PROPONENTE:

Siel Agrisolare S.r.l.

- Via Dismano,1280 47522 Cesena (FC) - sielagrisolaresrl@pec.it - PIVA 12000420963

REGIONE SICILIA

AREA METROPOLITANA DI CATANIA

COMUNE DI CALTAGIRONE

Stefano Marulli
20.10.2023
08:03:06
GMT+01:00

Oggetto: PROGETTO PER LA REALIZZAZIONE DI UN PARCO AGRIVOLTAICO CON POTENZA DI PICCO PARI A 222,26 MWp E POTENZA DI IMMISSIONE 195 MW, UBICATO NEL COMUNE DI CALTAGIRONE (CT) IN CONTRADA PIETRANERA E OPERE CONNESSE RICADENTI NEI COMUNI DI LICODIA EUBEA (CT) E CHIARAMONTE GULFI (RG). INTEGRAZIONI MASE CTVA REGISTRO UFFICIALE U. 0009433.11-08-2023 [ID:8869]

ELABORATO: Report producibilità

PROGETTAZIONE: I-PROJECT S.R.L.

ELABORATO:	Elaborato da:	COORDINATORE SIA:	IL PROGETTISTA:
AVCALT-T105	Ing. Vincenzo Oliveto	Ing. Salvatore Mele Firmato digitalmente da: Salvatore Enrico Mele Data: 18/10/2023 10:07:50	Arch. Antonio Manco
SCALA: -			
DATA: Settembre 2023			

Prot. int. n°: 0108	Rev.: 2	Mod.: 0
Pratica: Caltagirone	Archivio File:	

i-Project

Consulenza, Progettazione e Sviluppo Impianti ad Energia Rinnovabile

Sede Legale: Via Del Vecchio Politecnico, 9 - 20121 Milano (MI) - P.IVA 11092870 PEC: I-project@legalmail.it

Sede Opertiva:Via Bisceglie n° 17 - 84044 Albanella (SA) -mail:a.manco@ ctsrl.com- Cell: 3384117245

Firmato digitalmente da:
MANCO ANTONIO
Firmato il 18/10/2023 12:25
Seriale Certificato: 1897729
Valido dal 08/11/2022 al 08/11/2025
InfoCamere Qualified Electronic Signature CA

Version 7.4.1

PVsyst - Simulation report

Grid-Connected System

Project: Caltagirone

Variant: Nuova variante di simulazione

No 3D scene defined, no shadings

System power: 222.0 MWp

Favarella (Caltagirone) - Italy

Author

I-PROJECT srl

PVsyst V7.4.1
VC0, Simulation date:
23/08/23 12:43
with v7.4.1

Project summary

Geographical Site
Favarella (Caltagirone)
Italy

Situation

Latitude	37.19 °N
Longitude	14.65 °E
Altitude	500 m
Time zone	UTC+1

Project settings
Albedo 0.20

Meteo data
Favarella (Caltagirone)
Meteonorm 8.1 (1989-2003), Sat=100% - Sintetico

System summary

Grid-Connected System
No 3D scene defined, no shadings

PV Field Orientation
Orientation
Tracking plane, horizontal E-W axis
Normal azimuth to axis 0 °

Tracking algorithm
Astronomic calculation

Wind Speed threshold	0 m/s
Wind stow position	0 °

Near Shadings
No Shadings

System information

PV Array

Nb. of modules	317136 units
Pnom total	222.0 MWp

Inverters

Nb. of units	991 units
Pnom total	173.4 MWac
Pnom ratio	1.280

User's needs
Unlimited load (grid)

Results summary

Produced Energy	397147010 kWh/year	Specific production	1789 kWh/kWp/year	Perf. Ratio PR	89.68 %

Table of contents

General parameters

Grid-Connected System — **No 3D scene defined, no shadings**

PV Field Orientation

Orientation		Tracking algorithm		Trackers configuration
Tracking plane, horizontal E-W axis		Astronomic calculation		No 3D scene defined
Normal azimuth to axis	0 °	Wind Speed threshold	0 m/s	
		Wind stow position	0 °	

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon		Near Shadings	User's needs
Average Height	1.9 °	No Shadings	Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	AE Solar
Model	AE 700TME-132BDS
(Original PVsyst database)	
Unit Nom. Power	700 Wp
Number of PV modules	317136 units
Nominal (STC)	222.0 MWp

Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-175KTL-H0
(Original PVsyst database)	
Unit Nom. Power	175 kWac
Number of inverters	991 units
Total power	173425 kWac

Array #1 - Area_1

Number of PV modules	6600 units	Number of inverters	21 units
Nominal (STC)	4620 kWp	Total power	3675 kWac
Modules	264 Strings x 25 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	4320 kWp	Max. power (=>25°C)	193 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.26
I mpp	4393 A	Power sharing within this inverter	

Array #2 - Area_2

Number of PV modules	9275 units	Number of inverters	29 units
Nominal (STC)	6493 kWp	Total power	5075 kWac
Modules	371 Strings x 25 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	6071 kWp	Max. power (=>25°C)	193 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.28
I mpp	6173 A	Power sharing within this inverter	

Array #3 - Area_3

Number of PV modules	10500 units	Number of inverters	33 units
Nominal (STC)	7350 kWp	Total power	5775 kWac
Modules	420 Strings x 25 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	6873 kWp	Max. power (=>25°C)	193 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.27
I mpp	6989 A	Power sharing within this inverter	

PV Array Characteristics

Array #4 - Area_4

Number of PV modules	6720 units	Number of inverters	21 units
Nominal (STC)	4704 kWp	Total power	3675 kWac
Modules	280 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	4399 kWp	Max. power (=>25°C)	193 kWac
U mpp	944 V	Pnom ratio (DC:AC)	1.28
I mpp	4659 A	Power sharing within this inverter	

Array #5 - Area_5

Number of PV modules	26640 units	Number of inverters	83 units
Nominal (STC)	18.65 MWp	Total power	14525 kWac
Modules	1110 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	17.44 MWp	Max. power (=>25°C)	193 kWac
U mpp	944 V	Pnom ratio (DC:AC)	1.28
I mpp	18470 A	Power sharing within this inverter	

Array #6 - Area_6

Number of PV modules	61620 units	Number of inverters	192 units
Nominal (STC)	43.13 MWp	Total power	33600 kWac
Modules	2370 Strings x 26 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	40.33 MWp	Max. power (=>25°C)	193 kWac
U mpp	1023 V	Pnom ratio (DC:AC)	1.28
I mpp	39437 A	Power sharing within this inverter	

Array #7 - Area_7

Number of PV modules	34225 units	Number of inverters	107 units
Nominal (STC)	23.96 MWp	Total power	18725 kWac
Modules	1369 Strings x 25 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	22.40 MWp	Max. power (=>25°C)	193 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.28
I mpp	22780 A	Power sharing within this inverter	

Array #8 - Area_8

Number of PV modules	24720 units	Number of inverters	77 units
Nominal (STC)	17.30 MWp	Total power	13475 kWac
Modules	1030 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	16.18 MWp	Max. power (=>25°C)	193 kWac
U mpp	944 V	Pnom ratio (DC:AC)	1.28
I mpp	17139 A	Power sharing within this inverter	

Array #9 - Area_9

Number of PV modules	52026 units	Number of inverters	162 units
Nominal (STC)	36.42 MWp	Total power	28350 kWac
Modules	2001 Strings x 26 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	34.05 MWp	Max. power (=>25°C)	193 kWac
U mpp	1023 V	Pnom ratio (DC:AC)	1.28
I mpp	33297 A	Power sharing within this inverter	

PVsyst V7.4.1
VC0, Simulation date:
23/08/23 12:43
with v7.4.1

PV Array Characteristics

Array #10 - Area_10

Number of PV modules	35400 units	Number of inverters	111 units
Nominal (STC)	24.78 MWp	Total power	19425 kWac
Modules	1416 Strings x 25 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	23.17 MWp	Max. power (=>25°C)	193 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.28
I mpp	23562 A	Power sharing within this inverter	

Array #11 - Area_11

Number of PV modules	42960 units	Number of inverters	134 units
Nominal (STC)	30.07 MWp	Total power	23450 kWac
Modules	1790 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	28.12 MWp	Max. power (=>25°C)	193 kWac
U mpp	944 V	Pnom ratio (DC:AC)	1.28
I mpp	29786 A	Power sharing within this inverter	

Array #12 - Area_12

Number of PV modules	6450 units	Number of inverters	21 units
Nominal (STC)	4515 kWp	Total power	3675 kWac
Modules	258 Strings x 25 In series		
At operating cond. (50°C)		Operating voltage	600-1500 V
Pmpp	4222 kWp	Max. power (=>25°C)	193 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.23
I mpp	4293 A	Power sharing within this inverter	

Total PV power

Nominal (STC)	221995 kWp
Total	317136 modules
Module area	983967 m²
Cell area	923056 m²

Total inverter power

Total power	173425 kWac
Max. power	191263 kWac
Number of inverters	991 units
Pnom ratio	1.28

Array losses

Thermal Loss factor

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

Module Quality Loss

Loss Fraction -0.8 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.2 %

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

PVsyst V7.4.1
VC0, Simulation date:
23/08/23 12:43
with v7.4.1

DC wiring losses

Global wiring resistance 0.075 mΩ
Loss Fraction 1.5 % at STC

Array #1 - Area_1		**Array #2 - Area_2**	
Global array res.	3.6 mΩ	Global array res.	2.6 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #3 - Area_3		**Array #4 - Area_4**	
Global array res.	2.3 mΩ	Global array res.	3.3 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #5 - Area_5		**Array #6 - Area_6**	
Global array res.	0.83 mΩ	Global array res.	0.42 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #7 - Area_7		**Array #8 - Area_8**	
Global array res.	0.70 mΩ	Global array res.	0.89 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #9 - Area_9		**Array #10 - Area_10**	
Global array res.	0.50 mΩ	Global array res.	0.67 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #11 - Area_11		**Array #12 - Area_12**	
Global array res.	0.51 mΩ	Global array res.	3.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC

PVsyst V7.4.1
VC0, Simulation date:
23/08/23 12:43
with v7.4.1

Horizon definition

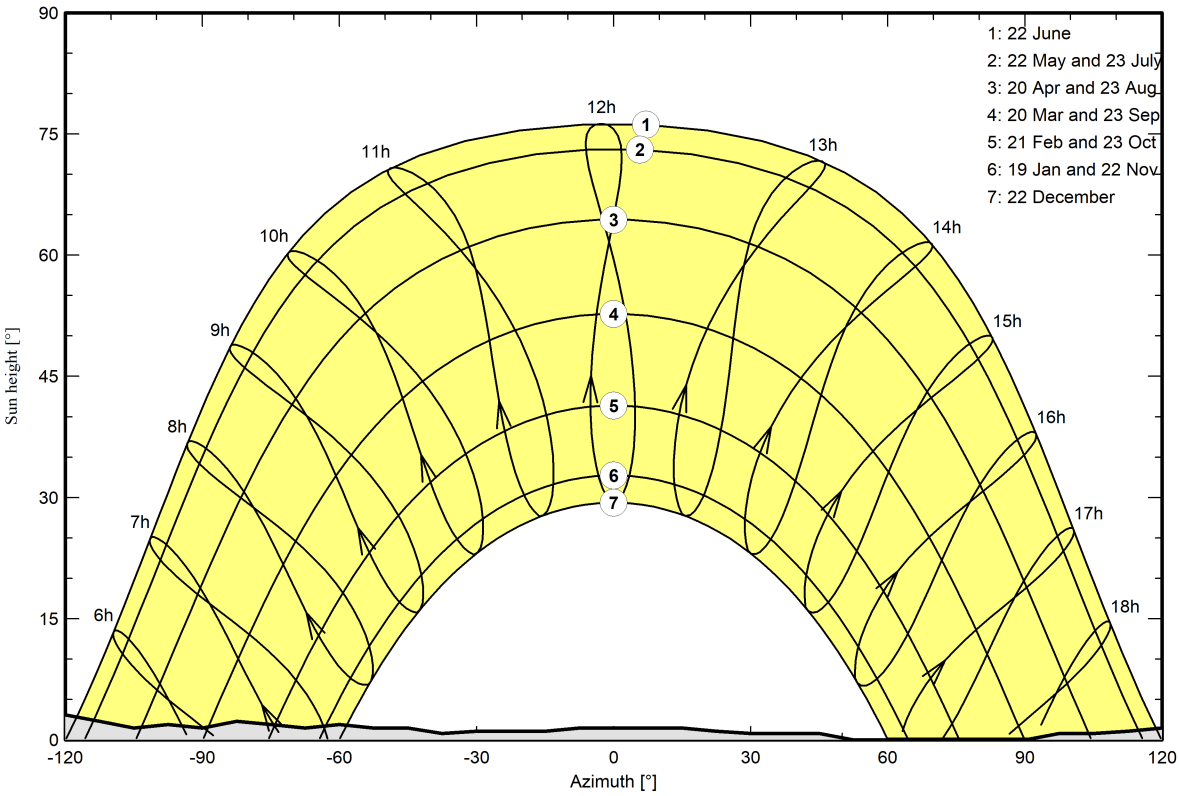
Horizon from PVGIS website API, Lat=37°11'11", Long=14°39'16", Alt=500m

Average Height	1.9 °	Albedo Factor	0.00
Diffuse Factor	1.00	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-143	-135	-120	-113	-105	-98	-90	-83	-75	-68
Height [°]	3.8	3.8	3.1	3.1	2.3	1.5	1.9	1.5	2.3	1.9	1.5
Azimuth [°]	-60	-53	-45	-38	-30	-15	-8	15	23	30	45
Height [°]	1.9	1.5	1.5	0.8	1.1	1.1	1.5	1.5	1.1	0.8	0.8
Azimuth [°]	53	90	98	105	113	120	128	135	143	180	
Height [°]	0.0	0.0	0.8	0.8	1.1	1.5	1.5	1.9	3.8	3.8	

Sun Paths (Height / Azimuth diagram)



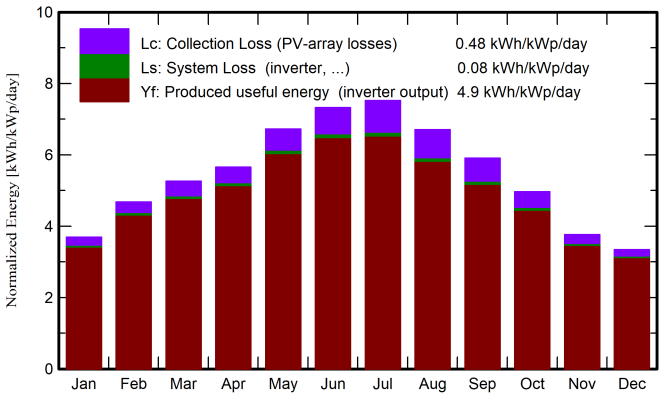
PVsyst V7.4.1
VC0, Simulation date:
23/08/23 12:43
with v7.4.1

Main results

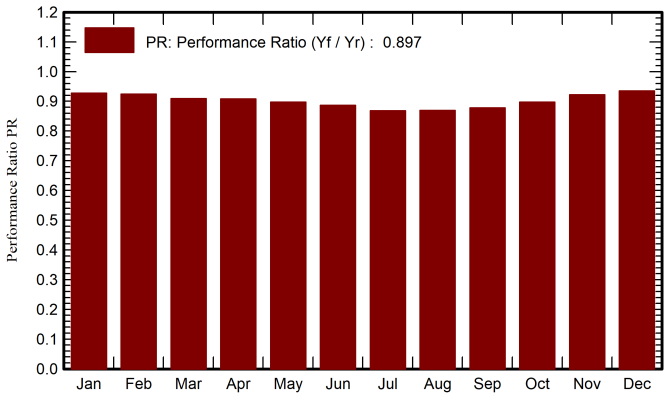
System Production

Produced Energy	397147010 kWh/year	Specific production	1789 kWh/kWp/year
		Perf. Ratio PR	89.68 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

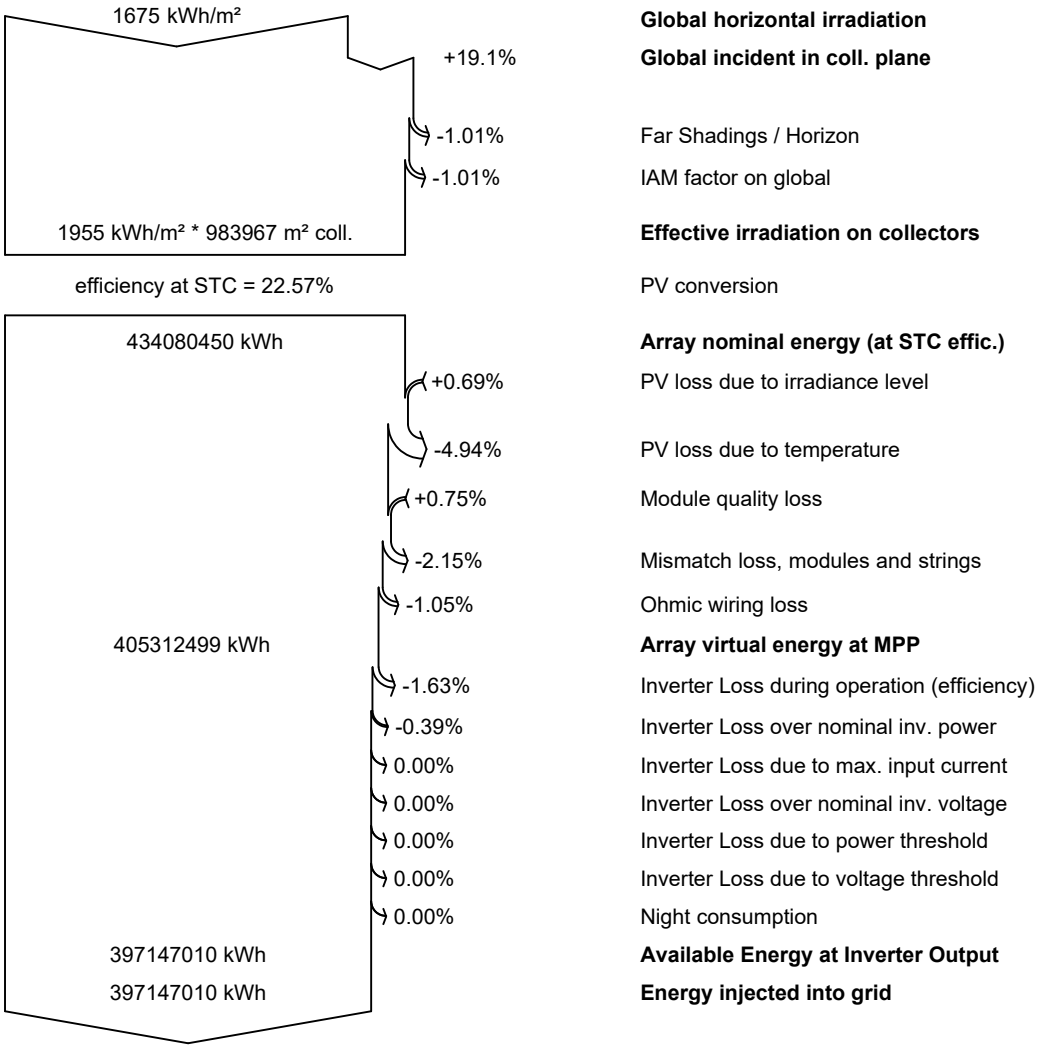
	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray kWh
January	69.1	26.54	8.70	114.5	112.9	23948738
February	91.4	36.35	8.69	130.9	128.8	27291998
March	133.5	56.75	10.84	163.2	160.0	33451056
April	157.7	74.45	13.32	169.8	165.6	34793081
May	198.9	82.85	17.23	208.5	203.8	42242812
June	209.4	79.05	21.37	219.8	215.1	43952966
July	221.5	72.94	25.08	233.1	228.1	45717682
August	194.9	71.33	25.49	207.8	203.3	40792212
September	150.5	56.76	21.74	177.2	173.1	35110734
October	112.9	43.68	18.40	154.0	151.3	31183719
November	73.4	36.02	13.87	112.8	110.8	23450701
December	61.7	28.40	10.35	103.5	102.1	21833647
Year	1674.8	665.12	16.31	1994.9	1954.7	403769346

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

PVsyst V7.4.1
VC0, Simulation date:
23/08/23 12:43
with v7.4.1

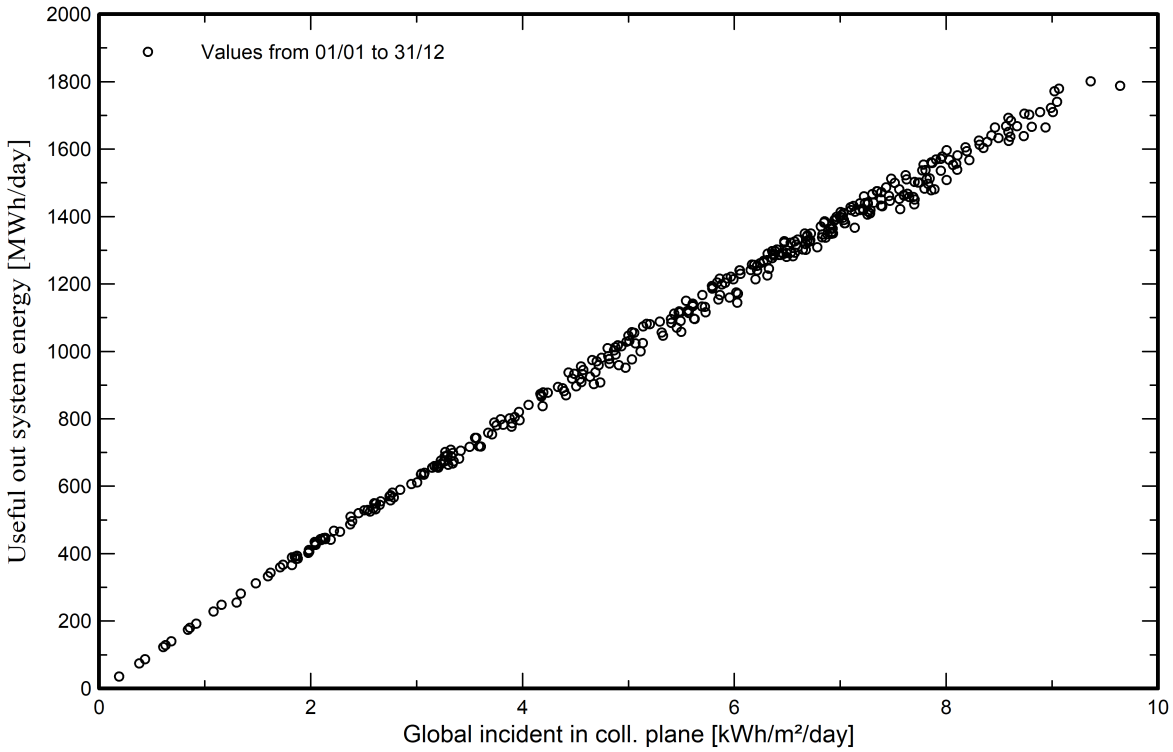
Loss diagram



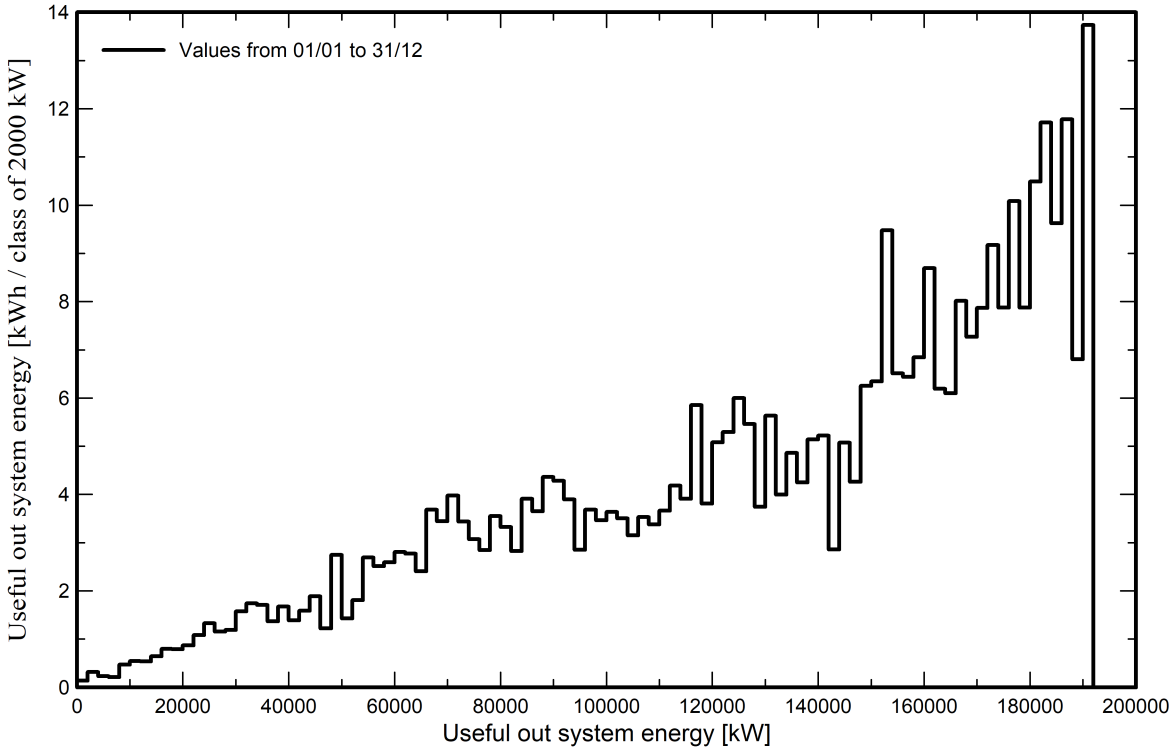
PVsyst V7.4.1
VC0, Simulation date:
23/08/23 12:43
with v7.4.1

Predef. graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



Aging Tool

Aging Parameters

Time span of simulation 25 years

Module average degradation

Loss factor 0.4 %/year

Mismatch due to degradation

Imp RMS dispersion 0.4 %/year

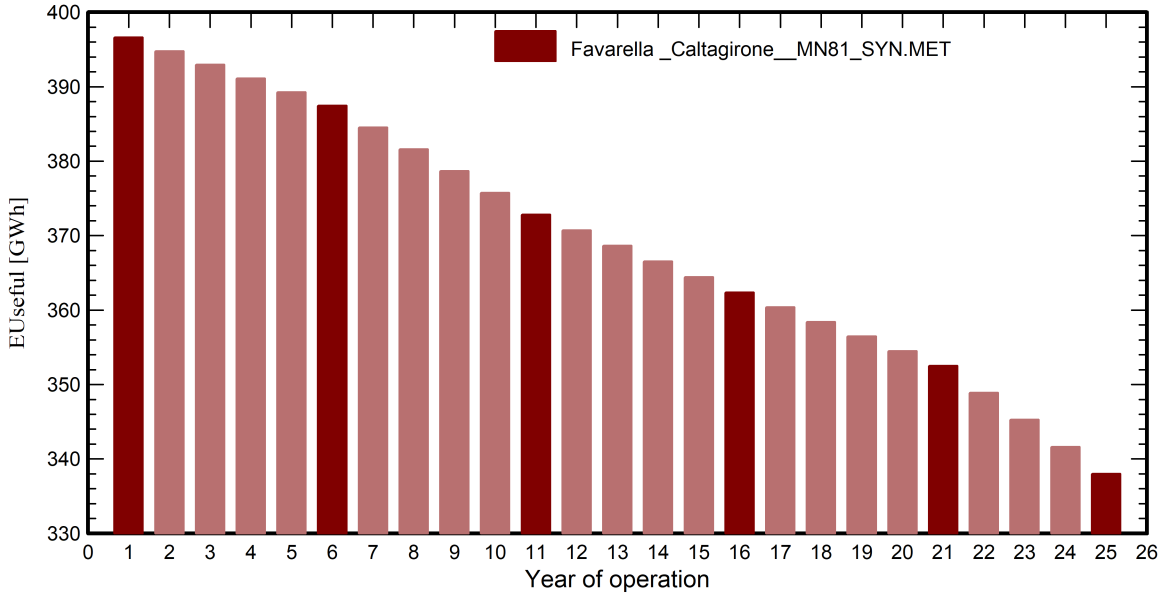
Vmp RMS dispersion 0.4 %/year

Meteo used in the simulation

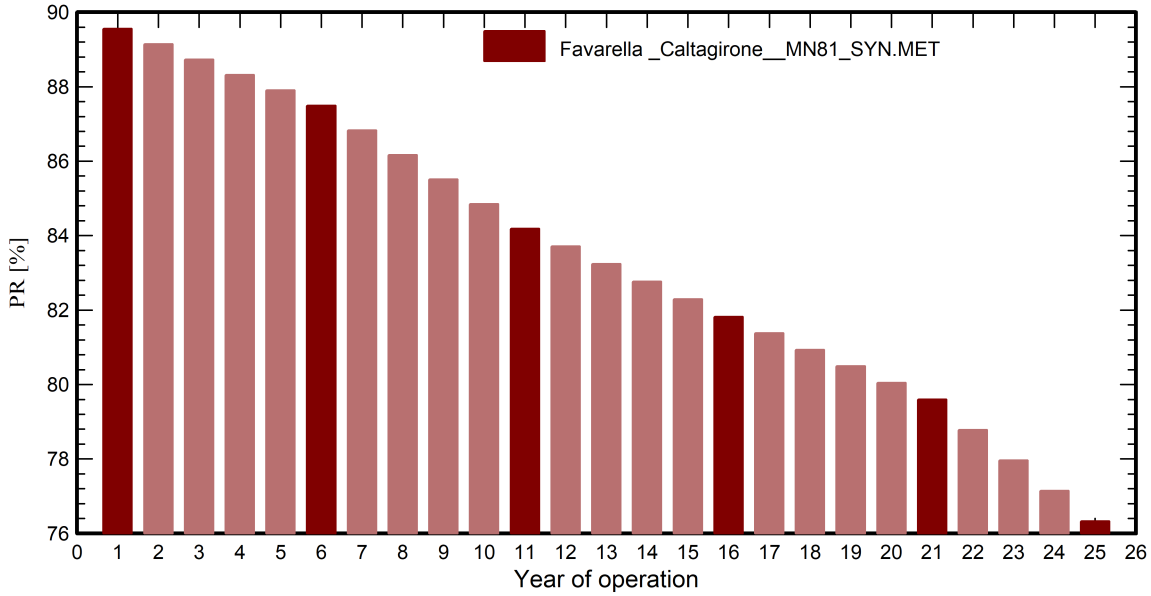
Favarella Caltagirone MN81 SYN

Years reference year

Useful out system energy



Performance Ratio



Aging Tool

Aging Parameters

Time span of simulation 25 years

Module average degradation

Loss factor 0.4 %/year

Mismatch due to degradation

Imp RMS dispersion 0.4 %/year

Vmp RMS dispersion 0.4 %/year

Meteo used in the simulation

Favarella Caltagirone MN81 SYN

Years reference year

	EUseful	PR	PR loss
Year	GWh	%	%
1	396.6	89.55	-0.23
2	394.8	89.14	-0.69
3	392.9	88.73	-1.15
4	391.1	88.31	-1.61
5	389.3	87.90	-2.07
6	387.4	87.49	-2.53
7	384.5	86.83	-3.27
8	381.6	86.17	-4.00
9	378.7	85.51	-4.74
10	375.7	84.84	-5.48
11	372.8	84.18	-6.21
12	370.7	83.71	-6.74
13	368.6	83.24	-7.26
14	366.5	82.77	-7.79
15	364.4	82.29	-8.32
16	362.3	81.82	-8.85
17	360.4	81.38	-9.34
18	358.4	80.93	-9.83
19	356.4	80.49	-10.33
20	354.5	80.04	-10.82
21	352.5	79.60	-11.32
22	348.9	78.78	-12.23
23	345.3	77.96	-13.14
24	341.6	77.14	-14.06
25	338.0	76.32	-14.97