

IMPIANTO AGRIVOLTAICO E OPERE DI CONNESSIONE

METKA EGN RENEWABLES DEVELOPMENT ITALY S.R.L.

POTENZA IMPIANTO 24,50 MW - COMUNE DI CEREIA (VR)

Proponente

METKA EGN RENEWABLES DEVELOPMENT ITALY S.R.L.

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Titolo Elaborato

STIMA PRODUCIBILITA'

LIVELLO PROGETTAZIONE	CODICE ELABORATO	FILE NAME	DATA
DEFINITIVO	PD_REL04	22ENV01_PD_REL04.00 - Stima producibilità.docx	23/12/2022

Revisioni

REV.	DATA	DESCRIZIONE	ESEGUITO	VERIFICATO	APPROVATO
0	23/12/22	EMISSIONE PER PERMITTING	LBO	MLA	ARU



COMUNE DI CEREIA (VR)
REGIONE VENETO



STIMA PRODUCIBILITA'

**PVsyst V7.2.20**

VC0, Simulation date:
18/10/22 18:10
with v7.2.20

Incico spa (Italy)

Project summary**Geographical Site**

Cerea
Italy

Situation

Latitude 45.19 °N
Longitude 11.22 °E
Altitude 15 m
Time zone UTC+1

Project settings

Albedo 0.20

Meteo data

Cerea
Meteonorm 8.0 (1991-2012), Sat=73% - Sintetico

System summary**Grid-Connected System****PV Field Orientation****Orientation**

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

Tracking system**Tracking algorithm**

Astronomic calculation

Near Shadings

Linear shadings

System information**PV Array**

Nb. of modules 42600 units
Pnom total 24.50 MWp

Inverters

Nb. of units 5 units
Pnom total 21.80 MWac
Pnom ratio 1.124

User's needs

Unlimited load (grid)

Results summary

Produced Energy 35.02 GWh/year Specific production 1430 kWh/kWp/year Perf. Ratio PR 80.47 %

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Near shading definition - Iso-shadings diagram	4
Main results	5
Loss diagram	6
Special graphs	7

**PVsyst V7.2.20**

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Incico spa (Italy)

General parameters**Grid-Connected System****PV Field Orientation****Orientation**

Tracking plane, horizontal N-S axis

Axis azimuth 0 °

Models used

Transposition Perez

Diffuse Perez, Meteonorm

Circumsolar separate

Horizon

Free Horizon

Tracking system**Tracking algorithm**

Astronomic calculation

Near Shadings

Linear shadings

Trackers configuration

Nb. of trackers 727 units

Sizes

Tracker Spacing 10.00 m

Collector width 4.84 m

Ground Cov. Ratio (GCR) 48.4 %

Phi min / max. +/- 90.0 °

Shading limit angles

Phi limits +/- 60.9 °

User's needs

Unlimited load (grid)

PV Array Characteristics**PV module**

Manufacturer

Jinkosolar

Model

JKM575M-7RL4-V

(Original PVsyst database)

Unit Nom. Power

575 Wp

Number of PV modules

42600 units

Nominal (STC)

24.50 MWp

Modules

1775 Strings x 24 In series

At operating cond. (50°C)

Pmpp

22.35 MWp

U mpp

962 V

I mpp

23231 A

Total PV power

Nominal (STC)

24495 kWp

Total

42600 modules

Module area

116472 m²**Inverter**

Manufacturer

Siemens

Model

Sinacon PV4360

(Original PVsyst database)

Unit Nom. Power

4360 kWac

Number of inverters

10 * MPPT 50% 5 units

Total power

21800 kWac

Operating voltage

875-1500 V

Pnom ratio (DC:AC)

1.12

Total inverter power

Total power

21800 kWac

Number of inverters

5 units

Pnom ratio

1.12

Array losses**Thermal Loss factor**

Module temperature according to irradiance

Uc (const) 29.0 W/m²KUv (wind) 0.0 W/m²K/m/s**DC wiring losses**

Global array res.

0.69 mΩ

Loss Fraction

1.5 % at STC

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

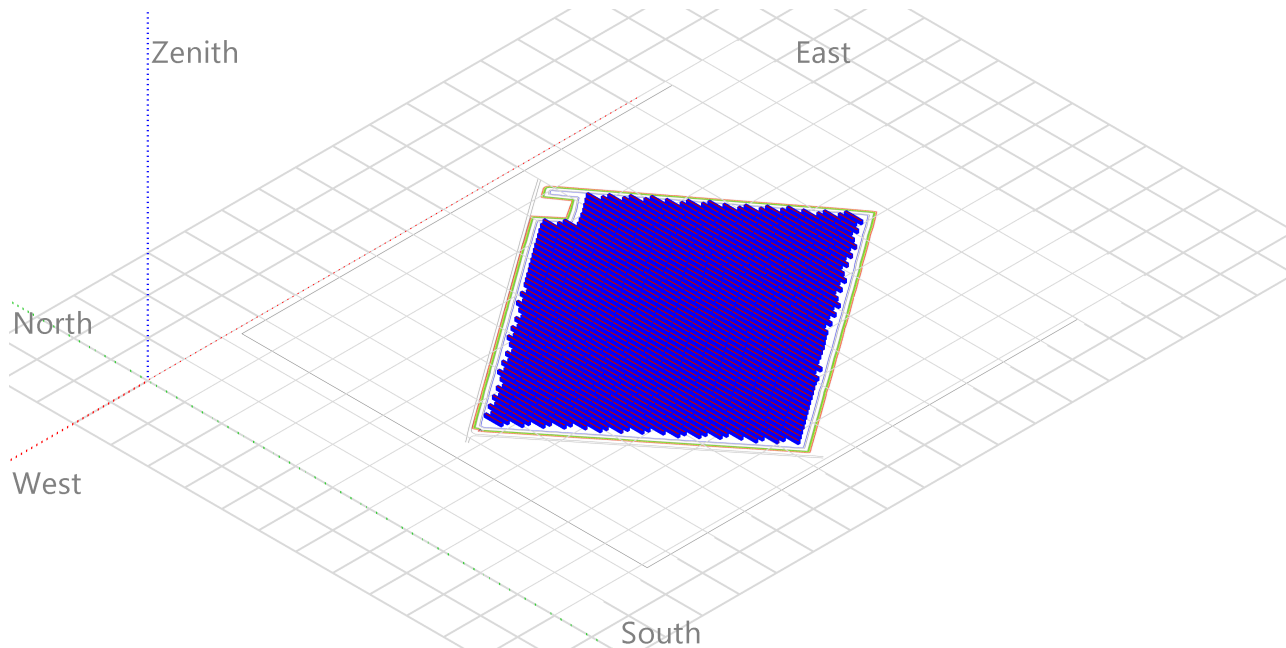
Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

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



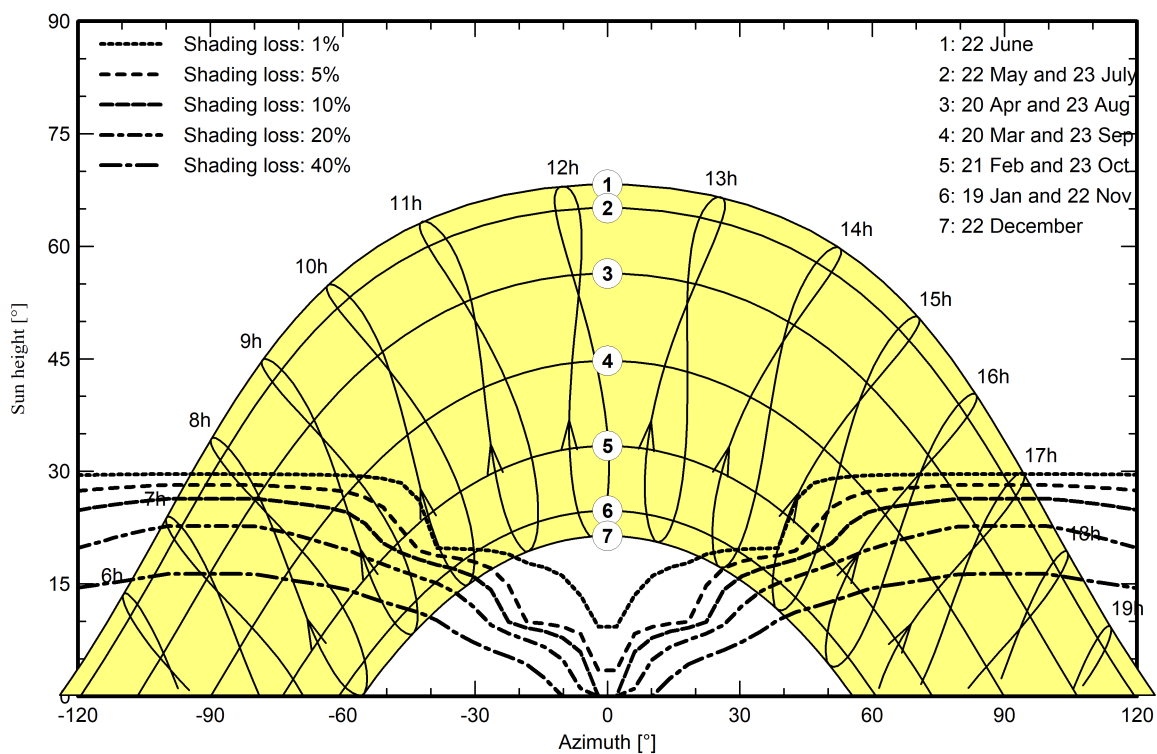
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1





Main results

System Production

Produced Energy

35.02 GWh/year

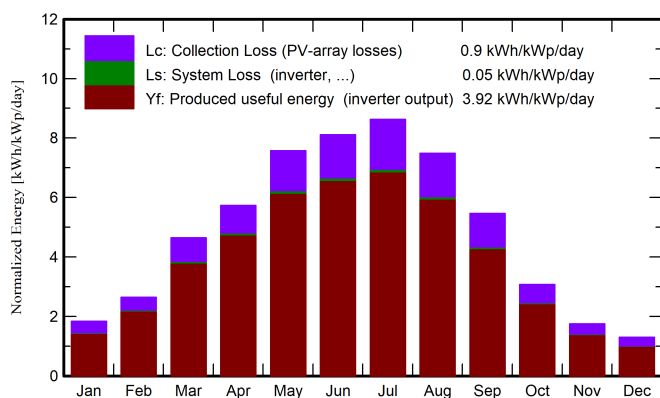
Specific production

1430 kWh/kWp/year

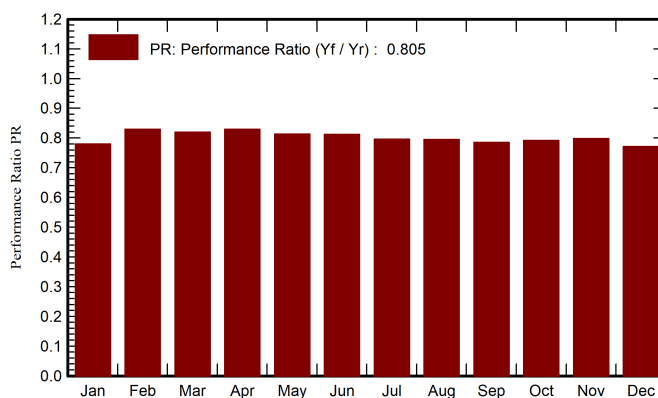
Performance Ratio PR

80.47 %

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	40.0	22.49	2.61	57.0	45.1	1.104	1.089	0.779
February	54.9	30.84	4.74	74.0	62.8	1.524	1.504	0.830
March	104.5	52.46	9.47	144.0	123.4	2.928	2.890	0.819
April	130.0	67.79	13.79	172.0	152.1	3.539	3.493	0.829
May	172.8	78.91	18.73	234.6	208.6	4.737	4.676	0.814
June	186.6	89.50	23.12	243.2	220.6	4.903	4.839	0.812
July	195.3	77.86	25.40	267.6	239.9	5.289	5.220	0.796
August	167.3	68.90	24.88	232.2	206.2	4.582	4.523	0.795
September	114.9	51.27	19.52	164.0	140.4	3.195	3.154	0.785
October	71.9	42.29	14.56	95.3	80.0	1.872	1.848	0.792
November	39.3	24.29	8.68	52.3	43.5	1.038	1.023	0.798
December	30.7	21.29	3.63	40.2	31.9	0.772	0.760	0.771
Year	1308.1	627.88	14.15	1776.6	1554.4	35.485	35.018	0.805

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

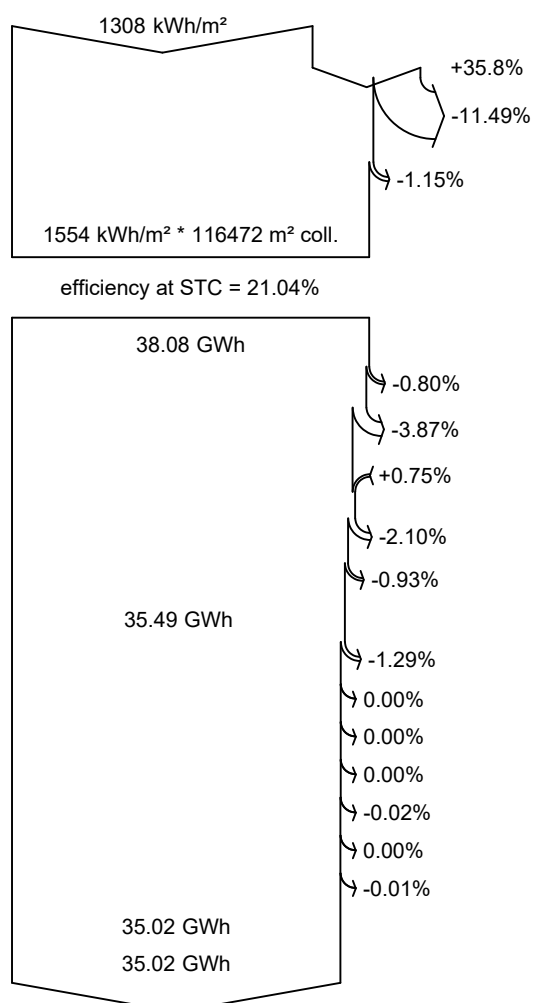
EArray Effective energy at the output of the array

E_Grid Energy injected into grid

PR Performance Ratio



Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Near Shadings: irradiance loss

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

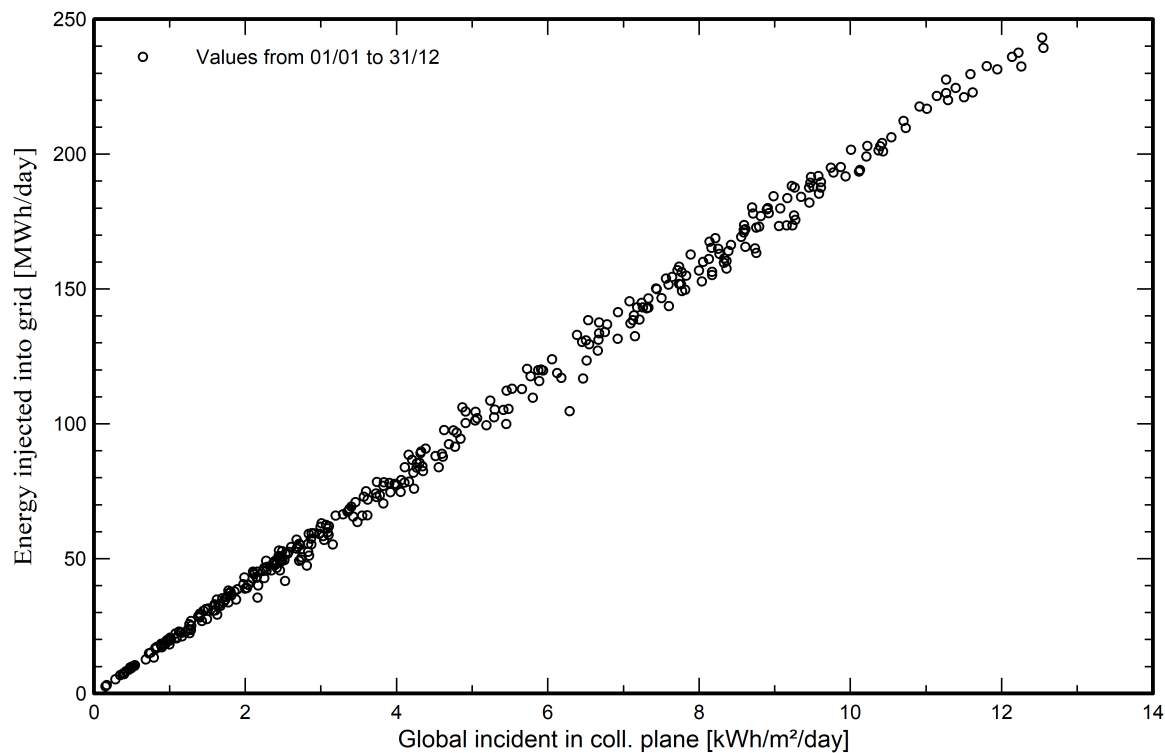
Available Energy at Inverter Output

Energy injected into grid



Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema

