



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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Ing. Jury Mancinelli

INE FICURINIA S.R.L.

a company of ILOS New Energy Italy
P.IVA e C.F.: IT 11311551002

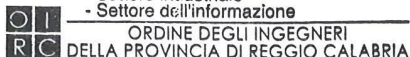
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Firmato Digitalmente

Legale rappresentante: Ing. Sergio Chiericoni

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alla Sezione degli Ingegneri (Sez. A)
- Settore civile e ambientale
- Settore industriale
- Settore dell'informazione



ORDINE DEGLI INGEGNERI

DELLA PROVINCIA DI REGGIO CALABRIA



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IDENTIFICATORE ELABORATO:

RS06REL065A0

CARTELLA:

VIA_2

TITOLO ELABORATO:

Analisi della risorsa solare e stima di produzione energia lotto 3254

SCALA:

-

GEOLOGIA E IDROLOGIA



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N. REV.	DATA	REVISIONE
0	apr-22	Emissione

ELABORATO	VERIFICATO	VALIDATO
Ing. Baldaconi	Ing. Bolignano	INE Ficurinia S.r.l.

PVsyst - Simulation report

Grid-Connected System

Project: Ficurinia #3254

Variant: New simulation variant

Ground system (tables) on a hill

System power: 45.33 MWp

Cavalera - Italy

Author

ARATO SRL (Italy)



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Project summary

Geographical Site	Situation	Project settings
Cavalera	Latitude	Albedo
Italy	37.49 °N	0.20
	Longitude	
	14.60 °E	
	Altitude	
	370 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	31 units
74304 units	Pnom total	45.25 MWac
Pnom total	45.33 MWp	1.002
	Pnom ratio	

Results summary

Produced Energy	77 GWh/year	Specific production	1692 kWh/kWp/year	Perf. Ratio PR	83.63 %
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Near shading definition - Iso-shadings diagram	12
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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	3286 units
Fixed plane		Sizes	
Tilt/Azimuth	31 / -1 °	Sheds spacing	9.61 m
		Collector width	4.60 m
		Ground Cov. Ratio (GCR)	47.8 %
Horizon		Near Shadings	
Average Height	1.9 °	According to strings	
		Electrical effect	90 %
		Models used	
		Transposition	Perez
		Diffuse	Imported
		Circumsolar	separate
		User's needs	
		Unlimited load (grid)	

PV Array Characteristics

PV module		Inverter	
Manufacturer	JA Solar	Manufacturer	Santerno
Model	JAM78S30-610/MR	Model	Sunway TG 1800 1500V TE - 600 (1600W)
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1600 kWac
Number of PV modules	5160 units	Number of inverters	2 units
Nominal (STC)	3148 kWp	Total power	3200 kWac
Array #1 - Area 1a			
Number of PV modules	2592 units	Number of inverters	1 unit
Nominal (STC)	1581 kWp	Total power	1600 kWac
Modules	108 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1432 kWp	Max. power (=>25°C)	1871 kWac
U mpp	983 V	Pnom ratio (DC:AC)	0.99
I mpp	1457 A		
Array #2 - Area 1b			
Number of PV modules	2568 units	Number of inverters	1 unit
Nominal (STC)	1566 kWp	Total power	1600 kWac
Modules	107 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	860-1200 V
Pmpp	1419 kWp	Max. power (=>25°C)	1871 kWac
U mpp	983 V	Pnom ratio (DC:AC)	0.98
I mpp	1444 A		
PV module		Inverter	
Manufacturer	JA Solar	Manufacturer	Sungrow
Model	JAM78S30-610/MR	Model	SG250HX
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	225 kWac
Number of PV modules	3024 units	Number of inverters	8 units
Nominal (STC)	1845 kWp	Total power	1800 kWac
Array #3 - Area 2			
Number of PV modules	744 units	Number of inverters	2 units
Nominal (STC)	454 kWp	Total power	450 kWac
Modules	31 Strings x 24 In series		



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PV Array Characteristics

Array #3 - Area 2

At operating cond. (50°C)

Pmpp	411 kWp
U mpp	983 V
I mpp	418 A

Operating voltage	500-1500 V
Max. power (=>30°C)	250 kWac
Pnom ratio (DC:AC)	1.01

Array #4 - Area 3

Number of PV modules	408 units
Nominal (STC)	249 kWp
Modules	17 Strings x 24 In series

Number of inverters	1 unit
Total power	225 kWac

At operating cond. (50°C)

Pmpp	225 kWp
U mpp	983 V
I mpp	229 A

Operating voltage	500-1500 V
Max. power (=>30°C)	250 kWac
Pnom ratio (DC:AC)	1.11

Array #22 - Area 16-17

Number of PV modules	1872 units
Nominal (STC)	1142 kWp
Modules	78 Strings x 24 In series

Number of inverters	5 units
Total power	1125 kWac

At operating cond. (50°C)

Pmpp	1034 kWp
U mpp	983 V
I mpp	1052 A

Operating voltage	500-1500 V
Max. power (=>30°C)	250 kWac
Pnom ratio (DC:AC)	1.02

PV module

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

Unit Nom. Power	610 Wp
Number of PV modules	10656 units
Nominal (STC)	6500 kWp

Inverter

Manufacturer	Santerno
Model	Sunway TG 1800 1500V TE - 600 (1662W)
(Custom parameters definition)	

Unit Nom. Power	1662 kWac
Number of inverters	4 units
Total power	6648 kWac

Array #5 - Area 4a

Number of PV modules	2616 units
Nominal (STC)	1596 kWp
Modules	109 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac

At operating cond. (50°C)

Pmpp	1445 kWp
U mpp	983 V
I mpp	1471 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	0.96

Array #6 - Area 4b

Number of PV modules	2616 units
Nominal (STC)	1596 kWp
Modules	109 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac

At operating cond. (50°C)

Pmpp	1445 kWp
U mpp	983 V
I mpp	1471 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	0.96

Array #13 - Area 9-10-11-12_a

Number of PV modules	2712 units
Nominal (STC)	1654 kWp
Modules	113 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac



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PV Array Characteristics

Array #13 - Area 9-10-11-12_a

At operating cond. (50°C)

Pmpp	1498 kWp
U mpp	983 V
I mpp	1525 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	1.00

Array #14 - Area 9-10-11-12_b

Number of PV modules	2712 units
Nominal (STC)	1654 kWp
Modules	113 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac

At operating cond. (50°C)

Pmpp	1498 kWp
U mpp	983 V
I mpp	1525 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	1.00

PV module

Manufacturer	JA Solar
Model	JAM78S30-610/MR
(Custom parameters definition)	
Unit Nom. Power	610 Wp
Number of PV modules	24336 units
Nominal (STC)	14.84 MWp

Inverter

Manufacturer	Santerno
Model	SUNWAY STATION TG1800&900-1500V-TE 600 (2493kW)
(Custom parameters definition)	
Unit Nom. Power	2493 kWac
Number of inverters	6 units
Total power	14958 kWac

Array #7 - Area 5-6_a

Number of PV modules	4056 units
Nominal (STC)	2474 kWp
Modules	169 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2240 kWp
U mpp	983 V
I mpp	2280 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	0.99

Array #8 - Area 5-6_b

Number of PV modules	4056 units
Nominal (STC)	2474 kWp
Modules	169 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2240 kWp
U mpp	983 V
I mpp	2280 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	0.99

Array #9 - Area 5-6_c

Number of PV modules	4032 units
Nominal (STC)	2460 kWp
Modules	168 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2227 kWp
U mpp	983 V
I mpp	2267 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	0.99

Array #10 - Area 5-6_d

Number of PV modules	4032 units
Nominal (STC)	2460 kWp
Modules	168 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac



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PV Array Characteristics

Array #10 - Area 5-6_d

At operating cond. (50°C)

Pmpp	2227 kWp
U mpp	983 V
I mpp	2267 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	0.99

Array #15 - Area 9-10-11-12_c

Number of PV modules	4080 units
Nominal (STC)	2489 kWp
Modules	170 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2254 kWp
U mpp	983 V
I mpp	2294 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	1.00

Array #16 - Area 9-10-11-12_d

Number of PV modules	4080 units
Nominal (STC)	2489 kWp
Modules	170 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2254 kWp
U mpp	983 V
I mpp	2294 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	1.00

Array #11 - Area 7

PV module

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

Unit Nom. Power	610 Wp
Number of PV modules	1440 units
Nominal (STC)	878 kWp
Modules	60 Strings x 24 In series

At operating cond. (50°C)

Pmpp	795 kWp
U mpp	983 V
I mpp	810 A

Inverter

Manufacturer	Santerno
Model	Sunway TG 900 1500V TE - 600 (831kW)
(Custom parameters definition)	

Unit Nom. Power	831 kWac
Number of inverters	1 unit
Total power	831 kWac
Operating voltage	860-1200 V
Max. power (=>25°C)	936 kWac
Pnom ratio (DC:AC)	1.06

Array #12 - Area 8

PV module

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

Unit Nom. Power	610 Wp
Number of PV modules	960 units
Nominal (STC)	586 kWp
Modules	40 Strings x 24 In series

At operating cond. (50°C)

Pmpp	530 kWp
U mpp	983 V
I mpp	540 A

Inverter

Manufacturer	Santerno
Model	Sunway TG 900 1500V TE - 600 (600kW)
(Custom parameters definition)	

Unit Nom. Power	600 kWac
Number of inverters	1 unit
Total power	600 kWac
Operating voltage	860-1200 V
Max. power (=>25°C)	1000 kWac
Pnom ratio (DC:AC)	0.98



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PV Array Characteristics

PV module		Inverter	
Manufacturer	JA Solar	Manufacturer	Santerno
Model	JAM78S30-610/MR	Model	Sunway TG 1800 1500V TE - 690
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1912 kWac
Number of PV modules	28728 units	Number of inverters	9 units
Nominal (STC)	17.52 MWp	Total power	17208 kWac
Array #17 - Area 13a			
Number of PV modules	3240 units	Number of inverters	1 unit
Nominal (STC)	1976 kWp	Total power	1912 kWac
Modules	135 Strings x 24 In series		
At operating cond. (50°C)			
Pmpp	1790 kWp	Operating voltage	690-1200 V
U mpp	983 V	Max. power (=>25°C)	2151 kWac
I mpp	1821 A	Pnom ratio (DC:AC)	1.03
Array #18 - Area 13b			
Number of PV modules	3264 units	Number of inverters	1 unit
Nominal (STC)	1991 kWp	Total power	1912 kWac
Modules	136 Strings x 24 In series		
At operating cond. (50°C)			
Pmpp	1803 kWp	Operating voltage	690-1200 V
U mpp	983 V	Max. power (=>25°C)	2151 kWac
I mpp	1835 A	Pnom ratio (DC:AC)	1.04
Array #19 - Area 14-15_a			
Number of PV modules	3240 units	Number of inverters	1 unit
Nominal (STC)	1976 kWp	Total power	1912 kWac
Modules	135 Strings x 24 In series		
At operating cond. (50°C)			
Pmpp	1790 kWp	Operating voltage	690-1200 V
U mpp	983 V	Max. power (=>25°C)	2151 kWac
I mpp	1821 A	Pnom ratio (DC:AC)	1.03
Array #20 - Area 14-15_b			
Number of PV modules	3240 units	Number of inverters	1 unit
Nominal (STC)	1976 kWp	Total power	1912 kWac
Modules	135 Strings x 24 In series		
At operating cond. (50°C)			
Pmpp	1790 kWp	Operating voltage	690-1200 V
U mpp	983 V	Max. power (=>25°C)	2151 kWac
I mpp	1821 A	Pnom ratio (DC:AC)	1.03
Array #21 - Area 14-15_c			
Number of PV modules	3216 units	Number of inverters	1 unit
Nominal (STC)	1962 kWp	Total power	1912 kWac
Modules	134 Strings x 24 In series		
At operating cond. (50°C)			
Pmpp	1776 kWp	Operating voltage	690-1200 V
U mpp	983 V	Max. power (=>25°C)	2151 kWac
I mpp	1808 A	Pnom ratio (DC:AC)	1.03



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PV Array Characteristics

Array #23 - Area 18-19-20-21_a

Number of PV modules	3168 units	Number of inverters	1 unit
Nominal (STC)	1932 kWp	Total power	1912 kWac
Modules	132 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1750 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.01
I mpp	1781 A		

Array #24 - Area 18-19-20-21_b

Number of PV modules	3120 units	Number of inverters	1 unit
Nominal (STC)	1903 kWp	Total power	1912 kWac
Modules	130 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1723 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.00
I mpp	1754 A		

Array #25 - Area 18-19-20-21_c

Number of PV modules	3120 units	Number of inverters	1 unit
Nominal (STC)	1903 kWp	Total power	1912 kWac
Modules	130 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1723 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.00
I mpp	1754 A		

Array #26 - Area 18-19-20-21_d

Number of PV modules	3120 units	Number of inverters	1 unit
Nominal (STC)	1903 kWp	Total power	1912 kWac
Modules	130 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	690-1200 V
Pmpp	1723 kWp	Max. power (=>25°C)	2151 kWac
U mpp	983 V	Pnom ratio (DC:AC)	1.00
I mpp	1754 A		

Total PV power

Nominal (STC)	45325 kWp
Total	74304 modules
Module area	207703 m²
Cell area	191490 m²

Total inverter power

Total power	45245 kWac
Number of inverters	31 units
Pnom ratio	1.00

Array losses

Array Soiling Losses

Loss Fraction 2.0 %

Thermal Loss factor

Module temperature according to irradiance
 Uc (const) 29.0 W/m²K
 Uv (wind) 0.0 W/m²K/m/s

Serie Diode Loss

Voltage drop 0.7 V
 Loss Fraction 0.1 % at STC

LID - Light Induced Degradation

Loss Fraction 1.0 %

Module Quality Loss

Loss Fraction -0.5 %

Module mismatch losses

Loss Fraction 0.5 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

Module average degradation

Year no 1
 Loss factor 0.4 %/year

Mismatch due to degradation

Imp RMS dispersion 0.4 %/year
 Vmp RMS dispersion 0.4 %/year



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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	1.000	0.985	0.943	0.840	0.000

DC wiring losses

Global wiring resistance 0.39 mΩ
 Loss Fraction 1.5 % at STC

Array #1 - Area 1a

Global array res. 11 mΩ
 Loss Fraction 1.5 % at STC

Array #3 - Area 2

Global array res. 39 mΩ
 Loss Fraction 1.5 % at STC

Array #5 - Area 4a

Global array res. 11 mΩ
 Loss Fraction 1.5 % at STC

Array #7 - Area 5-6_a

Global array res. 7.1 mΩ
 Loss Fraction 1.5 % at STC

Array #9 - Area 5-6_c

Global array res. 7.2 mΩ
 Loss Fraction 1.5 % at STC

Array #11 - Area 7

Global array res. 20 mΩ
 Loss Fraction 1.5 % at STC

Array #13 - Area 9-10-11-12_a

Global array res. 11 mΩ
 Loss Fraction 1.5 % at STC

Array #15 - Area 9-10-11-12_c

Global array res. 7.1 mΩ
 Loss Fraction 1.5 % at STC

Array #17 - Area 13a

Global array res. 8.9 mΩ
 Loss Fraction 1.5 % at STC

Array #19 - Area 14-15_a

Global array res. 8.9 mΩ
 Loss Fraction 1.5 % at STC

Array #21 - Area 14-15_c

Global array res. 9.0 mΩ
 Loss Fraction 1.5 % at STC

Array #23 - Area 18-19-20-21_a

Global array res. 9.1 mΩ
 Loss Fraction 1.5 % at STC

Array #25 - Area 18-19-20-21_c

Global array res. 9.3 mΩ
 Loss Fraction 1.5 % at STC

Array #2 - Area 1b

Global array res. 11 mΩ
 Loss Fraction 1.5 % at STC

Array #4 - Area 3

Global array res. 71 mΩ
 Loss Fraction 1.5 % at STC

Array #6 - Area 4b

Global array res. 11 mΩ
 Loss Fraction 1.5 % at STC

Array #8 - Area 5-6_b

Global array res. 7.1 mΩ
 Loss Fraction 1.5 % at STC

Array #10 - Area 5-6_d

Global array res. 7.2 mΩ
 Loss Fraction 1.5 % at STC

Array #12 - Area 8

Global array res. 30 mΩ
 Loss Fraction 1.5 % at STC

Array #14 - Area 9-10-11-12_b

Global array res. 11 mΩ
 Loss Fraction 1.5 % at STC

Array #16 - Area 9-10-11-12_d

Global array res. 7.1 mΩ
 Loss Fraction 1.5 % at STC

Array #18 - Area 13b

Global array res. 8.9 mΩ
 Loss Fraction 1.5 % at STC

Array #20 - Area 14-15_b

Global array res. 8.9 mΩ
 Loss Fraction 1.5 % at STC

Array #22 - Area 16-17

Global array res. 15 mΩ
 Loss Fraction 1.5 % at STC

Array #24 - Area 18-19-20-21_b

Global array res. 9.3 mΩ
 Loss Fraction 1.5 % at STC

Array #26 - Area 18-19-20-21_d

Global array res. 9.3 mΩ
 Loss Fraction 1.5 % at STC



PVsyst V7.2.12

VC0, Simulation date:
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ARATO SRL (Italy)

System losses

Auxiliaries loss

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

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 600 Vac tri
 Loss Fraction 1.00 % at STC

Inverters: Sunway TG 1800 1500V TE - 600 (1600W), SG250HX, Sunway TG 1800 1500V TE - 600 (1662W), SUNWAY STATION TG1800&900-1500V-

Wire section (31 Inv.) Copper 31 x 3 x 10000 mm²
 Average wires length 4821 m

MV line up to Injection

MV Voltage 20 kV
 Average each inverter
 Wires Copper 3 x 50 mm²
 Length 620 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 44648 kVA
 Iron loss (night disconnect) 1.72 kW/Inv.
 Loss Fraction 0.10 % at STC
 Coils equivalent resistance 3 x 2.10 mΩ/inv.
 Loss Fraction 1.00 % at STC



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Horizon definition

Horizon from PVGIS website API, Lat=37°29'29', Long=14°36'7', Alt=392m

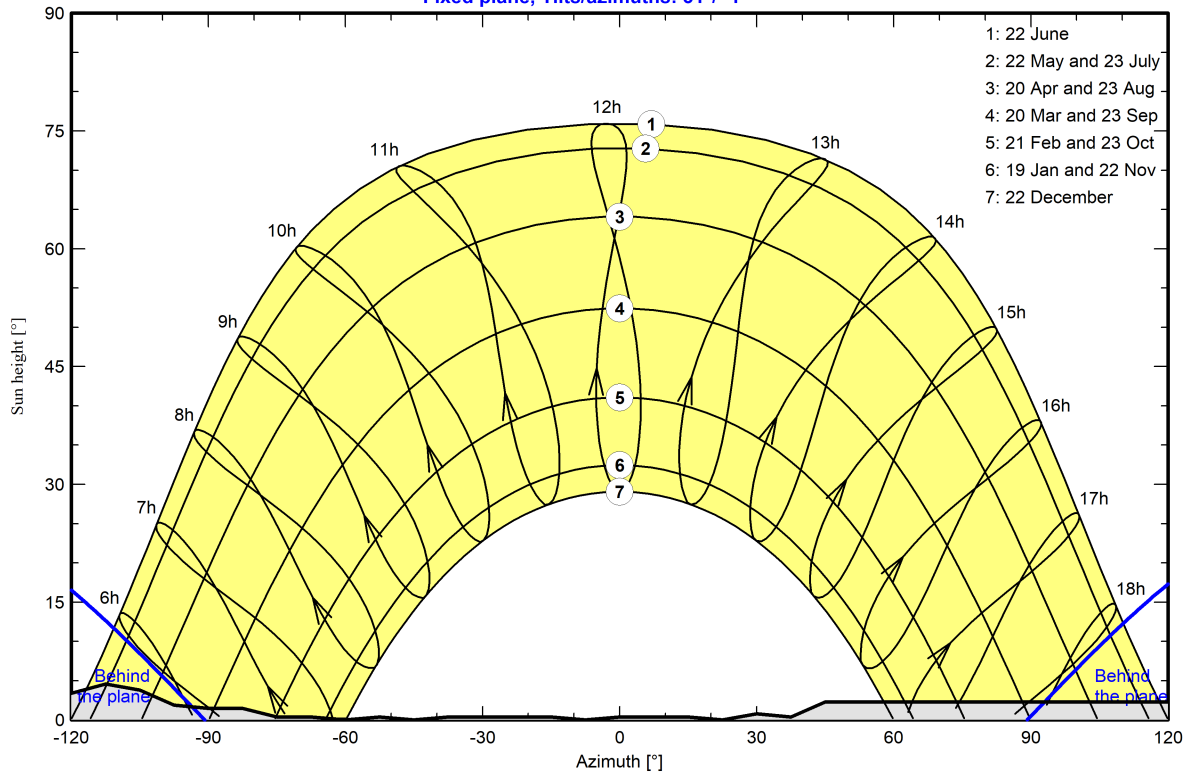
Average Height	1.9 °	Albedo Factor	0.97
Diffuse Factor	1.00	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-173	-158	-150	-143	-135	-128	-120	-113	-105	-98	-90
Height [°]	3.8	3.1	3.8	3.1	3.1	2.7	3.4	3.4	4.6	3.8	1.9	1.5
Azimuth [°]	-83	-75	-68	-60	-53	-45	-38	-15	-8	0	15	23
Height [°]	1.5	0.4	0.4	0.0	0.4	0.0	0.4	0.4	0.0	0.4	0.4	0.0
Azimuth [°]	30	38	45	135	143	150	158	165	173	180		
Height [°]	0.8	0.4	2.3	2.3	0.8	1.1	2.3	3.8	4.6	3.8		

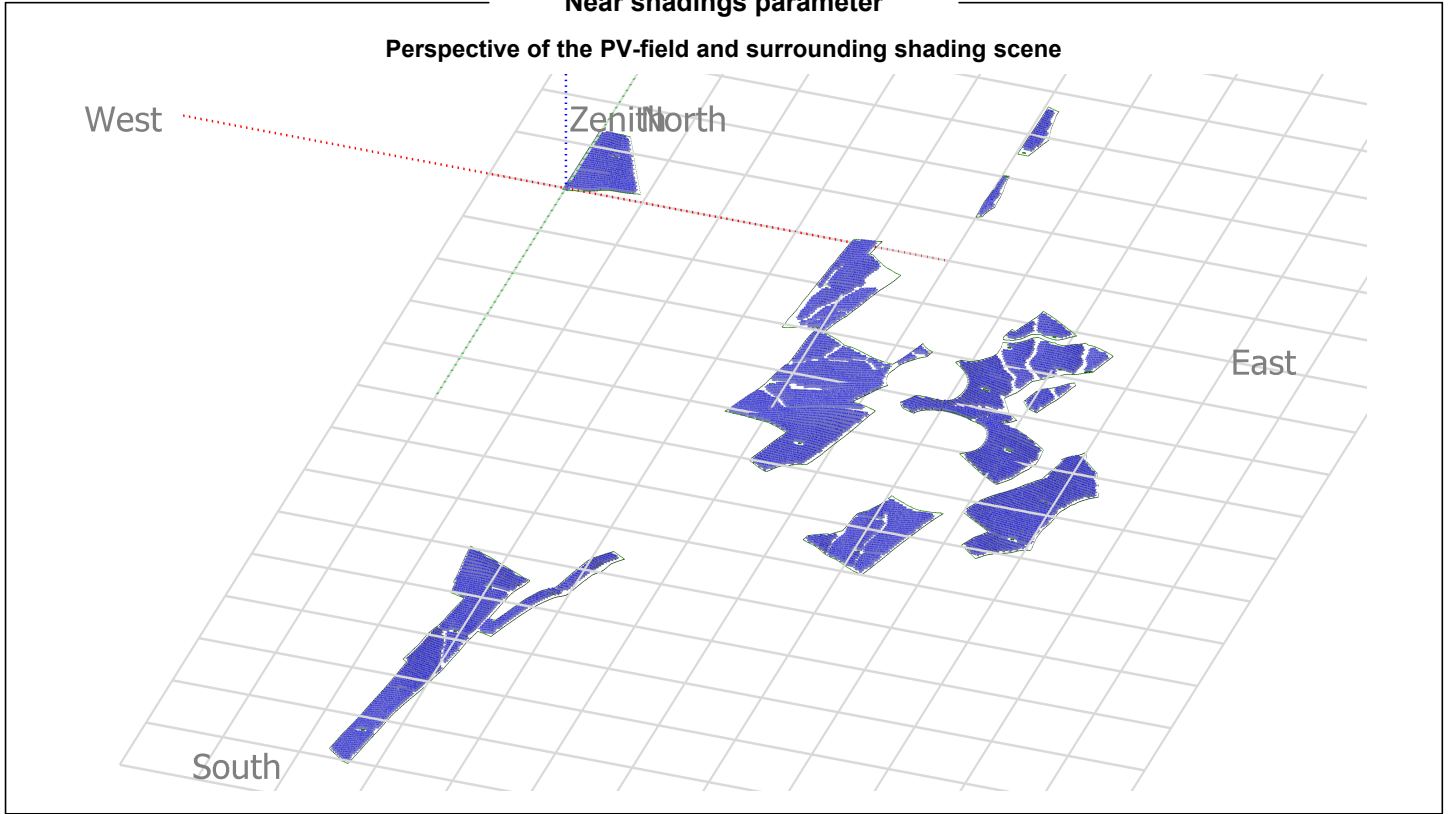
Sun Paths (Height / Azimuth diagram)

Fixed plane, Tilts/azimuths: 31°/ -1°





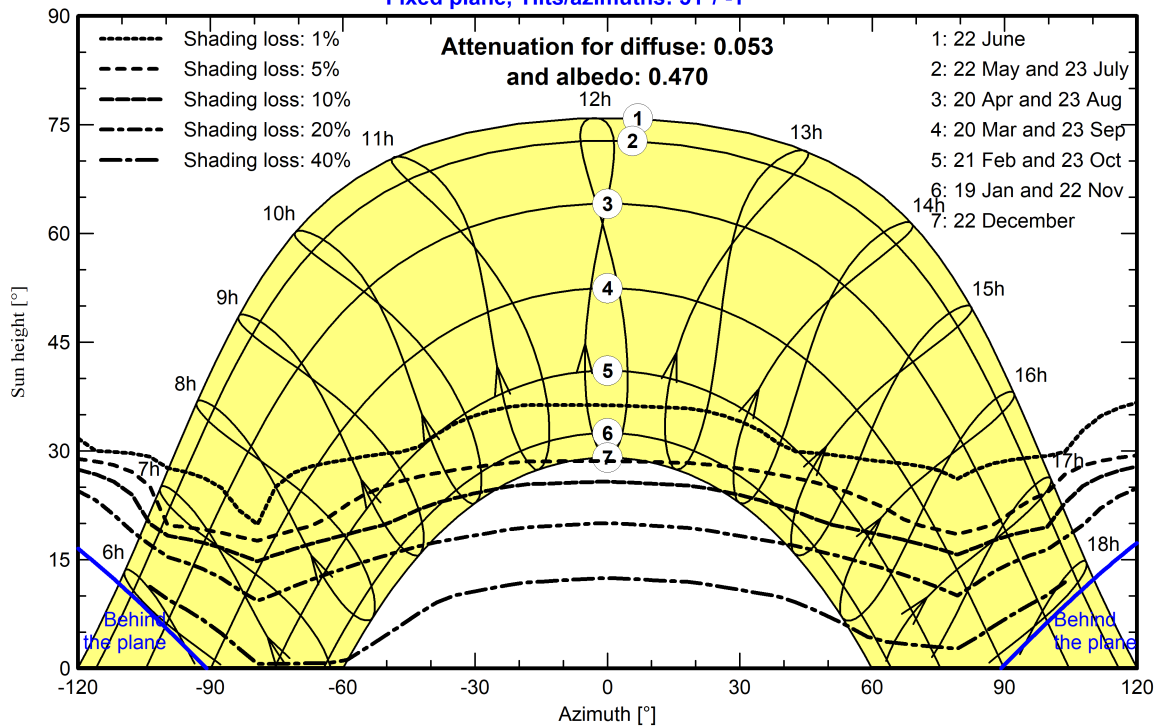
Near shadings parameter



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 31°/-1°





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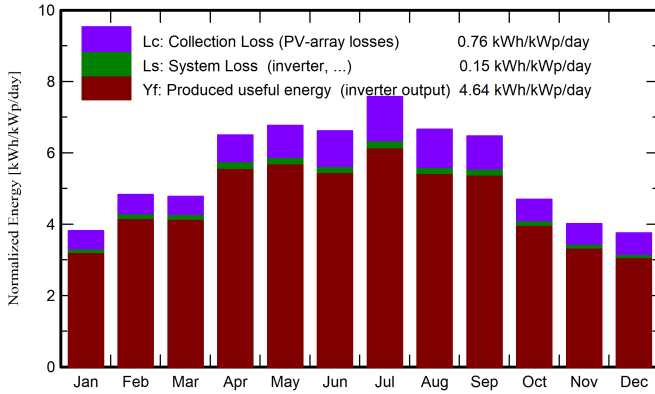
ARATO SRL (Italy)

Main results

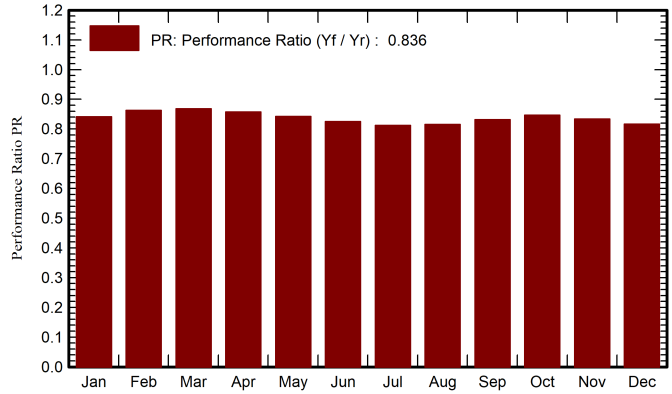
System Production

Produced Energy **77 GWh/year** Specific production **1692 kWh/kWp/year**
 Performance Ratio PR **83.63 %**

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	74.0	30.30	8.80	118.4	108.8	4.655	4.513	0.841
February	95.5	37.79	10.01	135.4	127.7	5.464	5.294	0.863
March	123.3	52.08	10.99	148.2	141.4	6.023	5.833	0.868
April	180.7	64.24	13.93	194.9	186.9	7.832	7.577	0.858
May	214.8	73.34	18.68	209.9	201.0	8.269	8.010	0.842
June	213.0	70.27	23.44	198.4	189.8	7.660	7.418	0.825
July	247.4	60.49	27.35	235.0	225.6	8.923	8.646	0.812
August	199.1	61.16	26.45	206.4	198.1	7.875	7.631	0.816
September	164.7	55.36	22.52	194.3	186.3	7.554	7.320	0.831
October	110.3	48.05	18.18	145.6	138.4	5.761	5.586	0.846
November	78.2	32.22	14.73	120.4	111.6	4.692	4.548	0.833
December	69.1	28.76	9.80	116.5	104.9	4.446	4.314	0.817
Year	1770.1	614.07	17.11	2023.2	1920.4	79.155	76.689	0.836

Legends

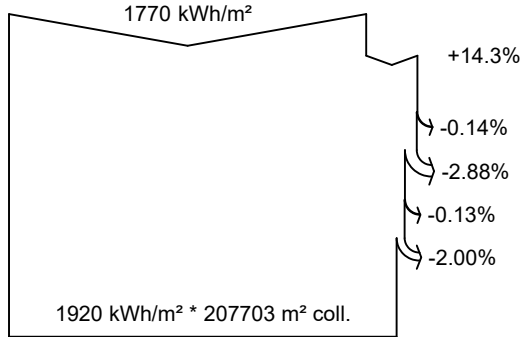
- GlobHor Global horizontal irradiation
- DiffHor Horizontal diffuse irradiation
- T_Amb Ambient Temperature
- GlobInc Global incident in coll. plane
- GlobEff Effective Global, corr. for IAM and shadings
- EArray Effective energy at the output of the array
- E_Grid Energy injected into grid
- PR Performance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



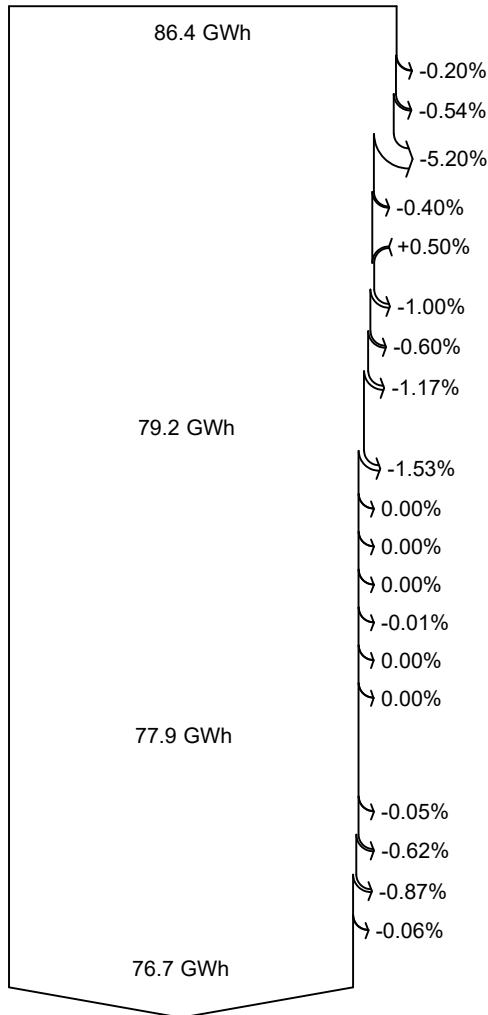
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Loss diagram



efficiency at STC = 21.66%



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

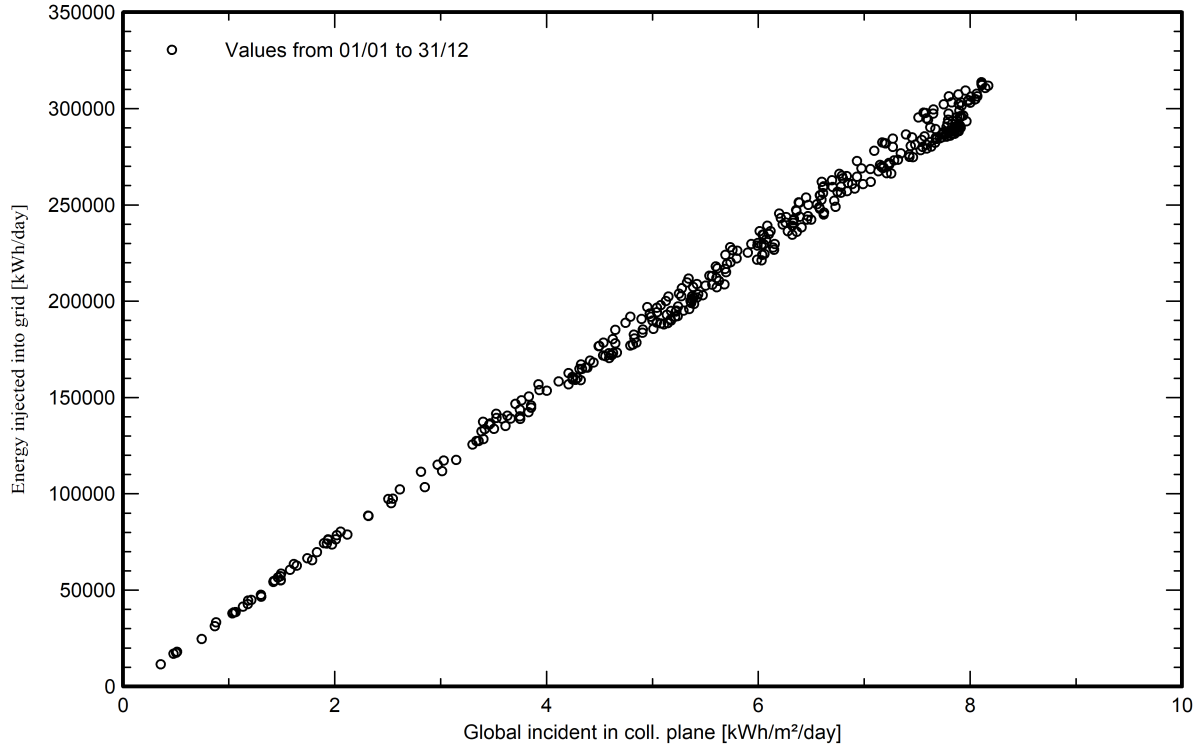
MV line ohmic loss

Energy injected into grid



Special graphs

Daily Input/Output diagram



System Output Power Distribution

