



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

INE FICURINIA S.R.L.
Piazza di Sant Anastasia 7
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RESPONSABILE PROGETTO:
Ing. Jury Mancinelli

INE FICURINIA S.R.L.
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Sede legale: Piazza di Sant Anastasia 7, 00186 Roma
ineficuriniarsrl@legalmail.it

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



PROGETTAZIONE E COORDINAMENTO

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OPERE ELETTRICHE

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ACUSTICA

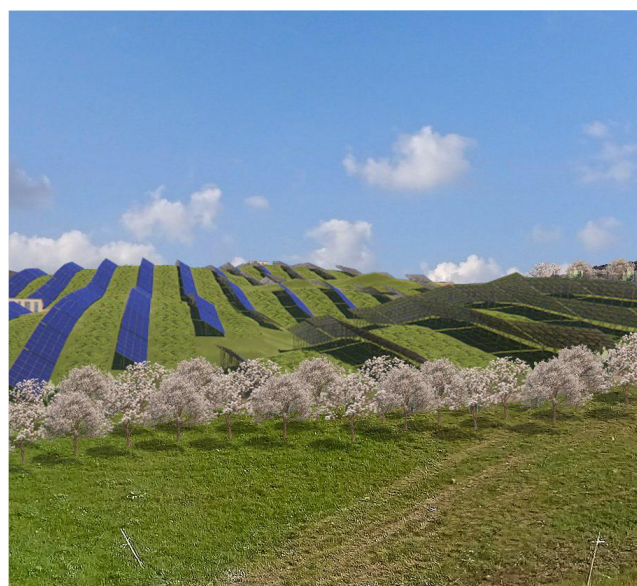
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ARCHEOLOGIA

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N. REV.	DATA	REVISIONE
0	apr-22	Emissione



IDENTIFICATORE ELABORATO:

RS06REL067A0

CARTELLA:

VIA_2

TITOLO ELABORATO:

Analisi della risorsa solare e stima di produzione energia lotto 3684

SCALA:

-

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

GEOLOGIA E IDROLOGIA



Dott. Geol. Domenico Boso
Ordine dei Geologi della Sicilia, n. 1005
Geoexpert di Maria Rita Arcidiacono
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IDRAULICA

i3 Ingegneria S.r.l.

i3 Ingegneria S.r.l.
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STUDIO PEDO-AGRONOMICO

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STRUTTURE ED OPERE CIVILI

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PVsyst - Simulation report

Grid-Connected System

Project: Ficurinia #3684

Variant: New simulation variant

Ground system (tables) on a hill

System power: 87.23 MWp

Cavalera - Italy



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VCO, Simulation date:
17/03/22 14:16
with v7.2.12

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Project summary

Geographical Site	Situation	Project settings
Cavalera	Latitude	Albedo
Italy	37.51 °N	0.20
	Longitude	
	14.61 °E	
	Altitude	
	383 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 / 3 °	90 %	
System information		
PV Array	Inverters	
Nb. of modules	Nb. of units	40 units
142992 units	Pnom total	76.49 MWac
Pnom total	87.23 MWp	1.140
	Pnom ratio	

Results summary

Produced Energy	145 GWh/year	Specific production	1660 kWh/kWp/year	Perf. Ratio PR	82.23 %
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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	6118 units
Fixed plane		Sizes	
Tilt/Azimuth	31 / 3 °	Sheds spacing	10.6 m
		Collector width	4.60 m
		Ground Cov. Ratio (GCR)	43.5 %
Horizon		Near Shadings	
Average Height	4.3 °	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 (1662W)
(Custom parameters definition)		(Custom parameters definition)	
Unit Nom. Power	610 Wp	Unit Nom. Power	1662 kWac
Number of PV modules	24264 units	Number of inverters	8 units
Nominal (STC)	14.80 MWp	Total power	13296 kWac
Array #1 - Area 1a		Array #1 - Area 1a	
Number of PV modules	3120 units	Number of inverters	1 unit
Nominal (STC)	1903 kWp	Total power	1662 kWac
Modules	130 Strings x 24 In series		
At operating cond. (50°C)		At operating cond. (50°C)	
Pmpp	1723 kWp	Operating voltage	860-1200 V
U mpp	983 V	Max. power (=>25°C)	1662 kWac
I mpp	1754 A	Pnom ratio (DC:AC)	1.15
Array #2 - Area 1b		Array #2 - Area 1b	
Number of PV modules	3120 units	Number of inverters	1 unit
Nominal (STC)	1903 kWp	Total power	1662 kWac
Modules	130 Strings x 24 In series		
At operating cond. (50°C)		At operating cond. (50°C)	
Pmpp	1723 kWp	Operating voltage	860-1200 V
U mpp	983 V	Max. power (=>25°C)	1662 kWac
I mpp	1754 A	Pnom ratio (DC:AC)	1.15
Array #3 - Area 1c		Array #3 - Area 1c	
Number of PV modules	3168 units	Number of inverters	1 unit
Nominal (STC)	1932 kWp	Total power	1662 kWac
Modules	132 Strings x 24 In series		
At operating cond. (50°C)		At operating cond. (50°C)	
Pmpp	1750 kWp	Operating voltage	860-1200 V
U mpp	983 V	Max. power (=>25°C)	1662 kWac
I mpp	1781 A	Pnom ratio (DC:AC)	1.16
Array #4 - Area 1d		Array #4 - Area 1d	
Number of PV modules	3072 units	Number of inverters	1 unit
Nominal (STC)	1874 kWp	Total power	1662 kWac
Modules	128 Strings x 24 In series		



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ARATO SRL (Italy)

PV Array Characteristics

Array #4 - Area 1d

At operating cond. (50°C)

Pmpp	1697 kWp
U mpp	983 V
I mpp	1727 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	1.13

Array #5 - Area 1e

Number of PV modules	3120 units
Nominal (STC)	1903 kWp
Modules	130 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac

At operating cond. (50°C)

Pmpp	1723 kWp
U mpp	983 V
I mpp	1754 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	1.15

Array #14 - Area 4a

Number of PV modules	2808 units
Nominal (STC)	1713 kWp
Modules	117 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac

At operating cond. (50°C)

Pmpp	1551 kWp
U mpp	983 V
I mpp	1579 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	1.03

Array #15 - Area 4b

Number of PV modules	2832 units
Nominal (STC)	1728 kWp
Modules	118 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac

At operating cond. (50°C)

Pmpp	1564 kWp
U mpp	983 V
I mpp	1592 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	1.04

Array #40 - Area 15

Number of PV modules	3024 units
Nominal (STC)	1845 kWp
Modules	126 Strings x 24 In series

Number of inverters	1 unit
Total power	1662 kWac

At operating cond. (50°C)

Pmpp	1670 kWp
U mpp	983 V
I mpp	1700 A

Operating voltage	860-1200 V
Max. power (=>25°C)	1662 kWac
Pnom ratio (DC:AC)	1.11

PV module

Manufacturer	JA Solar
Model	JAM78S30-610/MR

(Custom parameters definition)

Unit Nom. Power	610 Wp
Number of PV modules	71880 units
Nominal (STC)	43.85 MWp

Inverter

Manufacturer	Santerno
Model	Sunway TG 1800 1500V TE - 690

(Custom parameters definition)

Unit Nom. Power	1912 kWac
Number of inverters	20 units
Total power	38240 kWac

Array #6 - Area 2a

Number of PV modules	3792 units
Nominal (STC)	2313 kWp
Modules	158 Strings x 24 In series

Number of inverters	1 unit
Total power	1912 kWac



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ARATO SRL (Italy)

PV Array Characteristics

Array #6 - Area 2a

At operating cond. (50°C)

Pmpp 2095 kWp
 U mpp 983 V
 I mpp 2132 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.21

Array #7 - Area 2b

Number of PV modules 3792 units
 Nominal (STC) 2313 kWp
 Modules 158 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 2095 kWp
 U mpp 983 V
 I mpp 2132 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.21

Array #8 - Area 2c

Number of PV modules 3744 units
 Nominal (STC) 2284 kWp
 Modules 156 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 2068 kWp
 U mpp 983 V
 I mpp 2105 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.19

Array #9 - Area 2d

Number of PV modules 3816 units
 Nominal (STC) 2328 kWp
 Modules 159 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 2108 kWp
 U mpp 983 V
 I mpp 2145 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.22

Array #10 - Area 2e

Number of PV modules 3768 units
 Nominal (STC) 2298 kWp
 Modules 157 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 2081 kWp
 U mpp 983 V
 I mpp 2118 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.20

Array #11 - Area 3a

Number of PV modules 3696 units
 Nominal (STC) 2255 kWp
 Modules 154 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 2042 kWp
 U mpp 983 V
 I mpp 2078 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.18

Array #12 - Area 3b

Number of PV modules 3672 units
 Nominal (STC) 2240 kWp
 Modules 153 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac



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PV Array Characteristics

Array #12 - Area 3b

At operating cond. (50°C)

Pmpp 2028 kWp
 U mpp 983 V
 I mpp 2064 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.17

Array #13 - Area 3c

Number of PV modules 3672 units
 Nominal (STC) 2240 kWp
 Modules 153 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 2028 kWp
 U mpp 983 V
 I mpp 2064 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.17

Array #16 - Area 5a

Number of PV modules 3576 units
 Nominal (STC) 2181 kWp
 Modules 149 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 1975 kWp
 U mpp 983 V
 I mpp 2010 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.14

Array #17 - Area 5b

Number of PV modules 3576 units
 Nominal (STC) 2181 kWp
 Modules 149 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 1975 kWp
 U mpp 983 V
 I mpp 2010 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.14

Array #18 - Area 5c

Number of PV modules 3576 units
 Nominal (STC) 2181 kWp
 Modules 149 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 1975 kWp
 U mpp 983 V
 I mpp 2010 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.14

Array #30 - Area 10a

Number of PV modules 3336 units
 Nominal (STC) 2035 kWp
 Modules 139 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 1843 kWp
 U mpp 983 V
 I mpp 1875 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.06

Array #31 - Area 10b

Number of PV modules 3336 units
 Nominal (STC) 2035 kWp
 Modules 139 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac



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ARATO SRL (Italy)

PV Array Characteristics

Array #31 - Area 10b

At operating cond. (50°C)

Pmpp	1843 kWp
U mpp	983 V
I mpp	1875 A

Operating voltage	690-1200 V
Max. power (=>25°C)	2151 kWac
Pnom ratio (DC:AC)	1.06

Array #32 - Area 10c

Number of PV modules	3336 units
Nominal (STC)	2035 kWp
Modules	139 Strings x 24 In series

Number of inverters	1 unit
Total power	1912 kWac

At operating cond. (50°C)

Pmpp	1843 kWp
U mpp	983 V
I mpp	1875 A

Operating voltage	690-1200 V
Max. power (=>25°C)	2151 kWac
Pnom ratio (DC:AC)	1.06

Array #34 - Area 12

Number of PV modules	3528 units
Nominal (STC)	2152 kWp
Modules	147 Strings x 24 In series

Number of inverters	1 unit
Total power	1912 kWac

At operating cond. (50°C)

Pmpp	1949 kWp
U mpp	983 V
I mpp	1983 A

Operating voltage	690-1200 V
Max. power (=>25°C)	2151 kWac
Pnom ratio (DC:AC)	1.13

Array #35 - Area 13a

Number of PV modules	3936 units
Nominal (STC)	2401 kWp
Modules	164 Strings x 24 In series

Number of inverters	1 unit
Total power	1912 kWac

At operating cond. (50°C)

Pmpp	2174 kWp
U mpp	983 V
I mpp	2213 A

Operating voltage	690-1200 V
Max. power (=>25°C)	2151 kWac
Pnom ratio (DC:AC)	1.26

Array #36 - Area 13b

Number of PV modules	3936 units
Nominal (STC)	2401 kWp
Modules	164 Strings x 24 In series

Number of inverters	1 unit
Total power	1912 kWac

At operating cond. (50°C)

Pmpp	2174 kWp
U mpp	983 V
I mpp	2213 A

Operating voltage	690-1200 V
Max. power (=>25°C)	2151 kWac
Pnom ratio (DC:AC)	1.26

Array #37 - Area 14a

Number of PV modules	3264 units
Nominal (STC)	1991 kWp
Modules	136 Strings x 24 In series

Number of inverters	1 unit
Total power	1912 kWac

At operating cond. (50°C)

Pmpp	1803 kWp
U mpp	983 V
I mpp	1835 A

Operating voltage	690-1200 V
Max. power (=>25°C)	2151 kWac
Pnom ratio (DC:AC)	1.04

Array #38 - Area 14b

Number of PV modules	3264 units
Nominal (STC)	1991 kWp
Modules	136 Strings x 24 In series

Number of inverters	1 unit
Total power	1912 kWac



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PV Array Characteristics

Array #38 - Area 14b

At operating cond. (50°C)

Pmpp 1803 kWp
 U mpp 983 V
 I mpp 1835 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.04

Array #39 - Area 14c

Number of PV modules 3264 units
 Nominal (STC) 1991 kWp
 Modules 136 Strings x 24 In series

Number of inverters 1 unit
 Total power 1912 kWac

At operating cond. (50°C)

Pmpp 1803 kWp
 U mpp 983 V
 I mpp 1835 A

Operating voltage 690-1200 V
 Max. power (=>25°C) 2151 kWac
 Pnom ratio (DC:AC) 1.04

PV module

Manufacturer JA Solar
 Model JAM78S30-610/MR
 (Custom parameters definition)
 Unit Nom. Power 610 Wp
 Number of PV modules 38400 units
 Nominal (STC) 23.42 MWp

Inverter

Manufacturer Santerno
 Model SUNWAY STATION TG1800&900-1500V-TE 600 (2493kW)
 (Custom parameters definition)
 Unit Nom. Power 2493 kWac
 Number of inverters 8 units
 Total power 19944 kWac

Array #19 - Area 6a

Number of PV modules 4632 units
 Nominal (STC) 2826 kWp
 Modules 193 Strings x 24 In series

Number of inverters 1 unit
 Total power 2493 kWac

At operating cond. (50°C)

Pmpp 2559 kWp
 U mpp 983 V
 I mpp 2604 A

Operating voltage 860-1200 V
 Max. power (=>25°C) 2493 kWac
 Pnom ratio (DC:AC) 1.13

Array #20 - Area 6b

Number of PV modules 4632 units
 Nominal (STC) 2826 kWp
 Modules 193 Strings x 24 In series

Number of inverters 1 unit
 Total power 2493 kWac

At operating cond. (50°C)

Pmpp 2559 kWp
 U mpp 983 V
 I mpp 2604 A

Operating voltage 860-1200 V
 Max. power (=>25°C) 2493 kWac
 Pnom ratio (DC:AC) 1.13

Array #21 - Area 6c

Number of PV modules 4656 units
 Nominal (STC) 2840 kWp
 Modules 194 Strings x 24 In series

Number of inverters 1 unit
 Total power 2493 kWac

At operating cond. (50°C)

Pmpp 2572 kWp
 U mpp 983 V
 I mpp 2617 A

Operating voltage 860-1200 V
 Max. power (=>25°C) 2493 kWac
 Pnom ratio (DC:AC) 1.14

Array #22 - Area 7a

Number of PV modules 4896 units
 Nominal (STC) 2987 kWp
 Modules 204 Strings x 24 In series

Number of inverters 1 unit
 Total power 2493 kWac



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PV Array Characteristics

Array #22 - Area 7a

At operating cond. (50°C)

Pmpp	2704 kWp
U mpp	983 V
I mpp	2752 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	1.20

Array #23 - Area 7b

Number of PV modules	4968 units
Nominal (STC)	3030 kWp
Modules	207 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2744 kWp
U mpp	983 V
I mpp	2793 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	1.22

Array #24 - Area 7c

Number of PV modules	5064 units
Nominal (STC)	3089 kWp
Modules	211 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2797 kWp
U mpp	983 V
I mpp	2847 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	1.24

Array #25 - Area 7d

Number of PV modules	4776 units
Nominal (STC)	2913 kWp
Modules	199 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2638 kWp
U mpp	983 V
I mpp	2685 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	1.17

Array #26 - Area 7e

Number of PV modules	4776 units
Nominal (STC)	2913 kWp
Modules	199 Strings x 24 In series

Number of inverters	1 unit
Total power	2493 kWac

At operating cond. (50°C)

Pmpp	2638 kWp
U mpp	983 V
I mpp	2685 A

Operating voltage	860-1200 V
Max. power (=>25°C)	2493 kWac
Pnom ratio (DC:AC)	1.17

Array #27 - Area 8

PV module

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

Unit Nom. Power	610 Wp
Number of PV modules	1728 units
Nominal (STC)	1054 kWp
Modules	72 Strings x 24 In series

Inverter

Manufacturer	Santerno
Model	Sunway TG 900 1500V TE - 600 (1000kW)
(Custom parameters definition)	

Unit Nom. Power	1000 kWac
Number of inverters	1 unit
Total power	1000 kWac
Operating voltage	860-1200 V
Max. power (=>25°C)	1000 kWac
Pnom ratio (DC:AC)	1.05

At operating cond. (50°C)

Pmpp	955 kWp
U mpp	983 V
I mpp	971 A



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PV Array Characteristics

Array #28 - Area 9a

PV module

Manufacturer	JA Solar
Model	JAM78S30-610/MR
(Custom parameters definition)	
Unit Nom. Power	610 Wp
Number of PV modules	2568 units
Nominal (STC)	1566 kWp
Modules	107 Strings x 24 In series

At operating cond. (50°C)

Pmpp	1419 kWp
U mpp	983 V
I mpp	1444 A

Inverter

Manufacturer	Santerno
Model	SUNWAY TG 1800 1500V TE - 640 (1500 kVA)
(Custom parameters definition)	

Unit Nom. Power	1500 kWac
Number of inverters	1 unit
Total power	1500 kWac
Operating voltage	910-1200 V
Pnom ratio (DC:AC)	1.04

Array #29 - Area 9b

PV module

Manufacturer	JA Solar
Model	JAM78S30-610/MR
(Custom parameters definition)	
Unit Nom. Power	610 Wp
Number of PV modules	2544 units
Nominal (STC)	1552 kWp
Modules	106 Strings x 24 In series

At operating cond. (50°C)

Pmpp	1405 kWp
U mpp	983 V
I mpp	1430 A

Inverter

Manufacturer	Santerno
Model	Sunway TG 1800 1500V TE - 600 (1550W)
(Custom parameters definition)	

Unit Nom. Power	1550 kWac
Number of inverters	1 unit
Total power	1550 kWac
Operating voltage	860-1200 V
Max. power (=>25°C)	1871 kWac
Pnom ratio (DC:AC)	1.00

Array #33 - Area 11

PV module

Manufacturer	JA Solar
Model	JAM78S30-610/MR
(Custom parameters definition)	
Unit Nom. Power	610 Wp
Number of PV modules	1608 units
Nominal (STC)	981 kWp
Modules	67 Strings x 24 In series

At operating cond. (50°C)

Pmpp	888 kWp
U mpp	983 V
I mpp	904 A

Inverter

Manufacturer	Santerno
Model	Sunway TG 900 1500V TE - 600 (956kW)
(Custom parameters definition)	

Unit Nom. Power	956 kWac
Number of inverters	1 unit
Total power	956 kWac
Operating voltage	860-1200 V
Max. power (=>25°C)	956 kWac
Pnom ratio (DC:AC)	1.03

Total PV power

Nominal (STC)	87225 kWp
Total	142992 modules
Module area	399707 m²
Cell area	368508 m²

Total inverter power

Total power	76486 kWac
Number of inverters	40 units
Pnom ratio	1.14



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Array losses

Array Soiling Losses

Loss Fraction 2.0 %

Thermal Loss factor

Module temperature according to irradiance

Uc (const) 29.0 W/m²KUv (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

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 0.20 mΩ
Loss Fraction 1.5 % at STC

Array #1 - Area 1a

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

Array #3 - Area 1c

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

Array #5 - Area 1e

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

Array #7 - Area 2b

Global array res. 7.6 mΩ
Loss Fraction 1.5 % at STC

Array #9 - Area 2d

Global array res. 7.6 mΩ
Loss Fraction 1.5 % at STC

Array #11 - Area 3a

Global array res. 7.8 mΩ
Loss Fraction 1.5 % at STC

Array #13 - Area 3c

Global array res. 7.9 mΩ
Loss Fraction 1.5 % at STC

Array #15 - Area 4b

Global array res. 10 mΩ
Loss Fraction 1.5 % at STC

Array #17 - Area 5b

Global array res. 8.1 mΩ
Loss Fraction 1.5 % at STC

Array #19 - Area 6a

Global array res. 6.3 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Area 1b

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

Array #4 - Area 1d

Global array res. 9.4 mΩ
Loss Fraction 1.5 % at STC

Array #6 - Area 2a

Global array res. 7.6 mΩ
Loss Fraction 1.5 % at STC

Array #8 - Area 2c

Global array res. 7.7 mΩ
Loss Fraction 1.5 % at STC

Array #10 - Area 2e

Global array res. 7.7 mΩ
Loss Fraction 1.5 % at STC

Array #12 - Area 3b

Global array res. 7.9 mΩ
Loss Fraction 1.5 % at STC

Array #14 - Area 4a

Global array res. 10 mΩ
Loss Fraction 1.5 % at STC

Array #16 - Area 5a

Global array res. 8.1 mΩ
Loss Fraction 1.5 % at STC

Array #18 - Area 5c

Global array res. 8.1 mΩ
Loss Fraction 1.5 % at STC

Array #20 - Area 6b

Global array res. 6.3 mΩ
Loss Fraction 1.5 % at STC



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DC wiring losses

Array #21 - Area 6c			
Global array res.	6.2 mΩ	Global array res.	5.9 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #22 - Area 7a			
Global array res.	6.2 mΩ	Global array res.	5.9 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #23 - Area 7b			
Global array res.	5.8 mΩ	Global array res.	5.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #24 - Area 7c			
Global array res.	5.8 mΩ	Global array res.	5.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #25 - Area 7d			
Global array res.	6.1 mΩ	Global array res.	6.1 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #26 - Area 7e			
Global array res.	6.1 mΩ	Global array res.	6.1 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #27 - Area 8			
Global array res.	17 mΩ	Global array res.	11 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #28 - Area 9a			
Global array res.	17 mΩ	Global array res.	11 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #29 - Area 9b			
Global array res.	11 mΩ	Global array res.	8.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #30 - Area 10a			
Global array res.	11 mΩ	Global array res.	8.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #31 - Area 10b			
Global array res.	8.7 mΩ	Global array res.	8.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #32 - Area 10c			
Global array res.	8.7 mΩ	Global array res.	8.7 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #33 - Area 11			
Global array res.	18 mΩ	Global array res.	8.2 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #34 - Area 12			
Global array res.	18 mΩ	Global array res.	8.2 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #35 - Area 13a			
Global array res.	7.4 mΩ	Global array res.	7.4 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #36 - Area 13b			
Global array res.	7.4 mΩ	Global array res.	7.4 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #37 - Area 14a			
Global array res.	8.9 mΩ	Global array res.	8.9 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #38 - Area 14b			
Global array res.	8.9 mΩ	Global array res.	8.9 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #39 - Area 14c			
Global array res.	8.9 mΩ	Global array res.	9.6 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #40 - Area 15			
Global array res.	8.9 mΩ	Global array res.	9.6 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC

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	1.06 % at STC
Inverters: Sunway TG 1800 1500V TE - 600 (1662W), Sunway TG 1800 1500V TE - 690, SUNWAY STATION TG1800&900-1500V-TE 600 (2493kW), S	
Wire section (40 Inv.)	Copper 40 x 3 x 10000 mm ²
Average wires length	1020 m
MV line up to Injection	
MV Voltage	20 kV
Average each inverter	
Wires	Copper 3 x 50 mm ²
Length	500 m
Loss Fraction	0.10 % at STC



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AC losses in transformers

MV transfo

Grid voltage 20 kV

Operating losses at STC

Nominal power at STC 85889 kVA

Iron loss (night disconnect) 2.15 kW/Inv.

Loss Fraction 0.10 % at STC

Coils equivalent resistance 3 x 1.68 mΩ/inv.

Loss Fraction 1.00 % at STC



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Horizon definition

Horizon from PVGIS website API, Lat=37°30'28', Long=14°36'45', Alt=383m

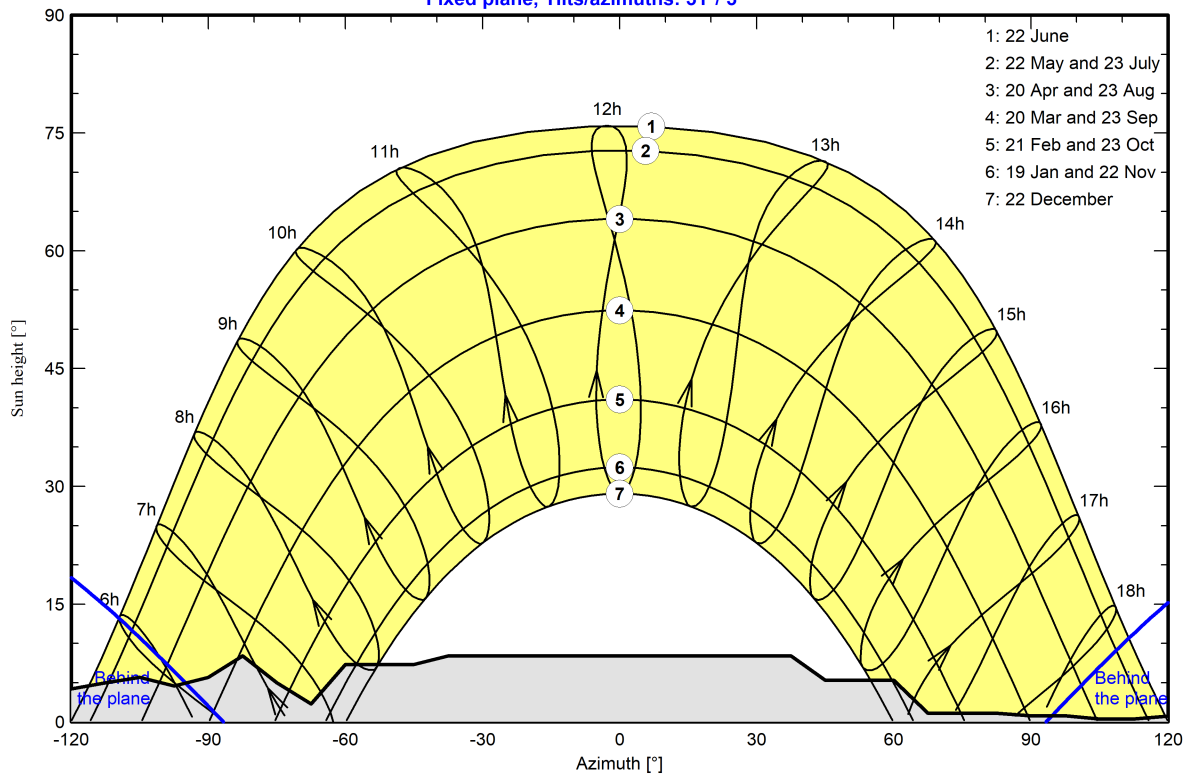
Average Height 4.3 ° Albedo Factor 0.62
 Diffuse Factor 0.95 Albedo Fraction 100 %

Horizon profile

Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-113	-105	-98
Height [°]	1.5	2.7	3.1	2.7	1.5	3.1	4.2	3.8	4.2	5.0	5.7	4.6
Azimuth [°]	-90	-83	-75	-68	-60	-45	-38	38	45	60	68	83
Height [°]	5.7	8.4	5.0	2.3	7.3	7.3	8.4	8.4	5.3	5.3	1.1	1.1
Azimuth [°]	90	98	105	113	128	135	143	150	158	165	173	180
Height [°]	0.8	0.8	0.4	0.4	1.1	1.1	0.8	1.5	1.1	1.1	1.5	1.5

Sun Paths (Height / Azimuth diagram)

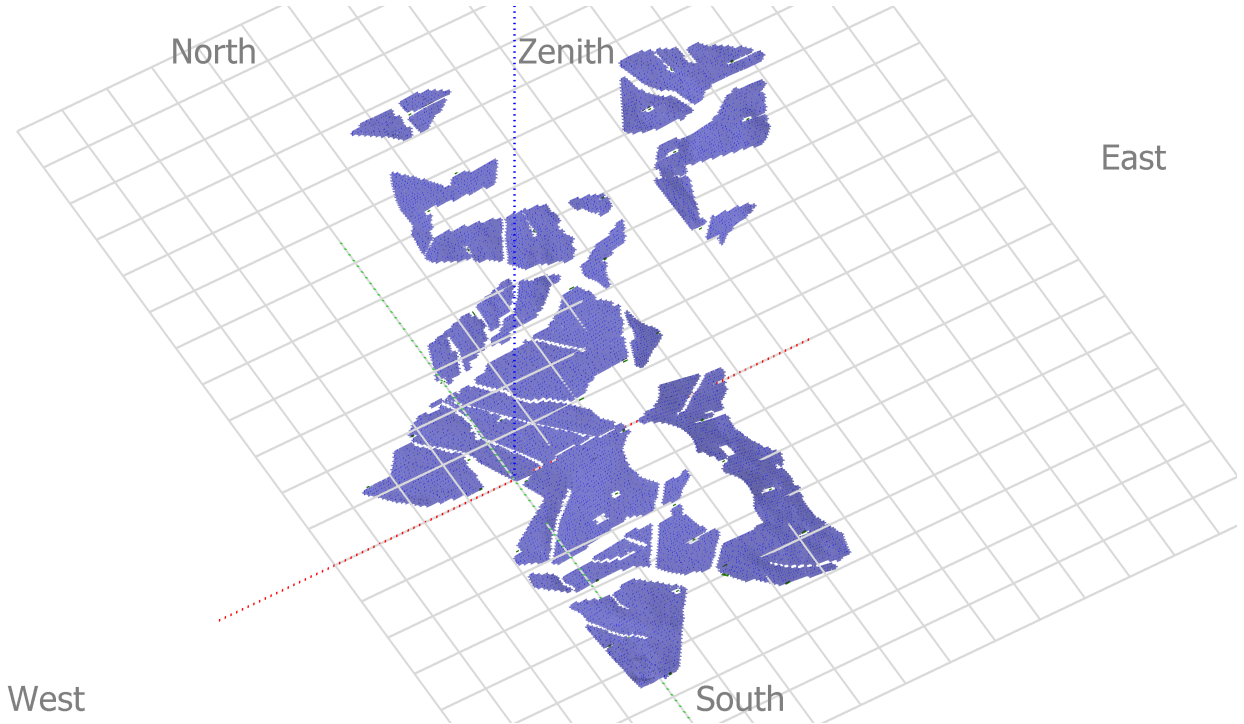
Fixed plane, Tilts/azimuths: 31°/ 3°





Near shadings parameter

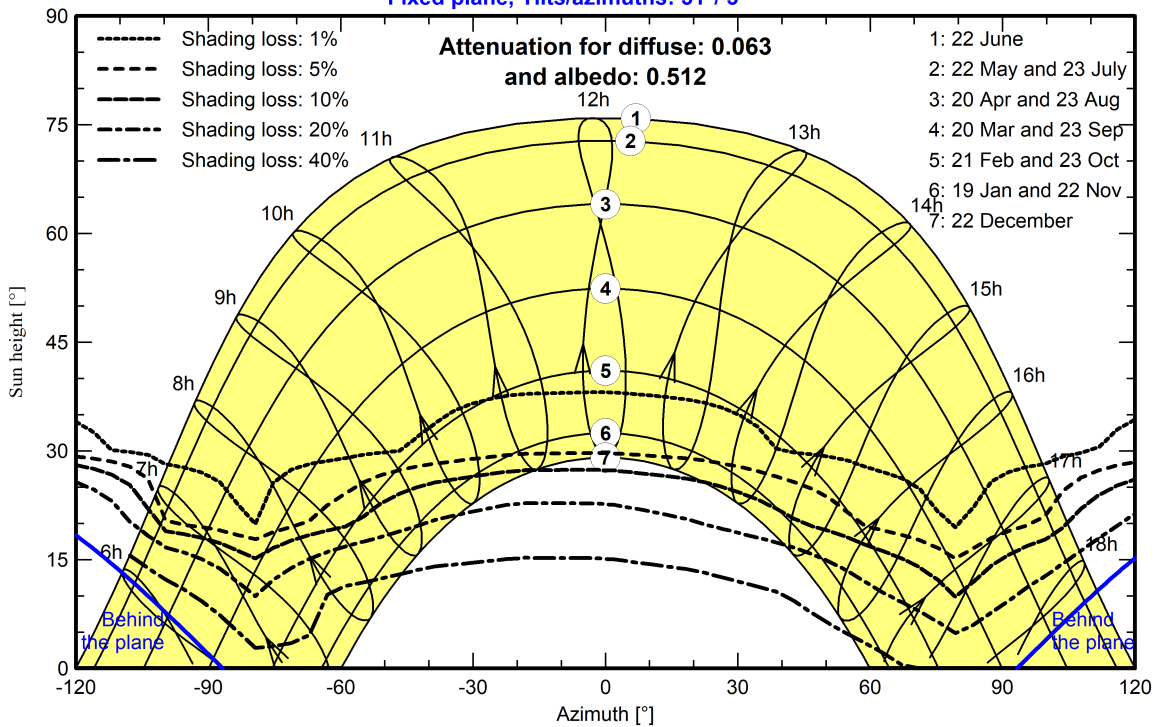
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 31°/ 3°





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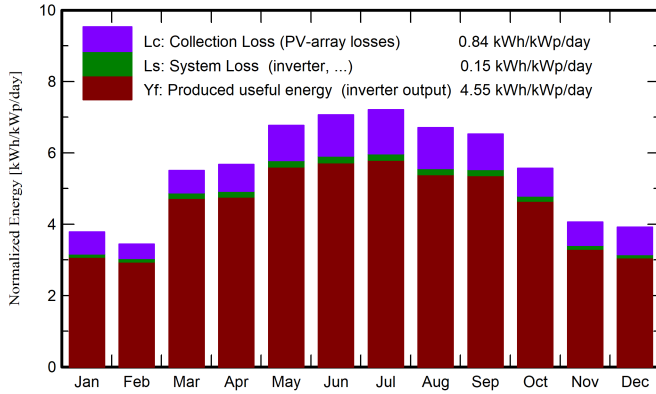
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Main results

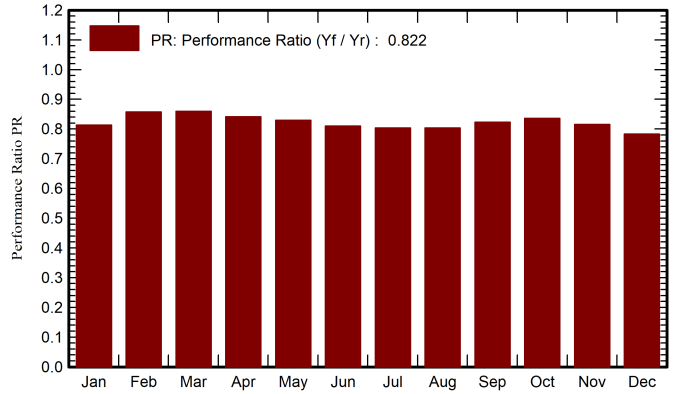
System Production

Produced Energy 145 GWh/year Specific production 1660 kWh/kWp/year
 Performance Ratio PR 82.23 %

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	117.2	104.3	8.58	8.32	0.814
February	72.8	40.94	4.54	96.3	88.3	7.43	7.21	0.858
March	140.7	58.51	7.87	170.5	161.0	13.20	12.79	0.860
April	159.7	67.25	13.05	170.1	160.6	12.90	12.49	0.841
May	214.3	78.44	17.43	209.7	198.6	15.66	15.18	0.830
June	227.6	70.77	23.09	212.0	201.0	15.47	14.99	0.811
July	234.9	65.96	25.31	223.5	212.4	16.17	15.67	0.804
August	200.6	62.39	25.33	208.0	197.9	15.05	14.58	0.804
September	165.7	55.83	20.81	195.8	186.4	14.50	14.05	0.823
October	126.5	43.45	15.54	172.5	162.9	12.97	12.57	0.835
November	79.0	32.23	9.08	121.7	109.6	8.93	8.66	0.816
December	72.3	30.73	5.63	121.3	104.1	8.53	8.28	0.783
Year	1768.4	638.34	14.52	2018.5	1887.2	149.40	144.78	0.822

Legends

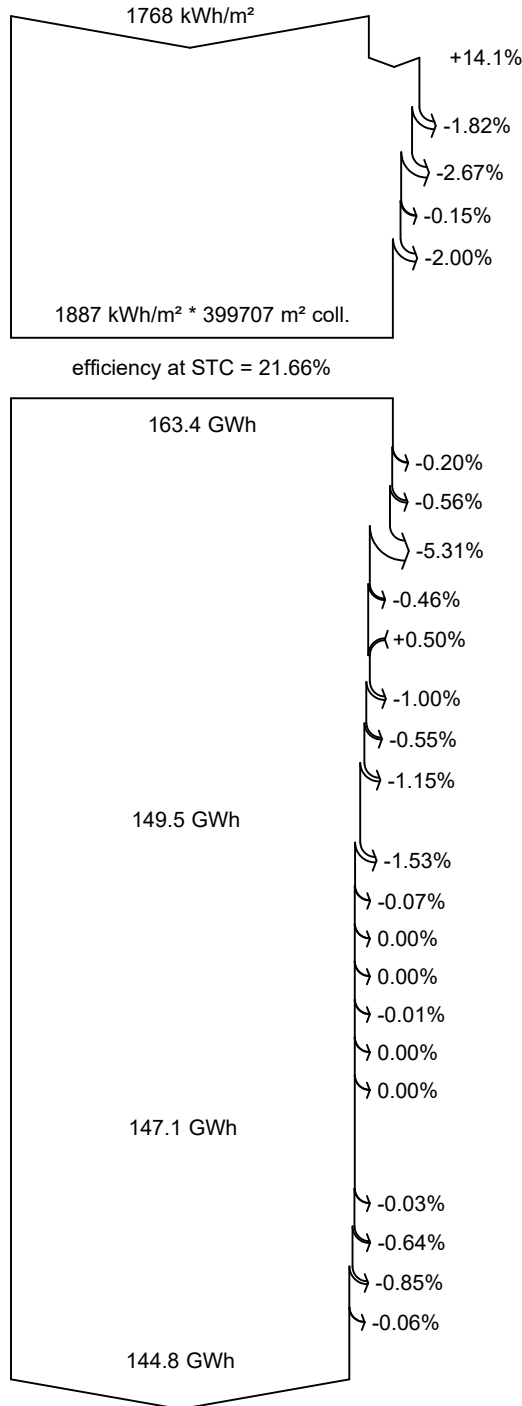
- GlobHor Global horizontal irradiation
- DiffHor Horizontal diffuse irradiation
- T_Amb Ambient Temperature
- GlobInc Global incident in coll. plane
- GlobEff Effective Global, corr. for IAM and shadings
- EArray Effective energy at the output of the array
- E_Grid Energy injected into grid
- PR Performance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

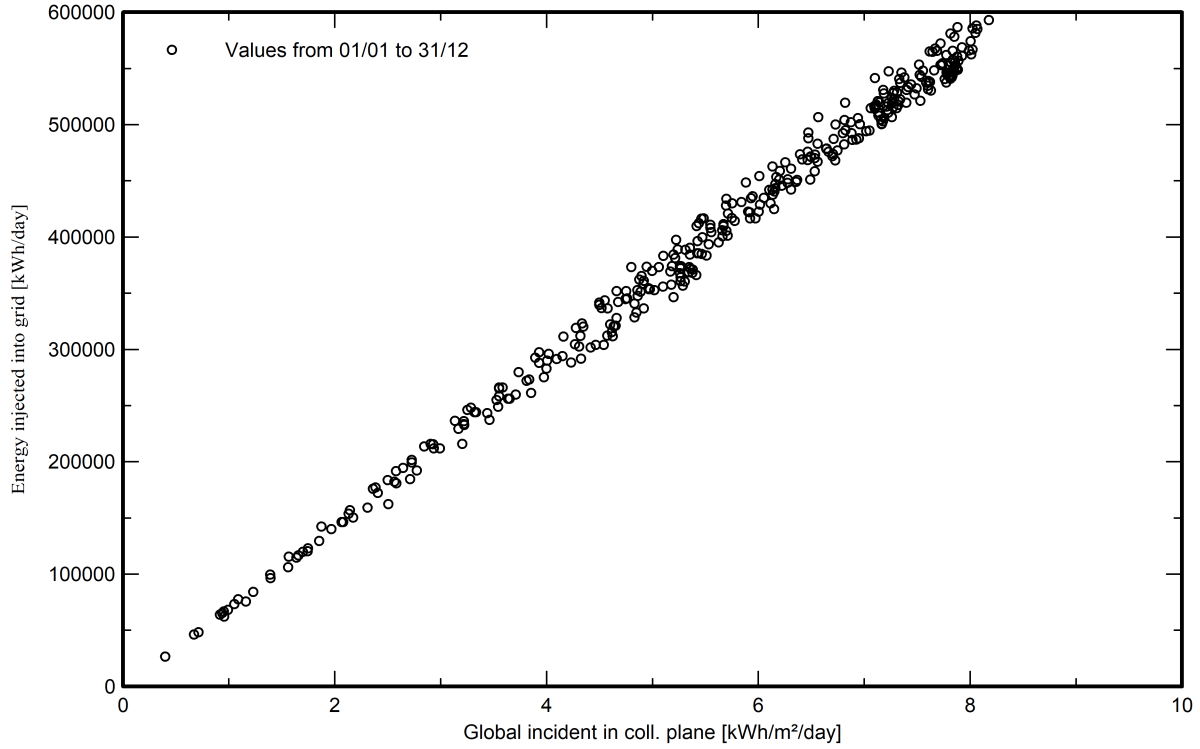
MV line ohmic loss

Energy injected into grid



Special graphs

Daily Input/Output diagram



System Output Power Distribution

