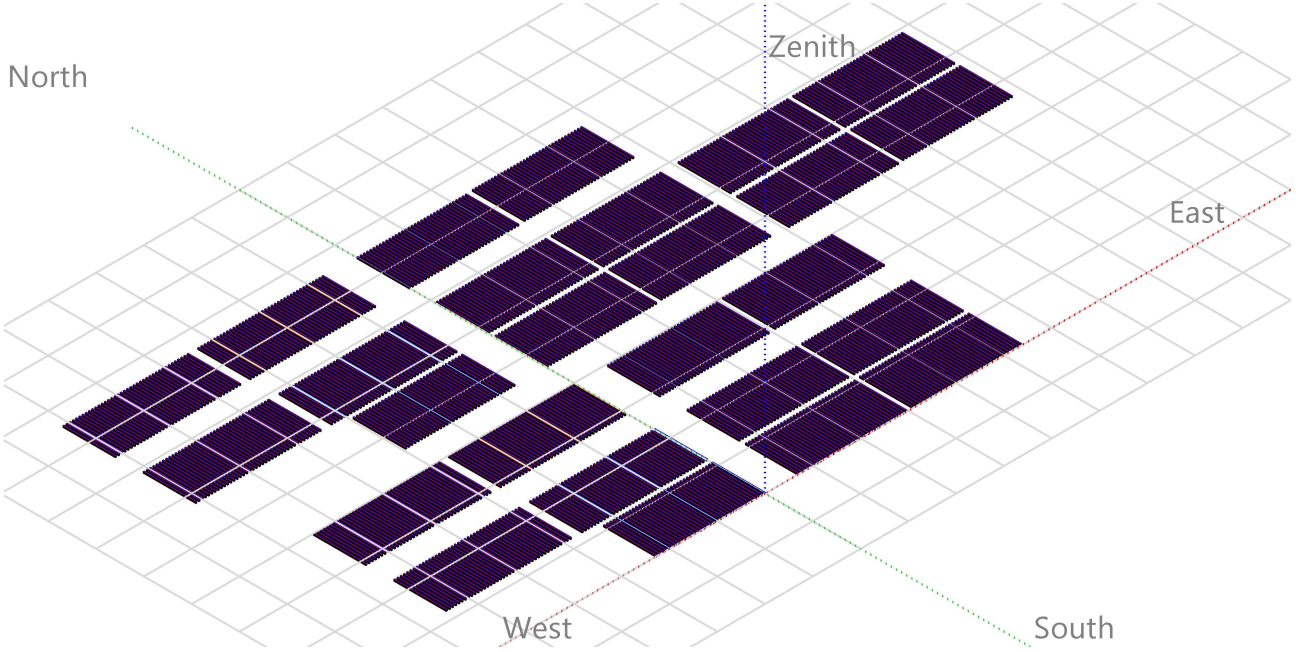
System losses

Auxiliaries loss
constant (fans) 20.0 kW
0.0 kW from Power thresh.
Night aux. cons. 10.0 kW

PVsyst V7.2.16
VC4, Simulation date:
27/08/22 13:10
with v7.2.16

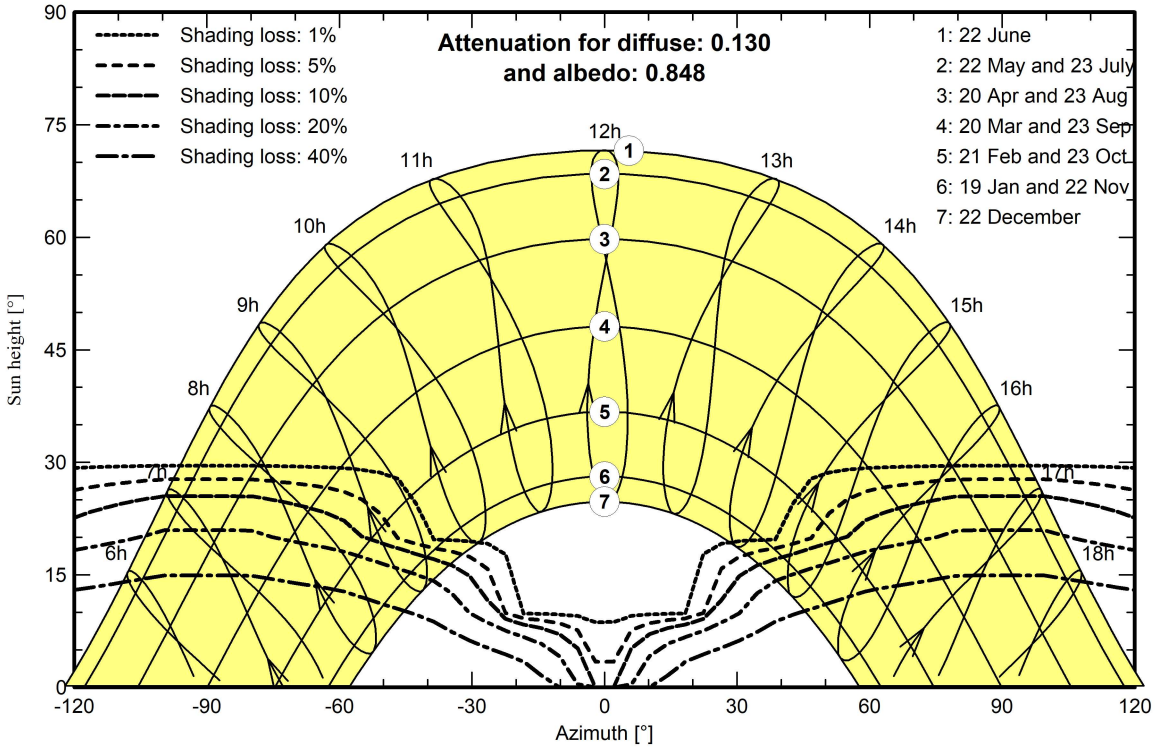
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1



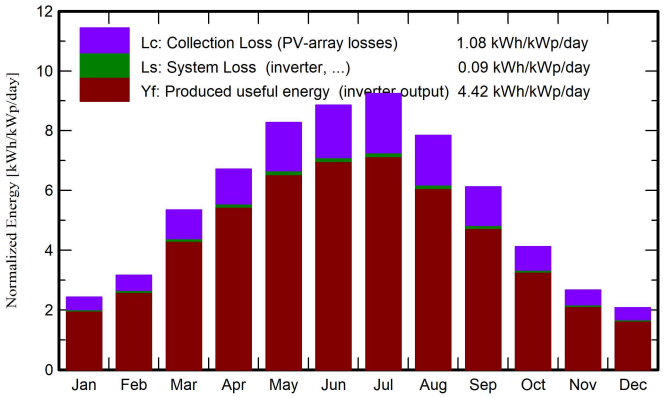
PVsyst V7.2.16
VC4, Simulation date:
27/08/22 13:10
with v7.2.16

Main results

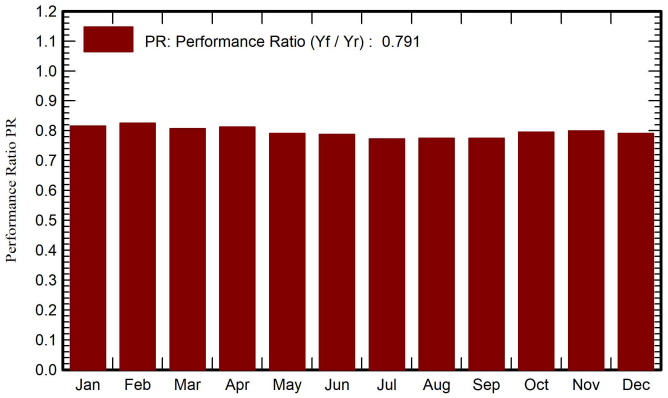
System Production

Produced Energy	61 GWh/year	Specific production	1612 kWh/kWp/year
		Performance Ratio PR	79.08 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

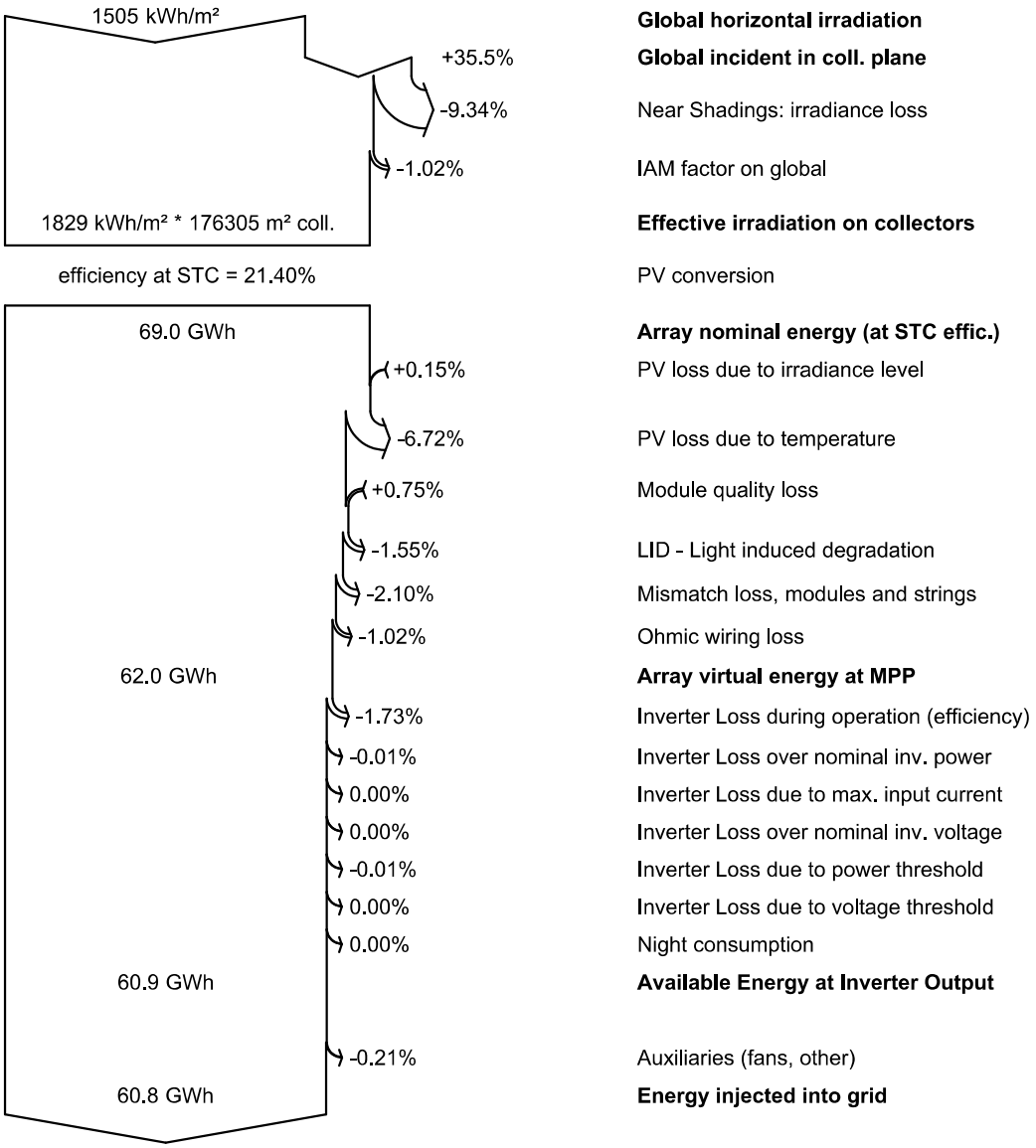
	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray GWh	E_Grid GWh	PR ratio
January	53.3	24.19	7.70	75.2	64.5	2.364	2.310	0.815
February	67.4	39.13	8.01	88.4	77.1	2.807	2.748	0.825
March	118.5	50.86	11.13	165.7	146.2	5.136	5.036	0.806
April	151.2	68.61	13.83	201.4	181.9	6.282	6.163	0.812
May	191.3	81.29	19.83	256.4	233.7	7.792	7.646	0.791
June	202.1	86.08	23.99	265.8	245.3	8.039	7.890	0.788
July	212.8	86.25	27.14	286.7	262.6	8.501	8.345	0.772
August	180.1	77.57	26.64	243.1	221.5	7.237	7.101	0.775
September	132.4	58.39	20.93	183.7	162.0	5.467	5.362	0.774
October	92.8	45.36	17.58	127.8	112.0	3.905	3.826	0.794
November	57.3	29.44	12.34	79.8	68.6	2.461	2.406	0.800
December	45.5	24.19	9.02	64.4	53.7	1.966	1.919	0.791
Year	1504.7	671.36	16.57	2038.4	1829.1	61.956	60.751	0.791

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

PVsyst V7.2.16
VC4, Simulation date:
27/08/22 13:10
with v7.2.16

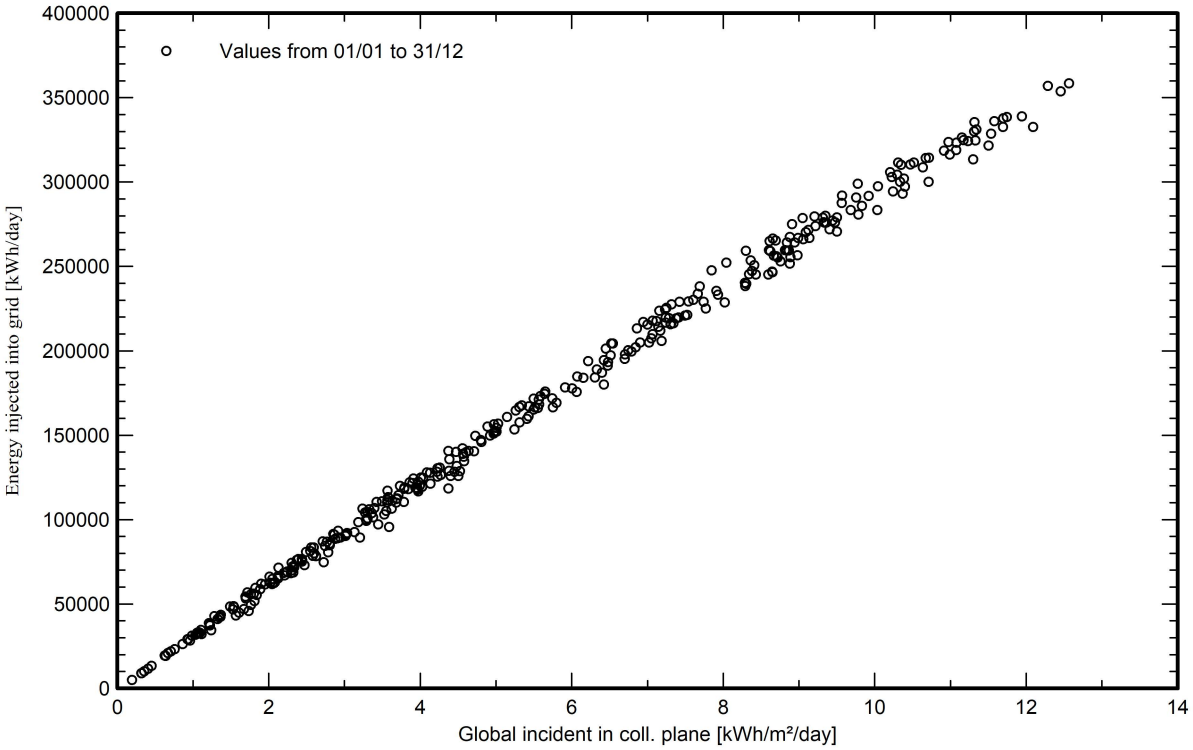
Loss diagram



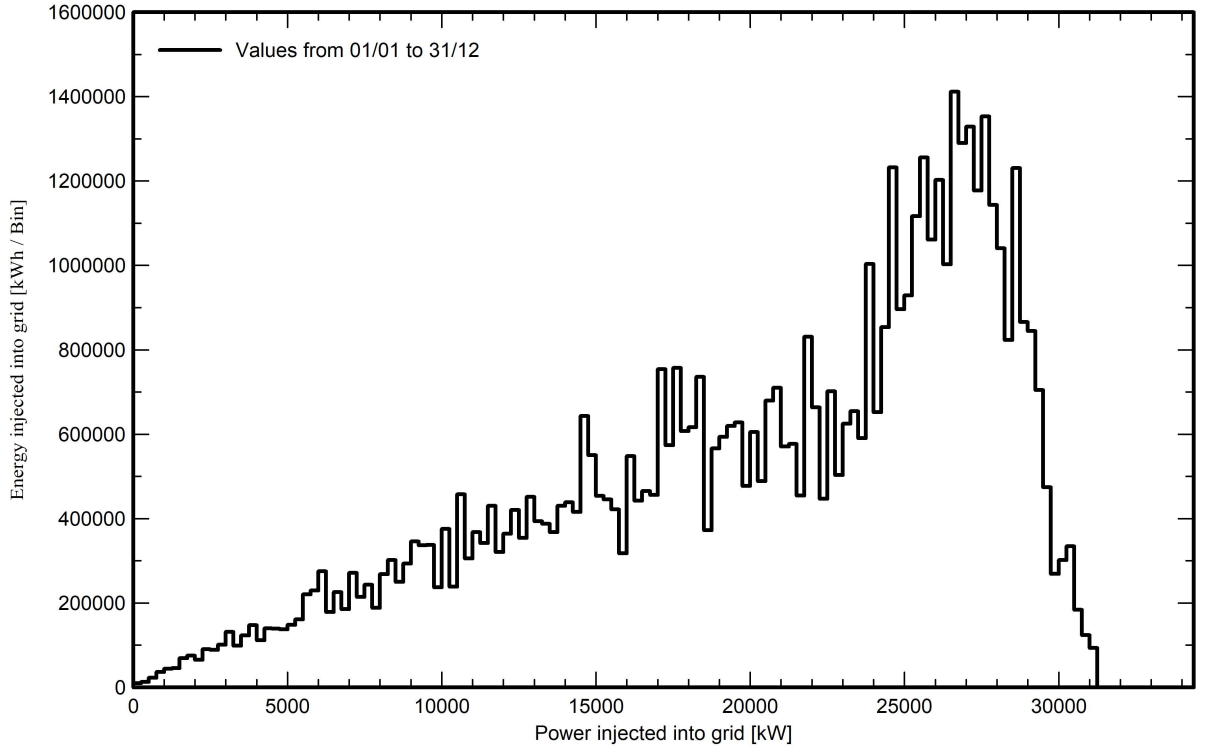
PVsyst V7.2.16
VC4, Simulation date:
27/08/22 13:10
with v7.2.16

Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



P50 - P90 evaluation

Meteo data

Source	Meteonorm 7.3 (1991-2010), Sat=74%
Kind	Not defined
Year-to-year variability(Variance)	0.5 %
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 %

Global variability (meteo + system)

Variability (Quadratic sum)	1.9 %

Annual production probability

Variability	1.14 GWh
P50	60.75 GWh
P90	59.29 GWh
P95	58.88 GWh

Probability distribution