



TRANSIZIONE ECOLOGICA



REGIONE SICILIA



COMUNE DI RAMACCA



COMUNE DI CASTEL DI IUDICA

NOME PROGETTO:

Costruzione ed esercizio di un impianto agrovoltaiico avente potenza in immissione pari a 240,500 MW, con relativo collegamento alla rete elettrica, sito nei comuni di Castel di Iudica e Ramacca (CT) - Impianto "FICURINIA".

ID. PROGETTO DEL MITE:

PROCEDURA:

Valutazione di impatto ambientale ai sensi dell'art. 23 c. 1 del D.Lgs. 152/06 e ss.mm.ii..

PROPONENTE:



INE Ficurinia Srl
A Company of ILOS New Energy Italy

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RESPONSABILE PROGETTO:
Ing. Jury Mancinelli

INE FICURINIA S.R.L.

a company of ILOS New Energy Italy

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Sergio Chiericoni
Firmato Digitalmente

Legale rappresentante: Ing. Sergio Chiericoni

ELABORATO REDATTO DA:

Dott. Ing. Giada Stella BOLIGNANO

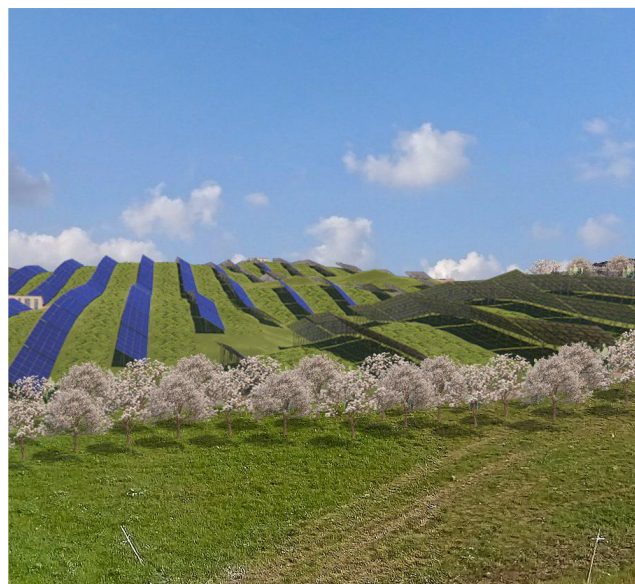
Iscrizione all'Albo n° A 2508

alla Sezione degli Ingegneri (Sez. A)

- Settore civile e ambientale
- Settore industriale
- Settore dell'informazione



ORDINE DEGLI INGEGNERI
DELLA PROVINCIA DI REGGIO CALABRIA



IDENTIFICATORE ELABORATO:

RS06REL066A0

CARTELLA:

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TITOLO ELABORATO:

Analisi della risorsa solare e stima di produzione energia lotto 3664

SCALA:

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PROGETTAZIONE E COORDINAMENTO

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DATA
apr-22

REVISIONE
Emissione

ELABORATO
Ing. Baldacconi

VERIFICATO
Ing. Bolignano

VALIDATO
INE Ficurinia S.r.l.

PVsyst - Simulation report

Grid-Connected System

Project: Ficurinia #3664

Variant: New simulation variant

Ground system (tables) on a hill

System power: 53.76 MWp

Cavalera - Italy

Author

ARATO SRL (Italy)



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Project summary

Geographical Site	Situation	Project settings
Cavalera	Latitude	Albedo
Italy	37.51 °N	0.20
	Longitude	
	14.60 °E	
	Altitude	
	289 m	
	Time zone	
	UTC+1	
Meteo data		
Cavalera		
PVGIS api TMY		

System summary

Grid-Connected System	Ground system (tables) on a hill	
Simulation for year no 1		
PV Field Orientation	Near Shadings	User's needs
Fixed plane	According to strings	Unlimited load (grid)
Tilt/Azimuth	Electrical effect	
31 / -1 °	90 %	
System information		
PV Array	Inverters	
Nb. of modules	Nb. of units	29 units
88128 units	Pnom total	49.41 MWac
Pnom total	53.76 MWp	1.088
	Pnom ratio	

Results summary

Produced Energy	90 GWh/year	Specific production	1666 kWh/kWp/year	Perf. Ratio PR	82.41 %
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ARATO SRL (Italy)

General parameters

Grid-Connected System		Ground system (tables) on a hill	
PV Field Orientation		Sheds configuration	
Orientation		Nb. of sheds	3796 units
Fixed plane		Sizes	
Tilt/Azimuth	31 / -1 °	Sheds spacing	11.4 m
		Collector width	4.60 m
		Ground Cov. Ratio (GCR)	40.3 %
Horizon		Near Shadings	
Average Height	3.9 °	According to strings	
		Electrical effect	90 %
		Models used	
		Transposition	Perez
		Diffuse	Imported
		Circumsolar	separate
		User's needs	
		Unlimited load (grid)	

PV Array Characteristics

Array #1 - Area 1			
PV module			
Manufacturer	JA Solar	Manufacturer	Sungrow
Model	JAM78S30-610/MR	Model	SG125HX
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	125 kWac
Number of PV modules	552 units	Number of inverters	3 units
Nominal (STC)	337 kWp	Total power	375 kWac
Modules	23 Strings x 24 In series	Operating voltage	500-1500 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	0.90
Pmpp	305 kWp		
U mpp	983 V		
I mpp	310 A		
PV module			
Manufacturer	JA Solar	Manufacturer	Santerno
Model	JAM78S30-610/MR	Model	Sunway TG 1800 1500V TE - 600 (1662W)
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1662 kWac
Number of PV modules	35112 units	Number of inverters	12 units
Nominal (STC)	21.42 MWp	Total power	19944 kWac
Array #2 - Area 2A			
Number of PV modules	3024 units	Number of inverters	1 unit
Nominal (STC)	1845 kWp	Total power	1662 kWac
Modules	126 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1670 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.11
I mpp	1700 A		
Array #3 - Area 2B			
Number of PV modules	3024 units	Number of inverters	1 unit
Nominal (STC)	1845 kWp	Total power	1662 kWac
Modules	126 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1670 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.11
I mpp	1700 A		



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PV Array Characteristics

Array #4 - Area 2C

Number of PV modules	3024 units	Number of inverters	1 unit
Nominal (STC)	1845 kWp	Total power	1662 kWac
Modules	126 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1670 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.11
I mpp	1700 A		

Array #5 - Area 2D

Number of PV modules	3000 units	Number of inverters	1 unit
Nominal (STC)	1830 kWp	Total power	1662 kWac
Modules	125 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1657 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.10
I mpp	1686 A		

Array #6 - Area 2E

Number of PV modules	3000 units	Number of inverters	1 unit
Nominal (STC)	1830 kWp	Total power	1662 kWac
Modules	125 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1657 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.10
I mpp	1686 A		

Array #7 - Area 3A

Number of PV modules	2664 units	Number of inverters	1 unit
Nominal (STC)	1625 kWp	Total power	1662 kWac
Modules	111 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1472 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	0.98
I mpp	1498 A		

Array #13 - Area 5A

Number of PV modules	2904 units	Number of inverters	1 unit
Nominal (STC)	1771 kWp	Total power	1662 kWac
Modules	121 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1604 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.07
I mpp	1633 A		

Array #14 - Area 5B

Number of PV modules	2904 units	Number of inverters	1 unit
Nominal (STC)	1771 kWp	Total power	1662 kWac
Modules	121 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1604 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.07
I mpp	1633 A		



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PV Array Characteristics

Array #15 - Area 5C

Number of PV modules	2904 units	Number of inverters	1 unit
Nominal (STC)	1771 kWp	Total power	1662 kWac
Modules	121 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1604 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.07
I mpp	1633 A		

Array #16 - Area 5D

Number of PV modules	2904 units	Number of inverters	1 unit
Nominal (STC)	1771 kWp	Total power	1662 kWac
Modules	121 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1604 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.07
I mpp	1633 A		

Array #19 - Area 8A

Number of PV modules	2880 units	Number of inverters	1 unit
Nominal (STC)	1757 kWp	Total power	1662 kWac
Modules	120 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1591 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.06
I mpp	1619 A		

Array #20 - Area 8B

Number of PV modules	2880 units	Number of inverters	1 unit
Nominal (STC)	1757 kWp	Total power	1662 kWac
Modules	120 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1591 kWp	Max. power (=>25°C)	1662 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.06
I mpp	1619 A		

PV module

Manufacturer	JA Solar
Model	JAM78S30-610/MR
(Custom parameters definition)	
Unit Nom. Power	610 Wp
Number of PV modules	35160 units
Nominal (STC)	21.45 MWp

Inverter

Manufacturer	Santerno
Model	Sunway TG 1800 1500V TE - 690
(Custom parameters definition)	
Unit Nom. Power	1912 kWac
Number of inverters	10 units
Total power	19120 kWac

Array #8 - Area 4A

Number of PV modules	3552 units	Number of inverters	1 unit
Nominal (STC)	2167 kWp	Total power	1912 kWac
Modules	148 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1962 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.13
I mpp	1997 A		



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PV Array Characteristics

Array #9 - Area 4B

Number of PV modules	3552 units	Number of inverters	1 unit
Nominal (STC)	2167 kWp	Total power	1912 kWac
Modules	148 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1962 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.13
I mpp	1997 A		

Array #10 - Area 4C

Number of PV modules	3552 units	Number of inverters	1 unit
Nominal (STC)	2167 kWp	Total power	1912 kWac
Modules	148 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1962 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.13
I mpp	1997 A		

Array #11 - Area 4D

Number of PV modules	3552 units	Number of inverters	1 unit
Nominal (STC)	2167 kWp	Total power	1912 kWac
Modules	148 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1962 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.13
I mpp	1997 A		

Array #12 - Area 4E

Number of PV modules	3528 units	Number of inverters	1 unit
Nominal (STC)	2152 kWp	Total power	1912 kWac
Modules	147 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1949 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.13
I mpp	1983 A		

Array #21 - Area 9A

Number of PV modules	3480 units	Number of inverters	1 unit
Nominal (STC)	2123 kWp	Total power	1912 kWac
Modules	145 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1922 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.11
I mpp	1956 A		

Array #22 - Area 9B

Number of PV modules	3480 units	Number of inverters	1 unit
Nominal (STC)	2123 kWp	Total power	1912 kWac
Modules	145 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1922 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.11
I mpp	1956 A		



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PV Array Characteristics

Array #23 - Area 9C

Number of PV modules 3456 units
 Nominal (STC) 2108 kWp
 Modules 144 Strings x 24 In series

At operating cond. (50°C)

Pmpp 1909 kWp
 U mpp 983 V
 I mpp 1943 A

Number of inverters 1 unit
 Total power 1912 kWac

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.10

Array #24 - Area 10A

Number of PV modules 3504 units
 Nominal (STC) 2137 kWp
 Modules 146 Strings x 24 In series

At operating cond. (50°C)

Pmpp 1936 kWp
 U mpp 983 V
 I mpp 1970 A

Number of inverters 1 unit
 Total power 1912 kWac

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.12

Array #25 - Area 10B

Number of PV modules 3504 units
 Nominal (STC) 2137 kWp
 Modules 146 Strings x 24 In series

At operating cond. (50°C)

Pmpp 1936 kWp
 U mpp 983 V
 I mpp 1970 A

Number of inverters 1 unit
 Total power 1912 kWac

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.12

PV module

Manufacturer JA Solar
 Model JAM78S30-610/MR
 (Custom parameters definition)

Unit Nom. Power 610 Wp
 Number of PV modules 17304 units
 Nominal (STC) 10.56 MWp

Array #17 - Area 6

Number of PV modules 4464 units
 Nominal (STC) 2723 kWp
 Modules 186 Strings x 24 In series

At operating cond. (50°C)

Pmpp 2466 kWp
 U mpp 983 V
 I mpp 2509 A

Inverter

Manufacturer Santerno
 Model SUNWAY STATION TG1800&900-1500V-TE 600 (2493kW)
 (Custom parameters definition)

Unit Nom. Power 2493 kWac
 Number of inverters 4 units
 Total power 9972 kWac

Number of inverters 1 unit
 Total power 2493 kWac

Operating voltage 860-1200 V
 Max. power (=>25°C) 2493 kWac
 Pnom ratio (DC:AC) 1.09

Array #18 - Area 7

Number of PV modules 4584 units
 Nominal (STC) 2796 kWp
 Modules 191 Strings x 24 In series

At operating cond. (50°C)

Pmpp 2532 kWp
 U mpp 983 V
 I mpp 2577 A

Number of inverters 1 unit
 Total power 2493 kWac

Operating voltage 860-1200 V
 Max. power (=>25°C) 2493 kWac
 Pnom ratio (DC:AC) 1.12



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PV Array Characteristics

Array #26 - Area 10C			
Number of PV modules	4128 units	Number of inverters	1 unit
Nominal (STC)	2518 kWp	Total power	2493 kWac
Modules	172 Strings x 24 In series		
At operating cond. (50°C)			
Pmpp	2280 kWp	Operating voltage	860-1200 V
U mpp	983 V	Max. power (=>25°C)	2493 kWac
I mpp	2321 A	Pnom ratio (DC:AC)	1.01
Array #27 - Area 10D			
Number of PV modules	4128 units	Number of inverters	1 unit
Nominal (STC)	2518 kWp	Total power	2493 kWac
Modules	172 Strings x 24 In series		
At operating cond. (50°C)			
Pmpp	2280 kWp	Operating voltage	860-1200 V
U mpp	983 V	Max. power (=>25°C)	2493 kWac
I mpp	2321 A	Pnom ratio (DC:AC)	1.01
Total PV power		Total inverter power	
Nominal (STC)	53758 kWp	Total power	49411 kWac
Total	88128 modules	Number of inverters	29 units
Module area	246345 m ²	Pnom ratio	1.09
Cell area	227116 m ²		

Array losses

Array Soiling Losses		Thermal Loss factor		Serie Diode Loss				
Loss Fraction	2.0 %	Module temperature according to irradiance		Voltage drop	0.7 V			
		Uc (const)	29.0 W/m ² K	Loss Fraction	0.1 % at STC			
		Uv (wind)	0.0 W/m ² K/m/s					
LID - Light Induced Degradation		Module Quality Loss		Module mismatch losses				
Loss Fraction	1.0 %	Loss Fraction	-0.5 %	Loss Fraction	0.5 % at MPP			
Strings Mismatch loss		Module average degradation						
Loss Fraction	0.1 %	Year no	1					
		Loss factor	0.4 %/year					
		Mismatch due to degradation						
		Imp RMS dispersion	0.4 %/year					
		Vmp RMS dispersion	0.4 %/year					
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	1.000	0.985	0.943	0.840	0.000

DC wiring losses

Global wiring resistance	0.33 mΩ
Loss Fraction	1.5 % at STC



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DC wiring losses

Array #1 - Area 1		Array #2 - Area 2A	
Global array res.	53 mΩ	Global array res.	9.6 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #3 - Area 2B		Array #4 - Area 2C	
Global array res.	9.6 mΩ	Global array res.	9.6 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #5 - Area 2D		Array #6 - Area 2E	
Global array res.	9.7 mΩ	Global array res.	9.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #7 - Area 3A		Array #8 - Area 4A	
Global array res.	11 mΩ	Global array res.	8.2 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #9 - Area 4B		Array #10 - Area 4C	
Global array res.	8.2 mΩ	Global array res.	8.2 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #11 - Area 4D		Array #12 - Area 4E	
Global array res.	8.2 mΩ	Global array res.	8.2 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #13 - Area 5A		Array #14 - Area 5B	
Global array res.	10.0 mΩ	Global array res.	10.0 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #15 - Area 5C		Array #16 - Area 5D	
Global array res.	10.0 mΩ	Global array res.	10.0 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #17 - Area 6		Array #18 - Area 7	
Global array res.	6.5 mΩ	Global array res.	6.3 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #19 - Area 8A		Array #20 - Area 8B	
Global array res.	10 mΩ	Global array res.	10 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #21 - Area 9A		Array #22 - Area 9B	
Global array res.	8.3 mΩ	Global array res.	8.3 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #23 - Area 9C		Array #24 - Area 10A	
Global array res.	8.4 mΩ	Global array res.	8.3 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #25 - Area 10B		Array #26 - Area 10C	
Global array res.	8.3 mΩ	Global array res.	7.0 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #27 - Area 10D			
Global array res.	7.0 mΩ		
Loss Fraction	1.5 % at STC		

System losses

Auxiliaries loss	
constant (fans)	10.00 kW
0.0 kW from Power thresh.	



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ARATO SRL (Italy)

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 800 Vac tri
Loss Fraction 0.64 % at STC

Inverters: SG125HX, Sunway TG 1800 1500V TE - 600 (1662W), Sunway TG 1800 1500V TE - 690, SUNWAY STATION TG1800&900-1500V-TE 600 (2

Wire section (29 Inv.) Copper 29 x 3 x 10000 mm²
Average wires length 3770 m

MV line up to Injection

MV Voltage 20 kV
Average each inverter
Wires Copper 3 x 50 mm²
Length 500 m
Loss Fraction 0.10 % at STC

AC losses in transformers

MV transfo

Grid voltage 20 kV

Operating losses at STC

Nominal power at STC 52942 kVA
Iron loss (night disconnect) 2.04 kW/Inv.
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 3.14 mΩ/inv.
Loss Fraction 1.00 % at STC



PVsyst V7.2.12

VCO, Simulation date:
 23/03/22 16:47
 with v7.2.12

ARATO SRL (Italy)

Horizon definition

Horizon from PVGIS website API, Lat=37°30'36", Long=14°35'52", Alt=289m

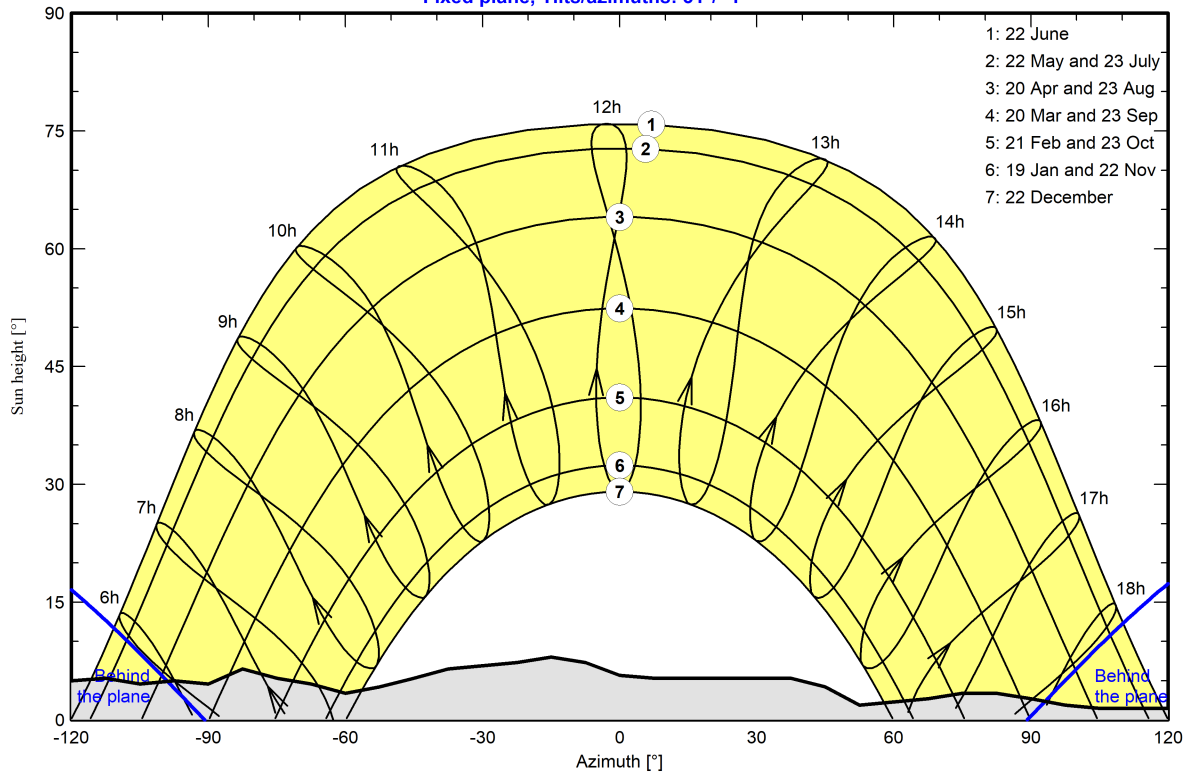
Average Height 3.9 ° Albedo Factor 0.72
 Diffuse Factor 0.96 Albedo Fraction 100 %

Horizon profile

Azimuth [°]	-180	-173	-158	-150	-143	-135	-128	-120	-113	-105	-98	-90	-83	-75
Height [°]	2.7	3.1	3.8	4.6	3.4	2.7	4.2	5.0	5.3	4.6	5.0	4.6	6.5	5.3
Azimuth [°]	-68	-60	-53	-45	-38	-30	-23	-15	-8	0	8	38	45	53
Height [°]	4.6	3.4	4.2	5.3	6.5	6.9	7.3	8.0	7.3	5.7	5.3	5.3	4.2	1.9
Azimuth [°]	60	68	75	83	90	98	105	135	143	150	158	173	180	
Height [°]	2.3	2.7	3.4	3.4	2.7	1.9	1.5	1.5	1.1	1.1	1.5	1.5	2.7	

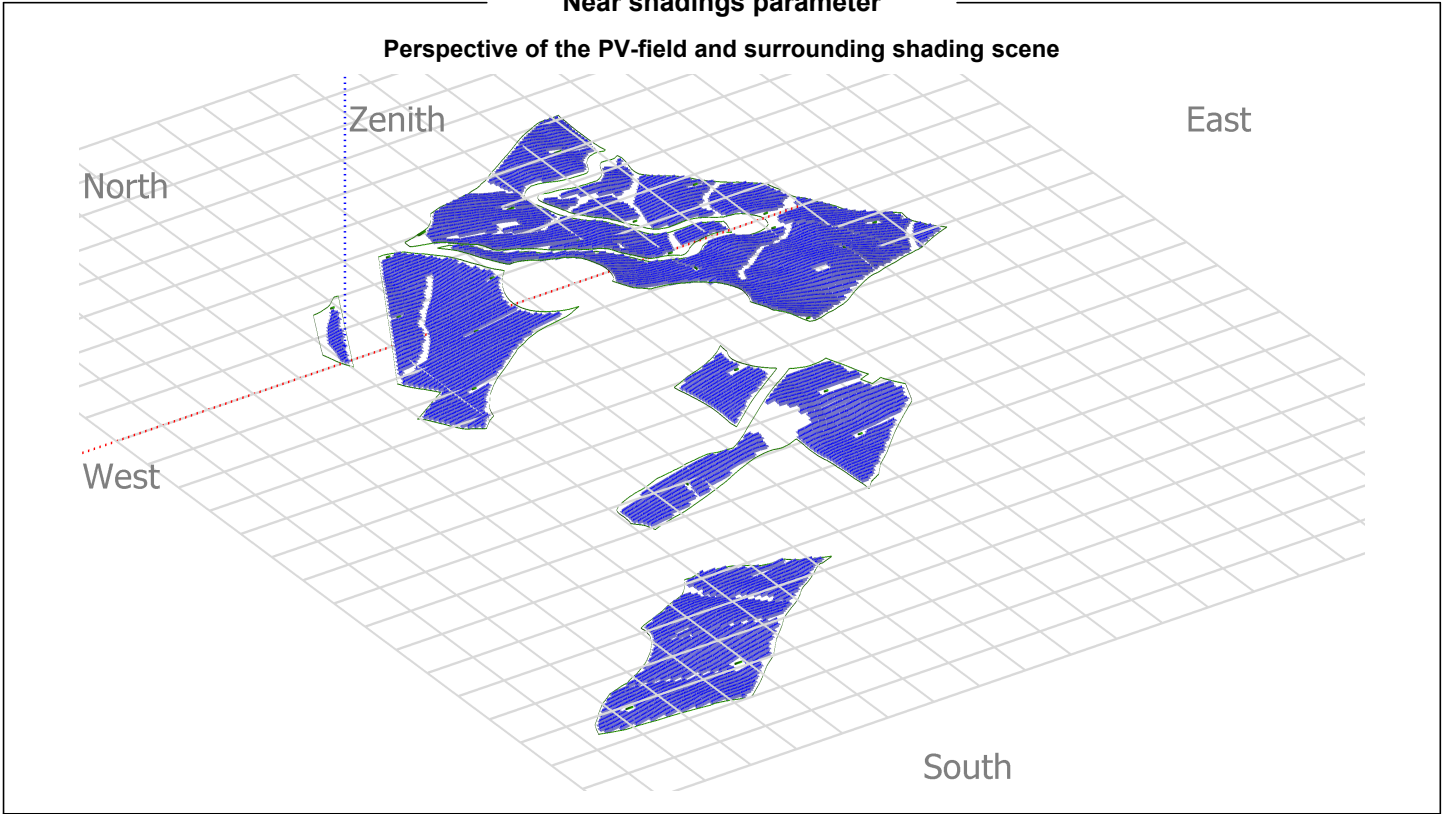
Sun Paths (Height / Azimuth diagram)

Fixed plane, Tilts/azimuths: 31°/ -1°





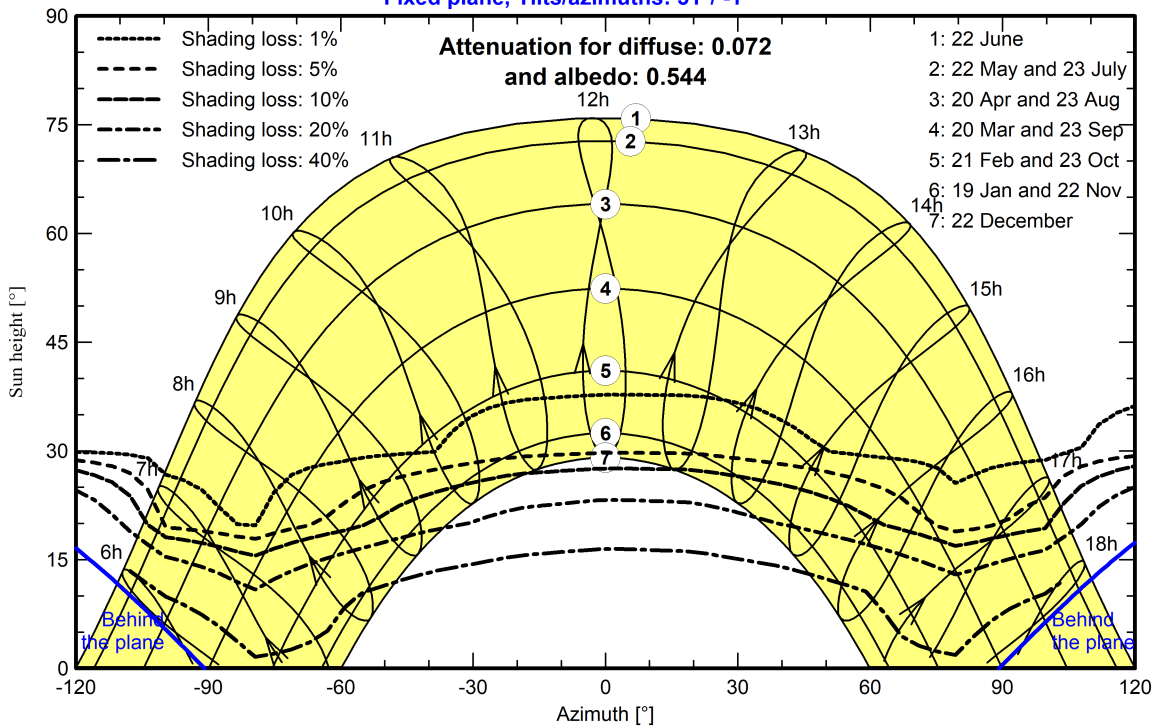
Near shadings parameter



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 31°/ -1°





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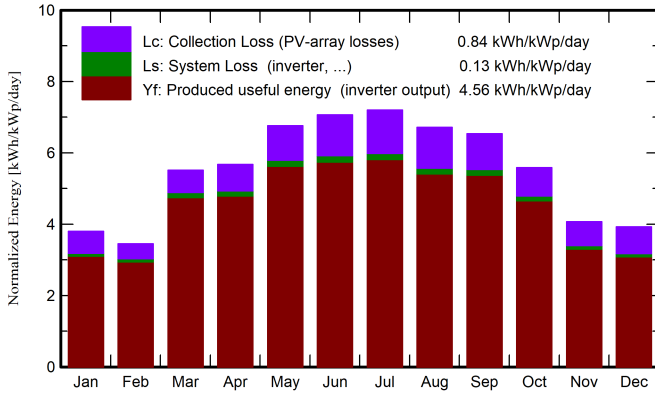
ARATO SRL (Italy)

Main results

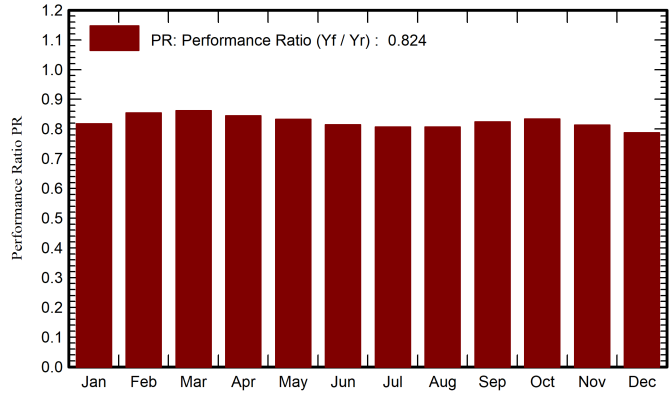
System Production

Produced Energy 90 GWh/year Specific production 1666 kWh/kWp/year
 Performance Ratio PR 82.41 %

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 GWh	E_Grid GWh	PR ratio
January	74.2	31.84	5.85	117.7	105.1	5.322	5.174	0.818
February	72.8	40.94	4.54	96.7	88.1	4.571	4.439	0.854
March	140.7	58.51	7.87	170.9	160.9	8.150	7.917	0.862
April	159.7	67.25	13.05	170.3	160.6	7.966	7.729	0.844
May	214.3	78.44	17.43	209.6	198.6	9.664	9.386	0.833
June	227.6	70.77	23.09	211.9	201.2	9.550	9.273	0.814
July	234.9	65.96	25.31	223.3	212.4	9.972	9.688	0.807
August	200.6	62.39	25.33	208.2	198.2	9.293	9.028	0.806
September	165.7	55.83	20.81	196.0	186.3	8.936	8.681	0.824
October	126.5	43.45	15.54	173.1	162.9	7.989	7.761	0.834
November	79.0	32.23	9.08	122.0	109.4	5.490	5.333	0.813
December	72.3	30.73	5.63	121.6	105.1	5.293	5.150	0.788
Year	1768.4	638.34	14.52	2021.5	1888.9	92.197	89.559	0.824

Legends

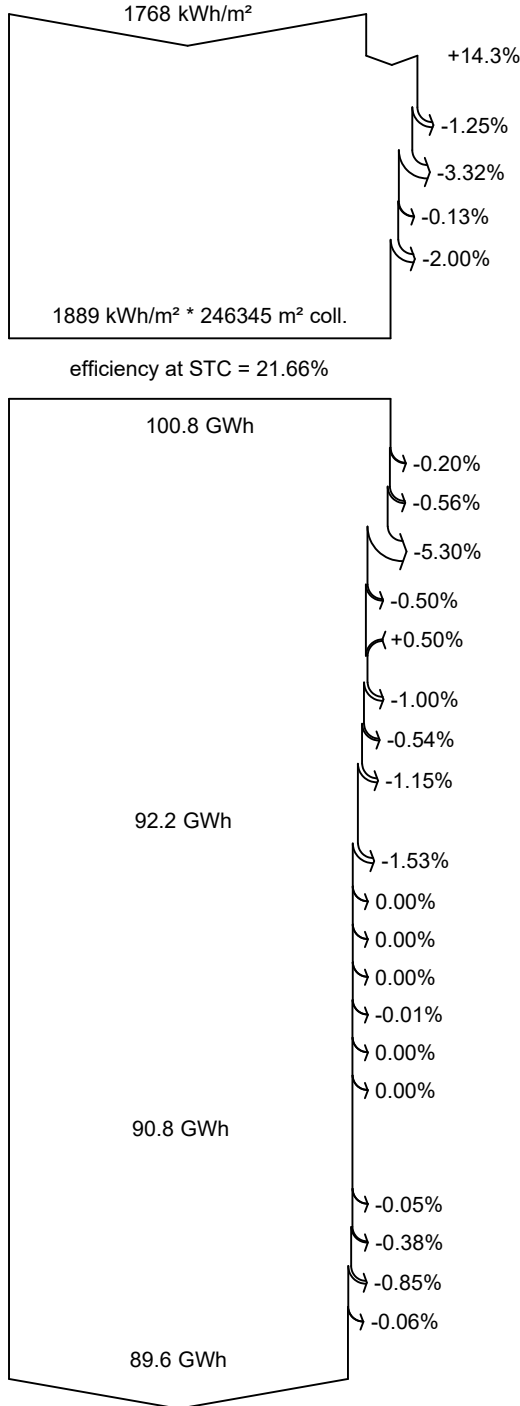
- GlobHor Global horizontal irradiation
- DiffHor Horizontal diffuse irradiation
- T_Amb Ambient Temperature
- GlobInc Global incident in coll. plane
- GlobEff Effective Global, corr. for IAM and shadings
- EArray Effective energy at the output of the array
- E_Grid Energy injected into grid
- PR Performance Ratio



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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Far Shadings / Horizon

Near Shadings: irradiance loss

IAM factor on global

Soiling loss factor

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

Module Degradation Loss (for year #1)

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

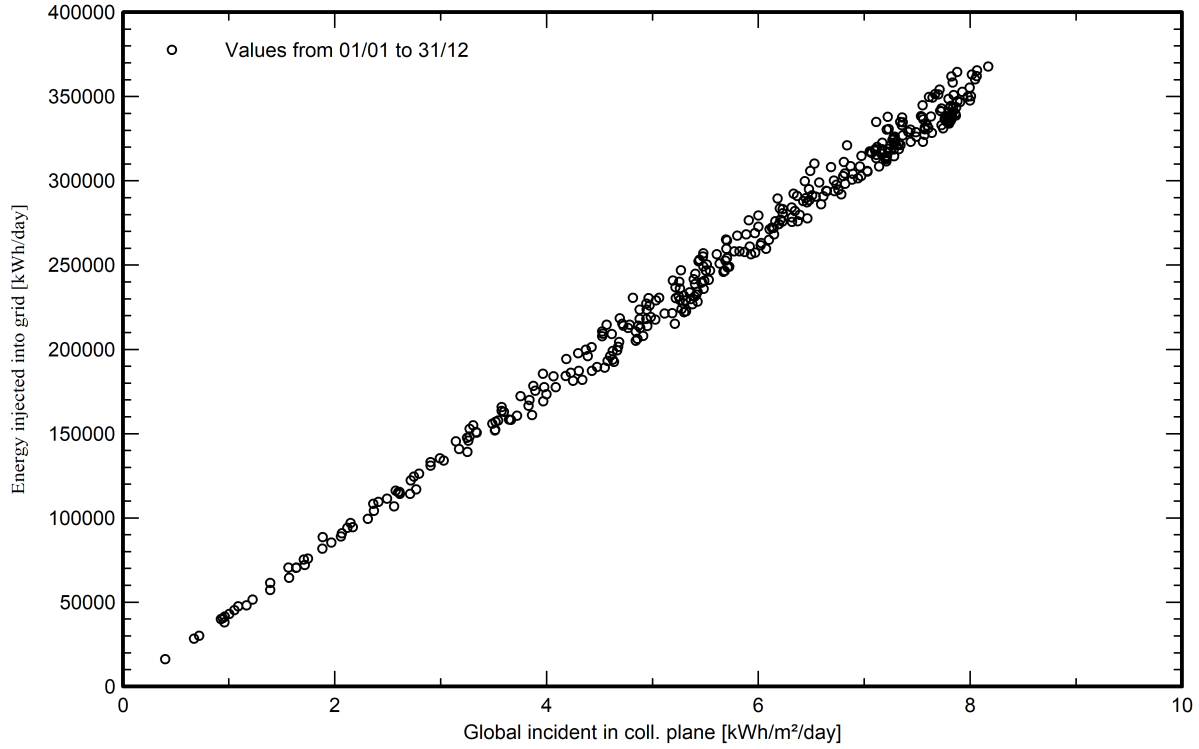
MV line ohmic loss

Energy injected into grid



Special graphs

Daily Input/Output diagram



System Output Power Distribution

