

COMUNE DI GENZANO DI LUCANIA
PROVINCIA DI POTENZA
REGIONE BASILICATA

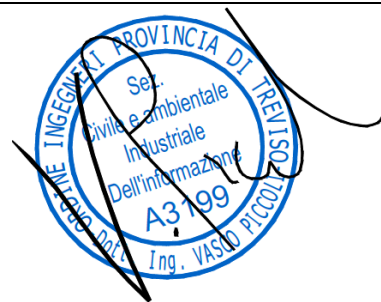
IMPIANTO SOLARE FOTOVOLTAICO "GENZANO RIPA D'API" CONNESSO ALLA RTN DI POTENZA DI PICCO P=19'993.87kWp E POTENZA DI IMMISSIONE PARI A 19'998.02 kW, DELLE RELATIVE OPERE DI CONNESSIONE ALLA RTN E PIANO AGRONOMO PER L'UTILIZZO A SCOPI AGRICOLI DELL'AREA

Proponente

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Progettazione



Preparato
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PROGETTAZIONE DEFINITIVA

Titolo elaborato

IMPIANTO FOTOVOLTAICO "RIPA D'API"
STIMA PRODUCIBILITÀ IMPIANTO FV

Elaborato N.

A.16

Data emissione

06/08/21

Nome file

STIMA PRODUCIBILITÀ

N. Progetto
SOL013a

Pagina
COVER

00
REV.

06/08/21
DATA

PRIMA EMISSIONE
DESCRIZIONE

PVsyst - Simulation report

Grid-Connected System

Project: SOL 013 - Genzano Ripa d'Api

Variant: pitch 5m tracker55_rev02 (def)

Trackers single array, with backtracking

System power: 19.99 MWp

Contrada San Francesco - Italy

Author

New Engineering s.r.l. (Italy)



PVsyst V7.2.3

VC8, Simulation date:
02/07/21 14:25
with v7.2.3

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Project summary

Geographical Site		Situation		Project settings	
Contrada San Francesco		Latitude	40.79 °N	Albedo	0.20
Italy		Longitude	16.09 °E		
		Altitude	323 m		
		Time zone	UTC+1		
Meteo data					
Contrada San Francesco					
Meteonorm 8.0 (1986-2005), Sat=100% - Synthetic					

System summary

Grid-Connected System		Trackers single array, with backtracking			
PV Field Orientation		Near Shadings		User's needs	
Tracking plane, horizontal N-S axis		According to strings		Unlimited load (grid)	
Axis azimuth	0 °	Electrical effect	80 %		
System information					
PV Array					
Nb. of modules	36686 units	Inverters		7 units	
Pnom total	19.99 MWp	Nb. of units		17.85 MWac	
		Pnom total		1.120	
		Pnom ratio			

Results summary

Produced Energy	32827 MWh/year	Specific production	1642 kWh/kWp/year	Perf. Ratio PR	86.51 %
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Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Near shading definition - Iso-shadings diagram	6
Main results	7
Loss diagram	8
Special graphs	9

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General parameters

Grid-Connected System	Trackers single array, with backtracking	
PV Field Orientation	Backtracking strategy	Models used
Orientation	Nb. of trackers	Transposition
Tracking plane, horizontal N-S axis	60 units	Perez
Axis azimuth	Single array	Diffuse
0 °		Perez, Meteonorm
	Sizes	Circumsolar
	Tracker Spacing	separate
	5.00 m	
	Collector width	
	2.18 m	
	Ground Cov. Ratio (GCR)	
	43.6 %	
	Left inactive band	
	0.02 m	
	Right inactive band	
	0.02 m	
	Phi min / max.	
	-/+ 55.0 °	
	Backtracking limit angle	
	Phi limits	
	+/- 63.4 °	
Horizon	Near Shadings	User's needs
Free Horizon	According to strings	Unlimited load (grid)
	Electrical effect	
	80 %	

PV Array Characteristics

PV module		Inverter	
Manufacturer	Jinkosolar	Manufacturer	Jema
Model	JKM545M-72HL4-TV	Model	IFX6 -2550 TL.620 (Rev2)
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	545 Wp	Unit Nom. Power	2550 kWac
Number of PV modules	36686 units	Number of inverters	7 unit
Nominal (STC)	19.99 MWp	Total power	17850 kWac
Modules	1411 Strings x 26 In series	Operating voltage	890-1250 V
At operating cond. (50°C)		Max. power (=>25°C)	2850 kWac
Pmpp	18.26 MWp	Pnom ratio (DC:AC)	1.12
U mpp	971 V		
I mpp	18796 A		
Total PV power		Total inverter power	
Nominal (STC)	19994 kWp	Total power	17850 kWac
Total	36686 modules	Nb. of inverters	7 units
Module area	94603 m ²	Pnom ratio	1.12
Cell area	87219 m ²		

Array losses

Array Soiling Losses	Thermal Loss factor	DC wiring losses
Loss Fraction	Module temperature according to irradiance	Global array res.
2.0 %	Uc (const)	0.74 mΩ
	29.0 W/m ² K	Loss Fraction
	Uv (wind)	1.3 % at STC
	0.0 W/m ² K/m/s	
LID - Light Induced Degradation	Module Quality Loss	Module mismatch losses
Loss Fraction	Loss Fraction	Loss Fraction
1.3 %	-0.3 %	0.5 % at MPP
Strings Mismatch loss		
Loss Fraction		
0.1 %		



Array losses

IAM loss factor

Incidence effect (IAM): User defined profile

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	1.000	0.989	0.971	0.924	0.729	0.000



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System losses

Auxiliaries loss

Proportionnal to Power 5.0 W/kW
0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 620 Vac tri
Loss Fraction 0.05 % at STC

Inverter: IFX6 -2550 TL.620 (Rev2)

Wire section (7 Inv.) Copper 7 x 3 x 3000 mm²
Average wires length 10 m

MV line up to Injection

MV Voltage 30 kV
Wires Copper 3 x 300 mm²
Length 4950 m
Loss Fraction 0.68 % at STC

AC losses in transformers

MV transfo

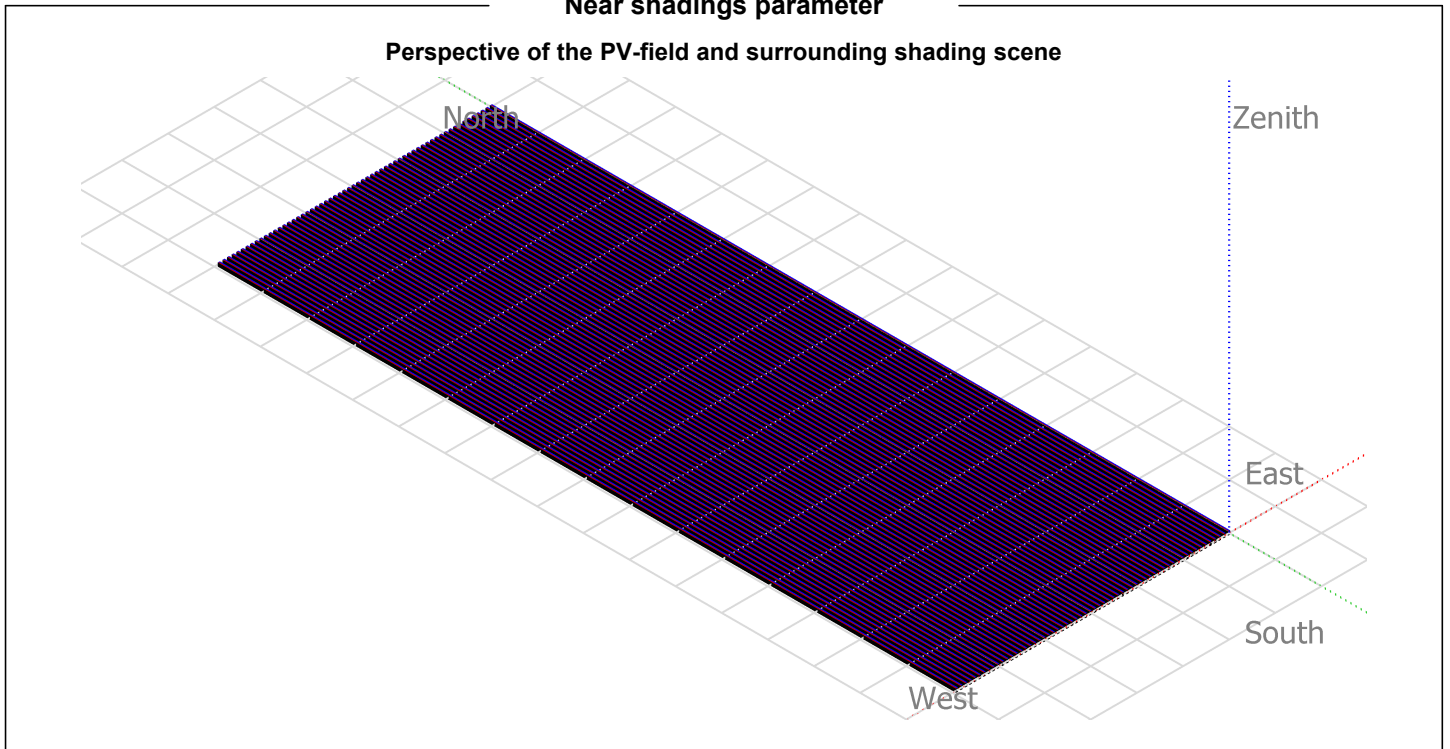
Grid voltage 30 kV

Operating losses at STC

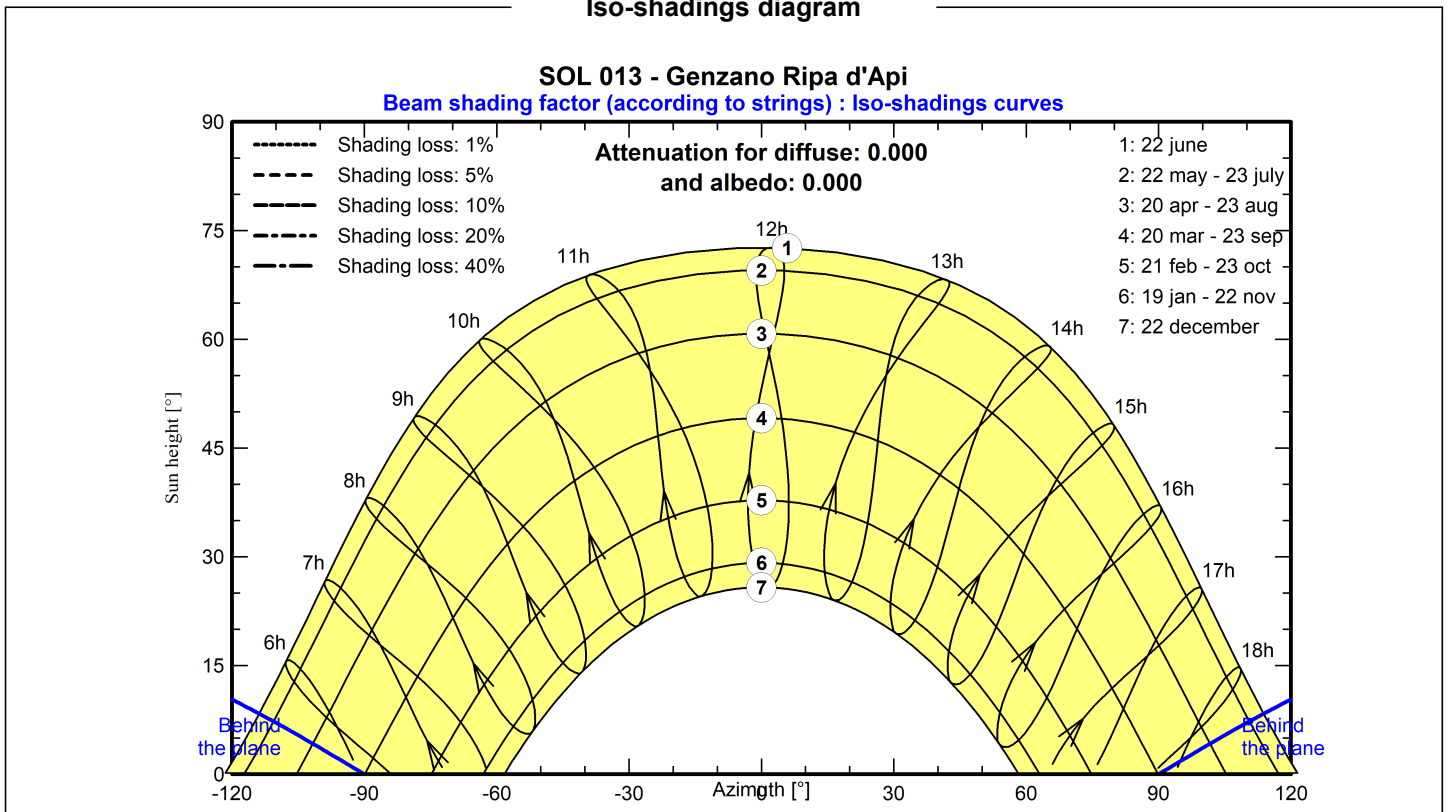
Nominal power at STC 19729 kVA
Iron loss (24/24 Connexion) 29.59 kW
Loss Fraction 0.15 % at STC
Coils equivalent resistance 3 x 0.16 mΩ
Loss Fraction 0.80 % at STC



Near shadings parameter



Iso-shadings diagram





Main results

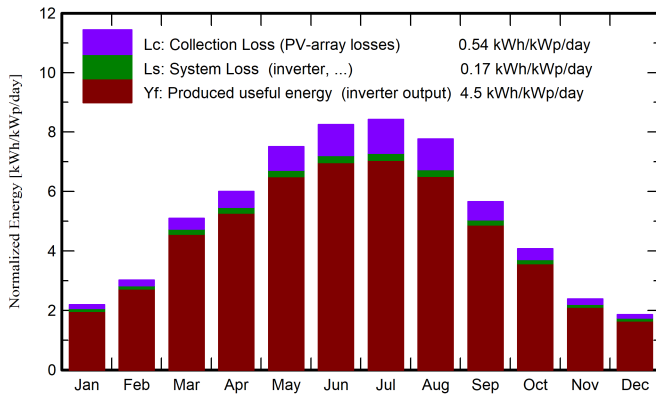
System Production

Produced Energy 32827 MWh/year

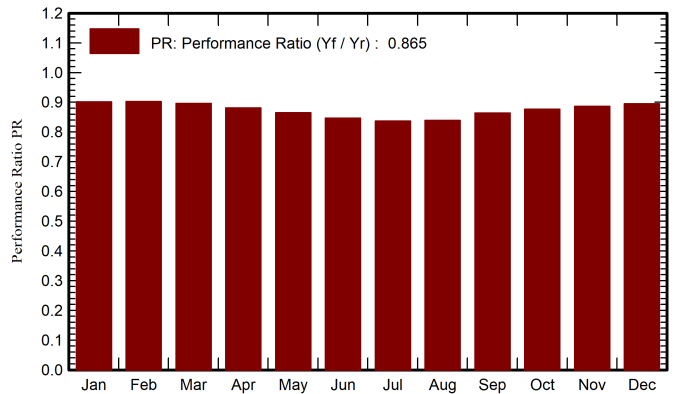
Specific production
Performance Ratio PR

1642 kWh/kWp/year
86.51 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

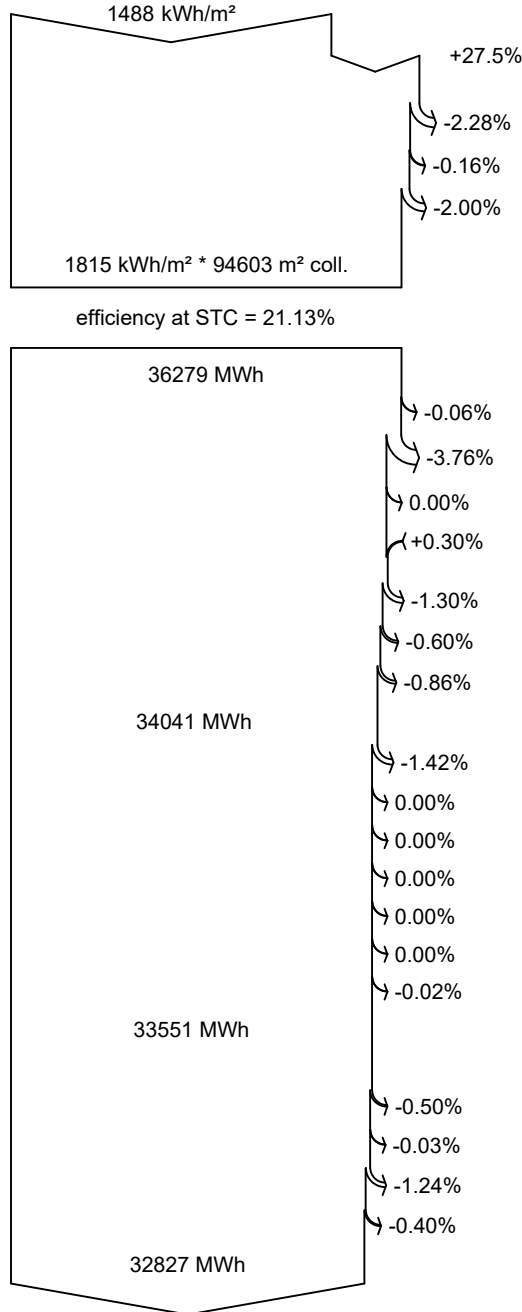
	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	PR ratio
January	52.1	23.50	6.32	67.8	64.5	1282	1222	0.901
February	68.1	38.72	6.72	84.5	80.2	1591	1526	0.903
March	120.6	48.27	9.42	158.2	151.4	2941	2835	0.897
April	144.8	71.62	12.46	180.0	171.8	3284	3170	0.881
May	185.0	86.55	17.07	232.9	222.8	4170	4030	0.866
June	195.2	79.77	21.83	247.5	237.3	4332	4189	0.846
July	206.1	84.53	25.11	261.1	250.3	4519	4372	0.837
August	185.2	68.99	24.85	240.8	231.1	4178	4039	0.839
September	132.5	60.08	19.63	169.6	162.1	3035	2931	0.864
October	96.6	40.88	15.98	126.5	120.9	2304	2218	0.877
November	57.5	32.59	11.59	71.5	67.7	1325	1266	0.886
December	44.6	23.21	7.76	57.4	54.5	1081	1027	0.895
Year	1488.4	658.70	14.95	1897.9	1814.6	34041	32827	0.865

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

Soiling loss factor

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Shadings: Electrical Loss acc. to strings

Module quality loss

LID - Light induced degradation

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

Auxiliaries (fans, other)

AC ohmic loss

Medium voltage transfo loss

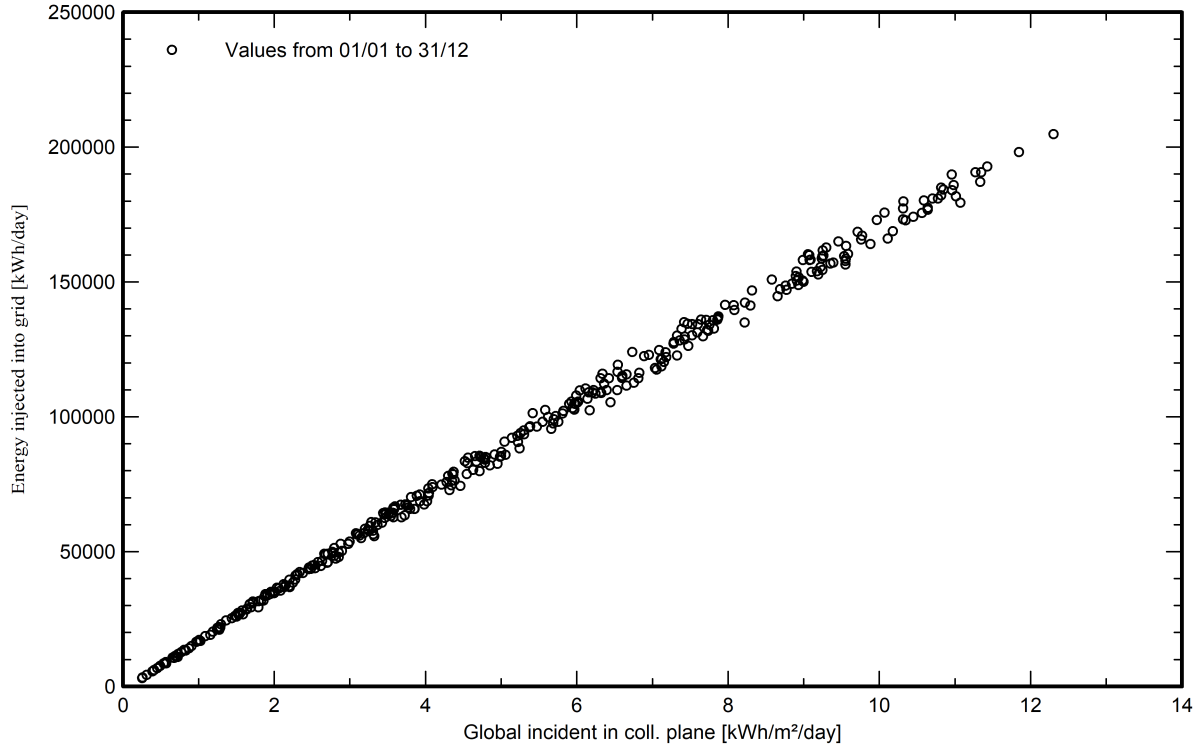
MV line ohmic loss

Energy injected into grid



Special graphs

Daily Input/Output diagram



System Output Power Distribution

