Regione Siciliana

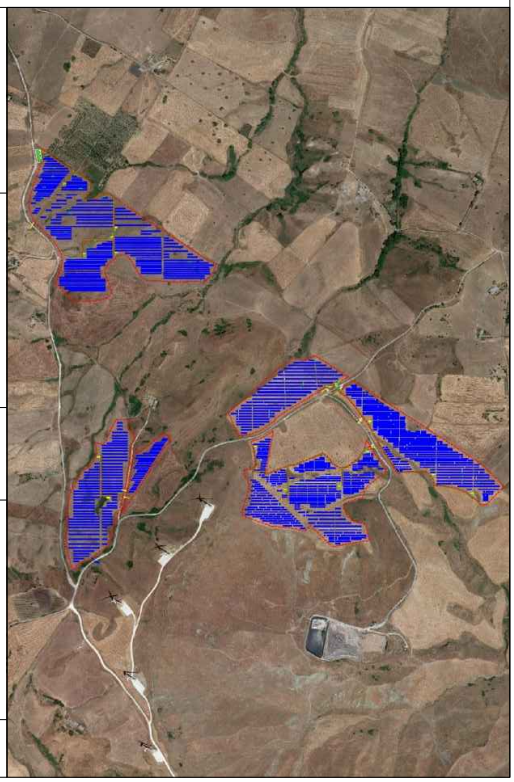
Città Metropolitana di Palermo | Comune di Castellana Sicula | Comune di Polizzi Generosa | Comune di Caltavuturo

Proponente

FLYNIS PV 3 S.r.l.

Via Statuto, 10 - 20121 Milano - Italy
pec: flynispv3srl@legalmail.it

Progetto Definitivo



Denominazione progetto:

REALIZZAZIONE IMPIANTO AGRIVOLTAICO "CONTRADA ALBERÌ"

Potenza nominale complessiva = 42473,60 kWp

Sito in:

COMUNI DI CASTELLANA SICULA, POLIZZI GENEROSA E CALTAVUTURO (PA)

Titolo elaborato:

Stima producibilità impianto

Elaborato n.	Scala
EL08	--

Prog. Definitiva: Ing. Nicodemo Agostino
Flyren Development S.r.l.
Lungo Po Antonelli, 21, Torino (TO)

Progettisti : Ing. Nicodemo Agostino
Flyren Development S.r.l.
Lungo Po Antonelli, 21, Torino (TO)

Collaboratori : Ing. Marco Pignolo
P.I. Alessandro Novella

COLLEGIO INGEGNERI PROVINCIA VERCELLI
SETTORE CIVILE E AMB. INDUSTR. - INFORM.
Dott. Ing. NICODEMO AGOSTINO
N° A 1265
SEZIONE A

REV.:	REDAZIONE:	CONTROLLO:	APPROVAZIONE :	DATA:
00	Ing. N.Agostino	Dott.ssa Eliana Santoro	Dott.ssa Eliana Santoro	20/06/2022
01				
02				

FIRMA/TIMBRO COMMITTENTE:

FLYREN
THE CULTURE OF CLEAN ENERGY

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C.F. / P. IVA n. 12062400010

Version 7.2.16

PVsyst - Simulation report

Grid-Connected System

Project: CONTRADA ALBERI LOTTO1

Variant: Nuova variante di simulazione

Sheds, single array

System power: 8320 kWp

Contrada Case Alberì - Italia

Author

AENNE INGEGNERIA di AGOSTINO Ing. NICODEMO (Italy)

Project summary

Geographical Site
Contrada Case Alberì
Italia

Situation

Latitude	37.72 °N
Longitude	14.00 °E
Altitude	769 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Contrada Case Alberì
Meteonorm 8.0 (1986-2005), Sat=100% - Sintetico

System summary

Grid-Connected System
Sheds, single array

PV Field Orientation
Fixed plane
Tilt/Azimuth 25 / 0 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	12800 units
Pnom total	8320 kWp

Inverters

Nb. of units	40 units
Pnom total	8000 kWac
Pnom ratio	1.040

Results summary

Produced Energy	13 GWh/year	Specific production	1580 kWh/kWp/year	Perf. Ratio PR	86.41 %

Table of contents

General parameters

Grid-Connected System

Sheds, single array

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	25 / 0 °

Sheds configuration	
Nb. of sheds	800 units
Single array	
Sizes	
Sheds spacing	10.00 m
Collector width	4.79 m
Ground Cov. Ratio (GCR)	47.9 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m
Shading limit angle	
Limit profile angle	19.8 °

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon

Average Height 4.7 °

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS7N-650MB-AG 1500V
(Custom parameters definition)	
Unit Nom. Power	650 Wp
Number of PV modules	12800 units
Nominal (STC)	8320 kWp

Inverter

Manufacturer	Huawei Technologies
Model	SUN 2000-215KTL-H3
(Custom parameters definition)	
Unit Nom. Power	200 kWac
Number of inverters	40 units
Total power	8000 kWac

Array #1 - Sottocampo #1

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #2 - Sottocampo #2

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #3 - Sottocampo #3

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #4 - Sottocampo #4

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #5 - Sottocampo #5

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #6 - Sottocampo #6

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #7 - Sottocampo #7

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #8 - Sottocampo #8

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #9 - Sottocampo #9

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #10 - Sottocampo #10

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #11 - Sottocampo #11

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #12 - Sottocampo #12

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #13 - Sottocampo #13

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #14 - Sottocampo #14

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #15 - Sottocampo #15

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #16 - Sottocampo #16

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #17 - Sottocampo #17

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #18 - Sottocampo #18

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #19 - Sottocampo #19

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #20 - Sottocampo #20

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #21 - Sottocampo #21

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #22 - Sottocampo #22

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #23 - Sottocampo #23

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #24 - Sottocampo #24

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #25 - Sottocampo #25

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #26 - Sottocampo #26

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #27 - Sottocampo #27

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #28 - Sottocampo #28

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #29 - Sottocampo #29

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #30 - Sottocampo #30

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #31 - Sottocampo #31

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #32 - Sottocampo #32

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #33 - Sottocampo #33

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #34 - Sottocampo #34

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #35 - Sottocampo #35

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #36 - Sottocampo #36

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #37 - Sottocampo #37

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #38 - Sottocampo #38

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #39 - Sottocampo #39

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #40 - Sottocampo #40

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Total PV power

Nominal (STC)	8320 kWp
Total	12800 modules
Module area	39761 m²

Total inverter power

Total power	8000 kWac
Number of inverters	40 units
Pnom ratio	1.04

Array losses

Array Soiling Losses
Loss Fraction 3.0 %

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

DC wiring losses
Global array res. 101 mΩ
Global wiring resistance 2.5 mΩ
Loss Fraction 1.5 % at STC

Module Quality Loss
Loss Fraction -0.4 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

IAM loss factor
Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

AC wiring losses

Inv. output line up to MV transfo
Inverter voltage 800 Vac tri
Loss Fraction 0.02 % at STC

Inverter: SUN 2000-215KTL-H3
Wire section (1 Inv.) Alu 1 x 3 x 240 mm²
Wires length 200 m

Inverter: SUN 2000-215KTL-H3
Wire section (39 Inv.) Alu 39 x 3 x 70 mm²
Average wires length 0 m

MV line up to Injection
MV Voltage 20 kV
Average each inverter
Wires Alu 3 x 150 mm²
Length 800 m
Loss Fraction 0.11 % at STC

AC losses in transformers

MV transfo
Grid voltage 20 kV

Operating losses at STC
Nominal power at STC 8212 kVA
Iron loss (24/24 Connexion) 2.74 kW/Inv.
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 2.34 mΩ/inv.
Loss Fraction 1.00 % at STC

Horizon definition

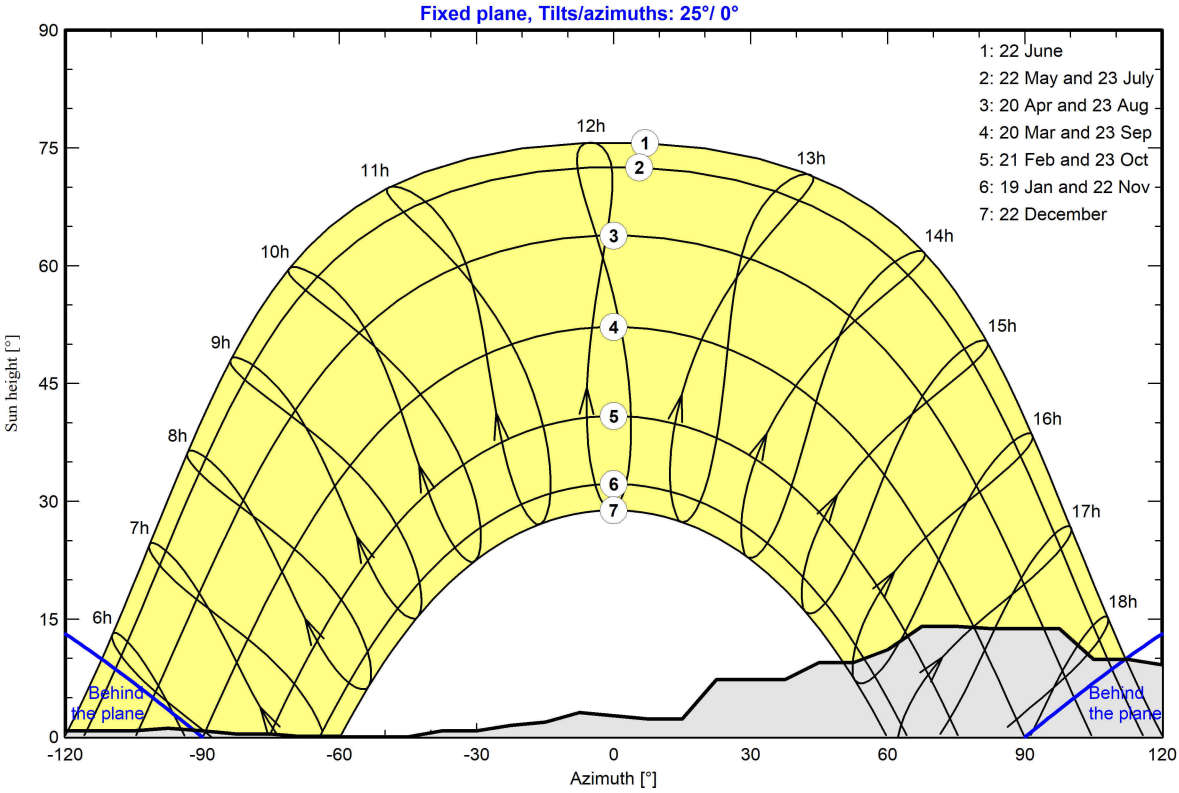
Horizon from PVGIS website API, Lat=37°43"2', Long=13°59"48', Alt=769m

Average Height	4.7 °	Albedo Factor	0.81
Diffuse Factor	0.97	Albedo Fraction	100 %

Horizon profile

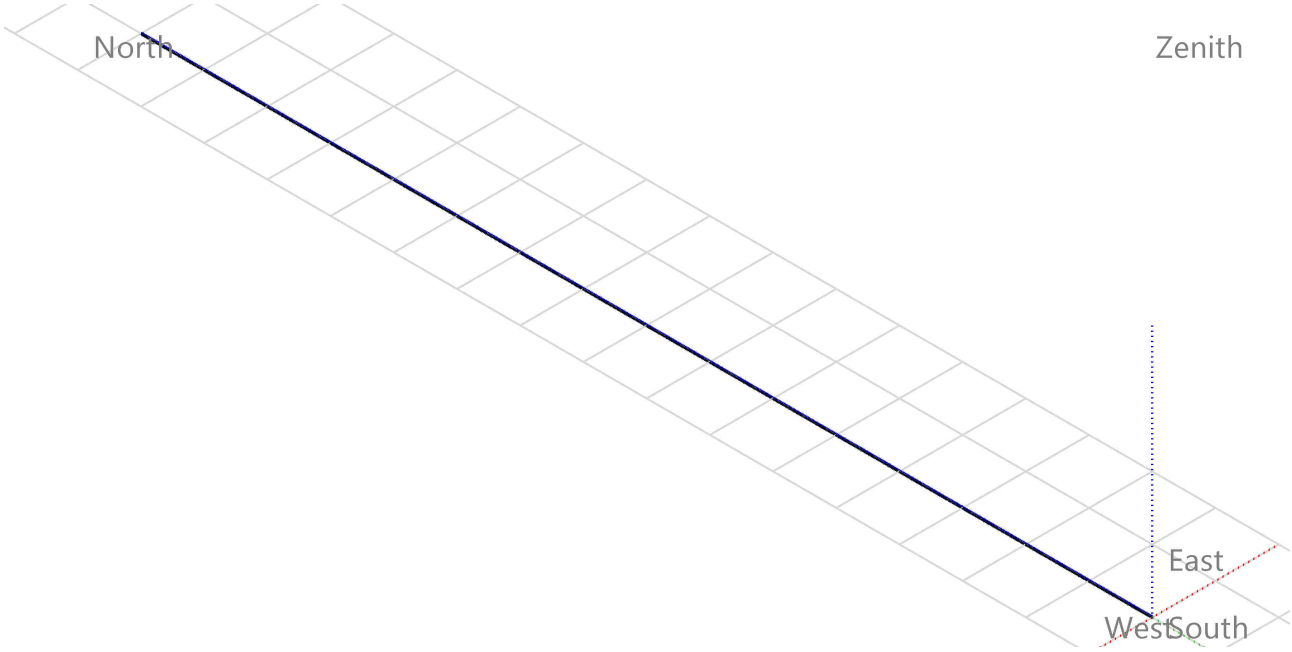
Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-105	-98
Height [°]	2.7	3.4	4.2	3.8	1.9	2.7	1.5	1.1	0.8	0.8	1.1
Azimuth [°]	-90	-83	-75	-68	-45	-38	-30	-23	-15	-8	0
Height [°]	0.8	0.4	0.4	0.0	0.0	0.8	0.8	1.5	1.9	3.1	2.7
Azimuth [°]	8	15	23	38	45	53	60	68	75	83	98
Height [°]	2.3	2.3	7.3	7.3	9.5	9.5	11.1	14.1	14.1	13.8	13.8
Azimuth [°]	105	113	120	128	135	143	150	158	165	173	180
Height [°]	9.9	9.9	9.2	7.6	7.6	4.6	4.6	3.8	2.7	3.1	2.7

Sun Paths (Height / Azimuth diagram)



Near shadings parameter

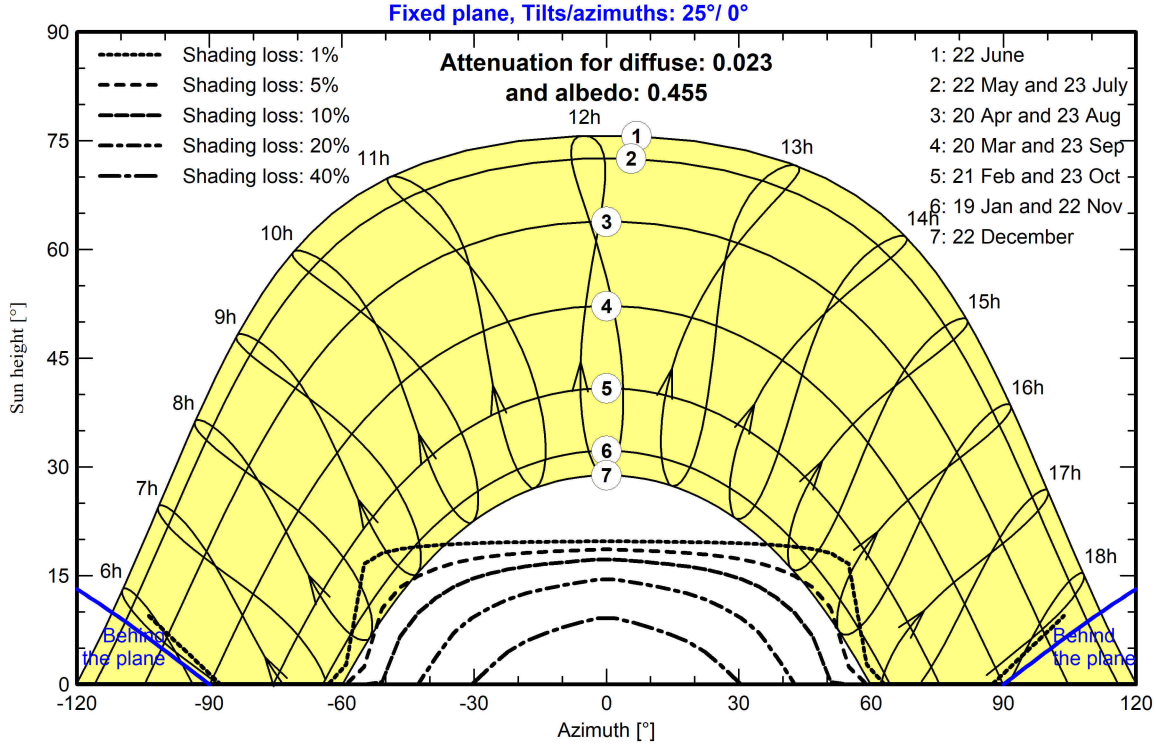
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 25°/ 0°

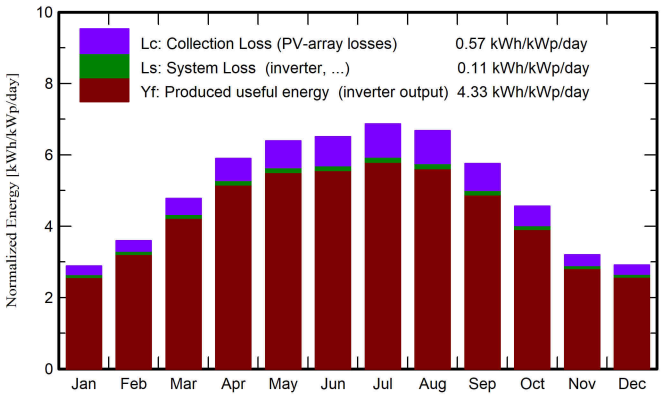


Main results

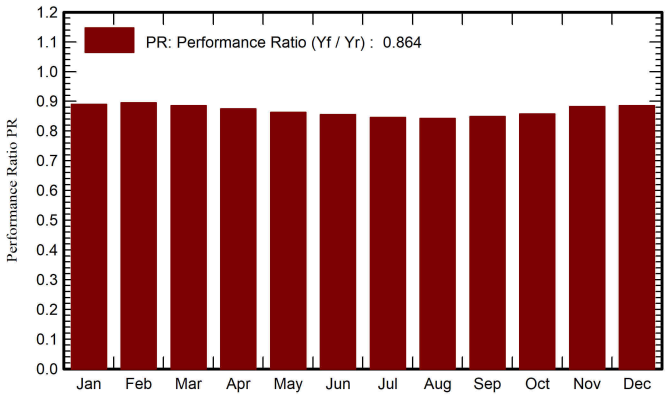
System Production

Produced Energy	13 GWh/year	Specific production	1580 kWh/kWp/year
		Performance Ratio PR	86.41 %

Normalized productions (per installed kWp)



Performance Ratio PR



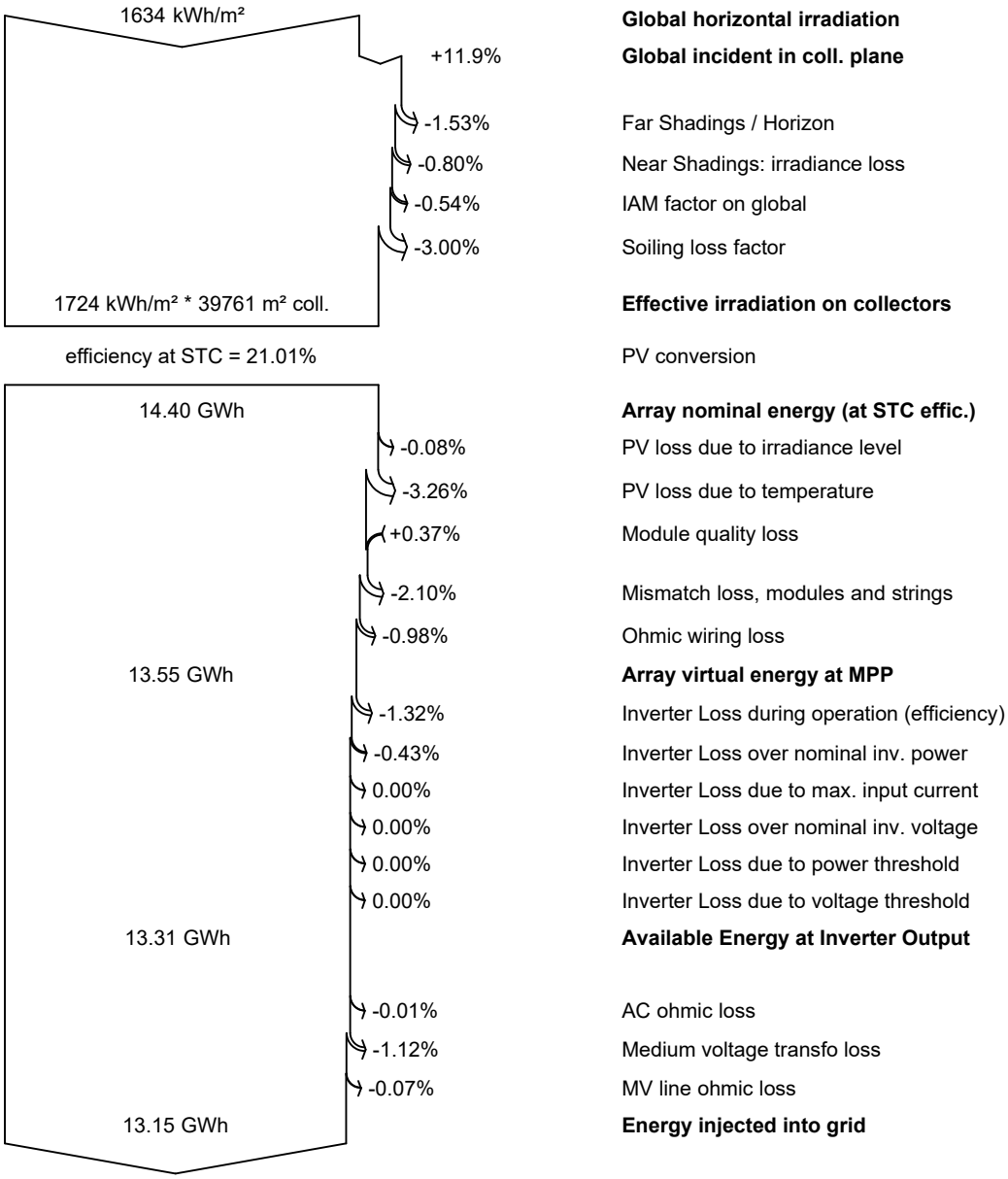
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray GWh	E_Grid GWh	PR ratio
January	60.2	25.26	7.79	89.5	83.5	0.683	0.663	0.890
February	78.5	42.54	7.70	100.7	94.0	0.770	0.750	0.895
March	125.7	57.77	10.01	148.1	139.0	1.119	1.091	0.885
April	163.4	68.24	12.21	177.1	166.9	1.320	1.288	0.875
May	200.7	71.62	16.45	198.1	187.8	1.457	1.422	0.862
June	204.6	76.14	20.38	195.2	185.0	1.423	1.389	0.856
July	219.4	70.74	23.45	212.8	202.1	1.533	1.496	0.845
August	196.9	65.62	23.71	207.0	196.2	1.486	1.450	0.842
September	148.4	52.75	20.23	172.7	162.8	1.250	1.219	0.849
October	109.3	42.46	17.16	141.5	132.3	1.037	1.010	0.858
November	69.1	35.49	12.79	96.1	89.8	0.725	0.705	0.882
December	57.6	21.92	9.29	90.4	84.2	0.686	0.666	0.886
Year	1633.8	630.56	15.14	1829.0	1723.7	13.488	13.149	0.864

Legends

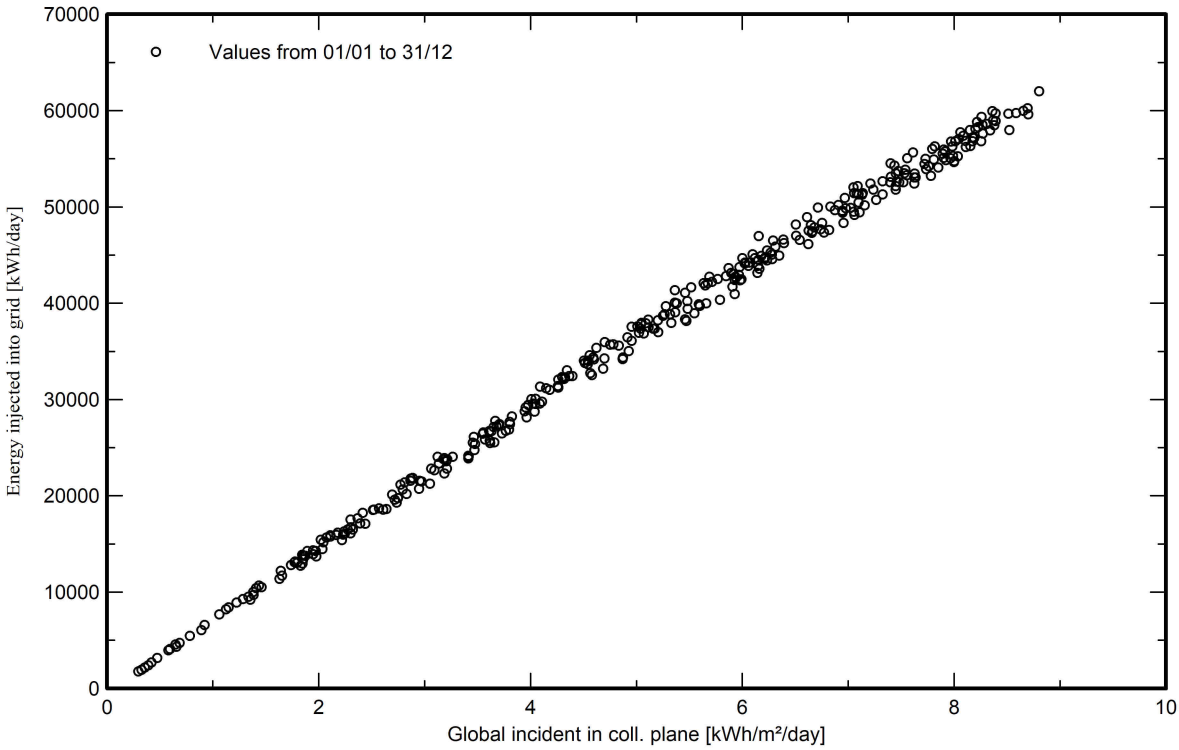
GlobHor	Global horizontal irradiation
DiffHor	Horizontal diffuse irradiation
T_Amb	Ambient Temperature
GlobInc	Global incident in coll. plane
GlobEff	Effective Global, corr. for IAM and shadings
EArray	Effective energy at the output of the array
E_Grid	Energy injected into grid
PR	Performance Ratio

Loss diagram

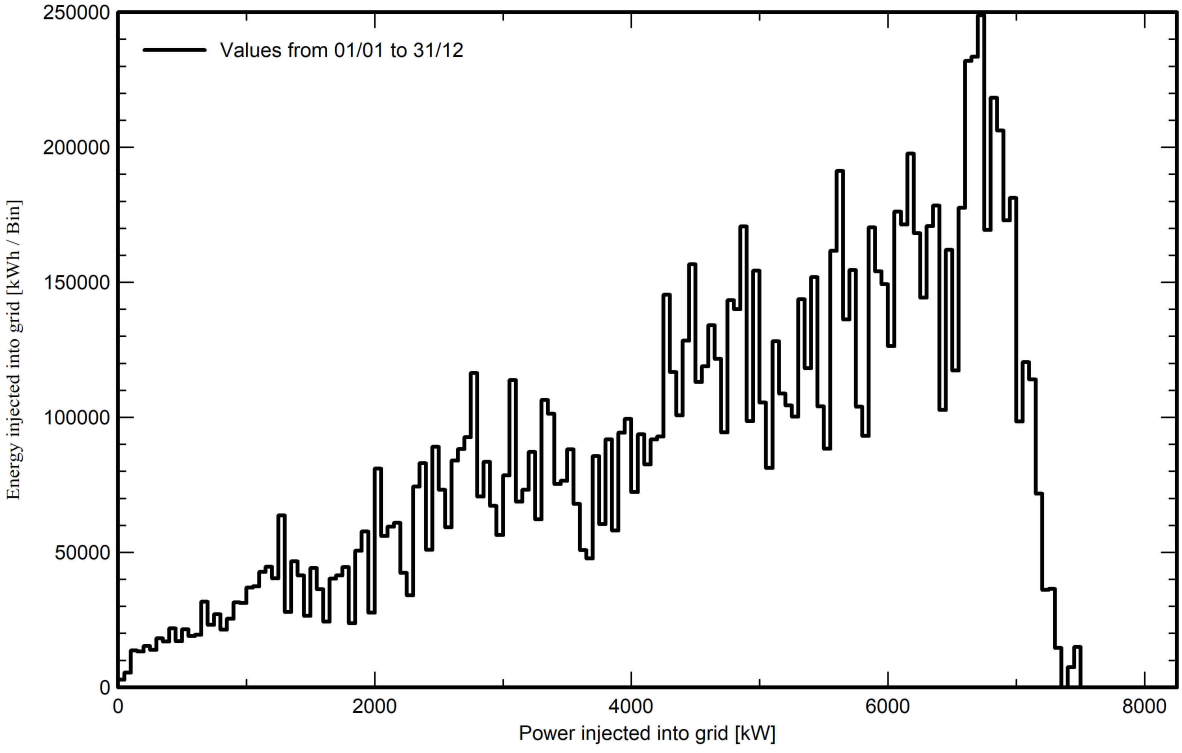


Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



Regione Siciliana

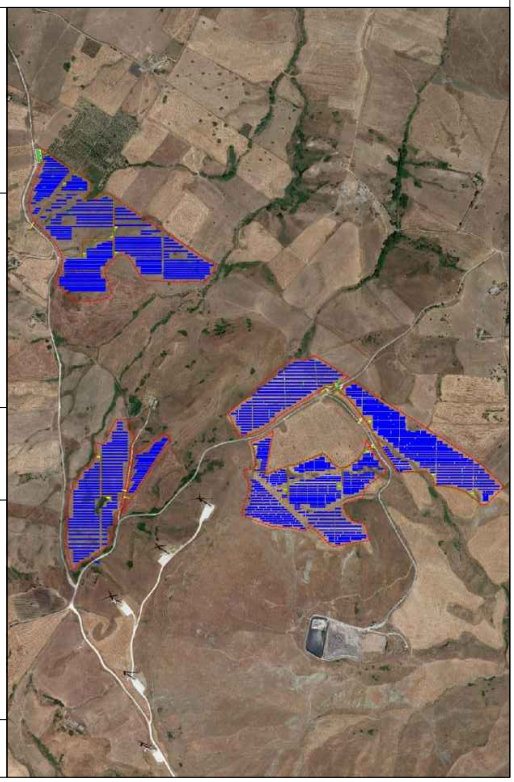
Città Metropolitana di Palermo | Comune di Castellana Sicula | Comune di Polizzi Generosa | Comune di Caltavuturo

Proponente

FLYNIS PV 3 S.r.l.

Via Statuto, 10 - 20121 Milano - Italy
pec: flynispv3srl@legalmail.it

Progetto Definitivo



Denominazione progetto:

REALIZZAZIONE IMPIANTO AGRIVOLTAICO "CONTRADA ALBERÌ"

Potenza nominale complessiva = 42473,60 kWp

Sito in: **COMUNI DI CASTELLANA SICULA, POLIZZI GENEROSA E CALTAVUTURO (PA)**

Titolo elaborato:

Stima producibilità impianto

Elaborato n. **EL08**

Scala --

Prog. Definitiva: Ing. Nicodemo Agostino
Flyren Development S.r.l.
Lungo Po Antonelli, 21, Torino (TO)

Progettisti : Ing. Nicodemo Agostino
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Collaboratori : Ing. Marco Pignolo
P.I. Alessandro Novella

COLLEGIO INGEGNERI PROVINCIA VERCELLI
SETTORE CIVILE E AMB. INDUSTR. - INFORM.
Dott. Ing. NICODEMO AGOSTINO
N° A 1265
SEZIONE A

REV.:	REDAZIONE:	CONTROLLO:	APPROVAZIONE :	DATA:
00	Ing. N.Agostino	Dott.ssa Eliana Santoro		20/06/2022
01				
02				

FIRMA/TIMBRO COMMITTENTE:

FLYREN
THE CULTURE OF CLEAN ENERGY

Flyren Development S.r.l.
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tel: 011/ 8123575 - fax: 011/ 8127528
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web: www.flyren.eu
C.F. / P. IVA n. 12062400010

Version 7.2.16

PVsyst - Simulation report

Grid-Connected System

Project: CONTRADA ALBERI LOTTO2

Variant: Nuova variante di simulazione

Sheds, single array

System power: 8320 kWp

Contrada Case Alberì - Italy

Author

AENNE INGEGNERIA di AGOSTINO Ing. NICODEMO (Italy)

Project summary

Geographical Site
Contrada Case Alberì
Italy

Situation

Latitude	37.72 °N
Longitude	14.00 °E
Altitude	769 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Contrada Case Alberì
Meteonorm 8.0 (1986-2005), Sat=100% - Sintetico

System summary

Grid-Connected System
Sheds, single array

PV Field Orientation
Fixed plane
Tilt/Azimuth 25 / 0 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	12800 units
Pnom total	8320 kWp

Inverters

Nb. of units	40 units
Pnom total	8000 kWac
Pnom ratio	1.040

Results summary

Produced Energy	13 GWh/year	Specific production	1580 kWh/kWp/year	Perf. Ratio PR	86.41 %

Table of contents

General parameters

Grid-Connected System

Sheds, single array

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	25 / 0 °

Sheds configuration	
Nb. of sheds	800 units
Single array	
Sizes	
Sheds spacing	10.00 m
Collector width	4.79 m
Ground Cov. Ratio (GCR)	47.9 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m
Shading limit angle	
Limit profile angle	19.8 °

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon

Average Height 4.7 °

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS7N-650MB-AG 1500V
(Custom parameters definition)	
Unit Nom. Power	650 Wp
Number of PV modules	12800 units
Nominal (STC)	8320 kWp

Inverter

Manufacturer	Huawei Technologies
Model	SUN 2000-215KTL-H3
(Custom parameters definition)	
Unit Nom. Power	200 kWac
Number of inverters	40 units
Total power	8000 kWac

Array #1 - Sottocampo #1

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #2 - Sottocampo #2

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #3 - Sottocampo #3

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #4 - Sottocampo #4

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #5 - Sottocampo #5

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #6 - Sottocampo #6

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #7 - Sottocampo #7

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #8 - Sottocampo #8

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #9 - Sottocampo #9

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #10 - Sottocampo #10

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #11 - Sottocampo #11

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #12 - Sottocampo #12

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #13 - Sottocampo #13

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #14 - Sottocampo #14

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #15 - Sottocampo #15

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #16 - Sottocampo #16

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #17 - Sottocampo #17

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #18 - Sottocampo #18

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #19 - Sottocampo #19

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #20 - Sottocampo #20

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #21 - Sottocampo #21

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #22 - Sottocampo #22

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #23 - Sottocampo #23

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #24 - Sottocampo #24

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #25 - Sottocampo #25

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #26 - Sottocampo #26

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #27 - Sottocampo #27

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #28 - Sottocampo #28

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #29 - Sottocampo #29

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #30 - Sottocampo #30

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #31 - Sottocampo #31

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #32 - Sottocampo #32

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #33 - Sottocampo #33

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #34 - Sottocampo #34

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #35 - Sottocampo #35

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #36 - Sottocampo #36

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #37 - Sottocampo #37

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #38 - Sottocampo #38

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #39 - Sottocampo #39

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #40 - Sottocampo #40

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Total PV power

Nominal (STC)	8320 kWp	Total power	8000 kWac
Total	12800 modules	Number of inverters	40 units
Module area	39761 m²	Pnom ratio	1.04

Array losses

Array Soiling Losses
Loss Fraction 3.0 %

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

DC wiring losses
Global array res. 101 mΩ
Global wiring resistance 2.5 mΩ
Loss Fraction 1.5 % at STC

Module Quality Loss
Loss Fraction -0.4 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

IAM loss factor
Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

AC wiring losses

Inv. output line up to MV transfo
Inverter voltage 800 Vac tri
Loss Fraction 0.02 % at STC

Inverter: SUN 2000-215KTL-H3
Wire section (1 Inv.) Alu 1 x 3 x 240 mm²
Wires length 200 m

Inverter: SUN 2000-215KTL-H3
Wire section (39 Inv.) Alu 39 x 3 x 70 mm²
Average wires length 0 m

MV line up to Injection
MV Voltage 20 kV
Average each inverter
Wires Alu 3 x 150 mm²
Length 800 m
Loss Fraction 0.11 % at STC

AC losses in transformers

MV transfo
Grid voltage 20 kV

Operating losses at STC
Nominal power at STC 8212 kVA
Iron loss (24/24 Connexion) 2.74 kW/Inv.
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 2.34 mΩ/inv.
Loss Fraction 1.00 % at STC

Horizon definition

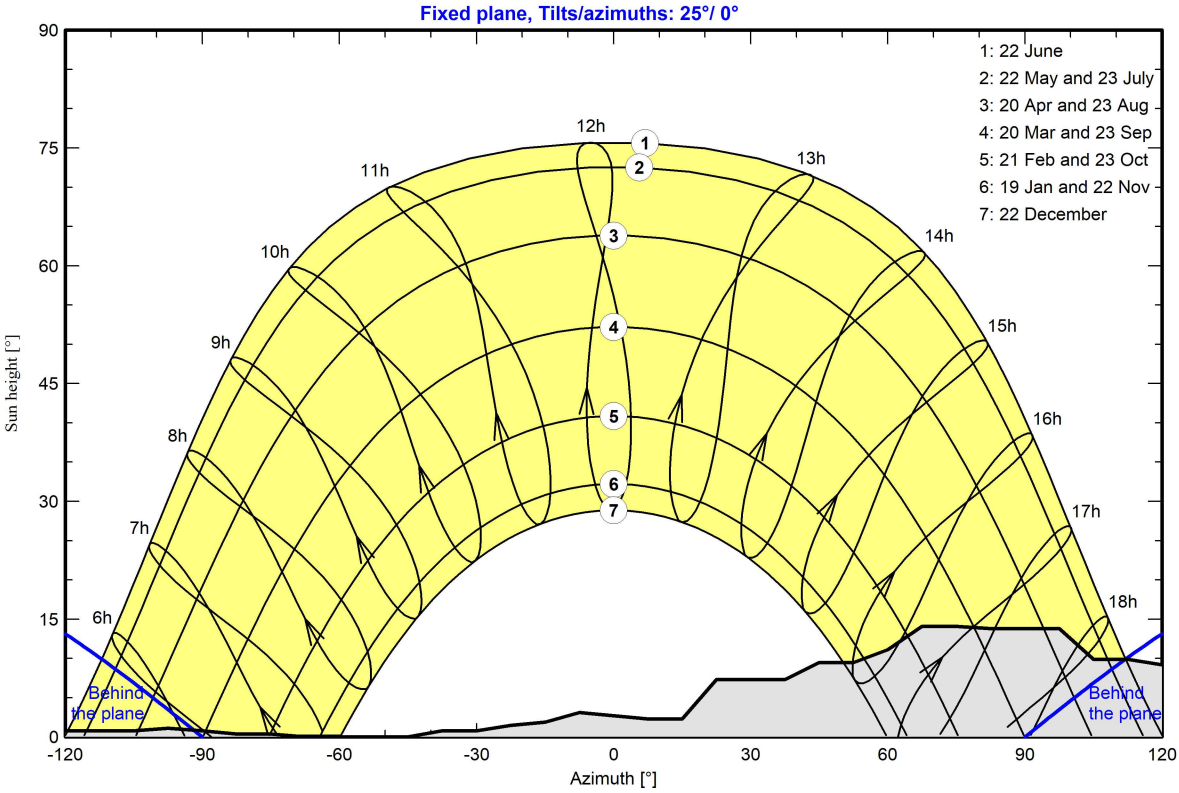
Horizon from PVGIS website API, Lat=37°43"2', Long=13°59"48', Alt=769m

Average Height	4.7 °	Albedo Factor	0.81
Diffuse Factor	0.97	Albedo Fraction	100 %

Horizon profile

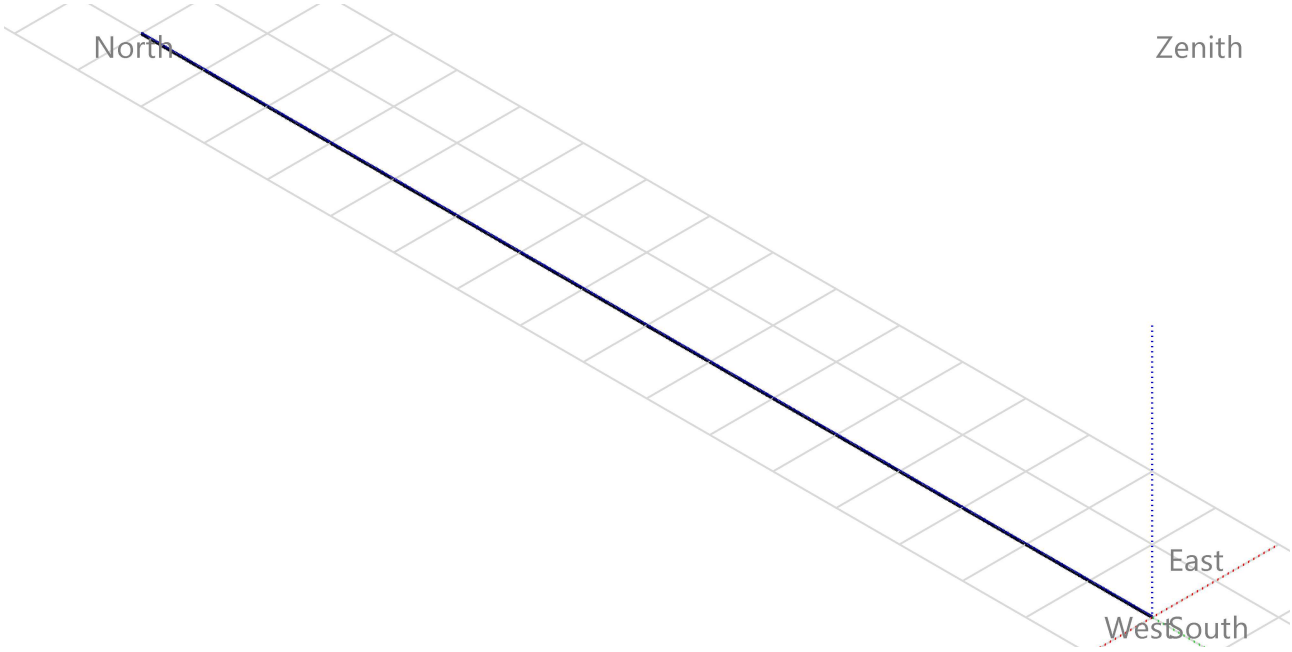
Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-105	-98
Height [°]	2.7	3.4	4.2	3.8	1.9	2.7	1.5	1.1	0.8	0.8	1.1
Azimuth [°]	-90	-83	-75	-68	-45	-38	-30	-23	-15	-8	0
Height [°]	0.8	0.4	0.4	0.0	0.0	0.8	0.8	1.5	1.9	3.1	2.7
Azimuth [°]	8	15	23	38	45	53	60	68	75	83	98
Height [°]	2.3	2.3	7.3	7.3	9.5	9.5	11.1	14.1	14.1	13.8	13.8
Azimuth [°]	105	113	120	128	135	143	150	158	165	173	180
Height [°]	9.9	9.9	9.2	7.6	7.6	4.6	4.6	3.8	2.7	3.1	2.7

Sun Paths (Height / Azimuth diagram)



Near shadings parameter

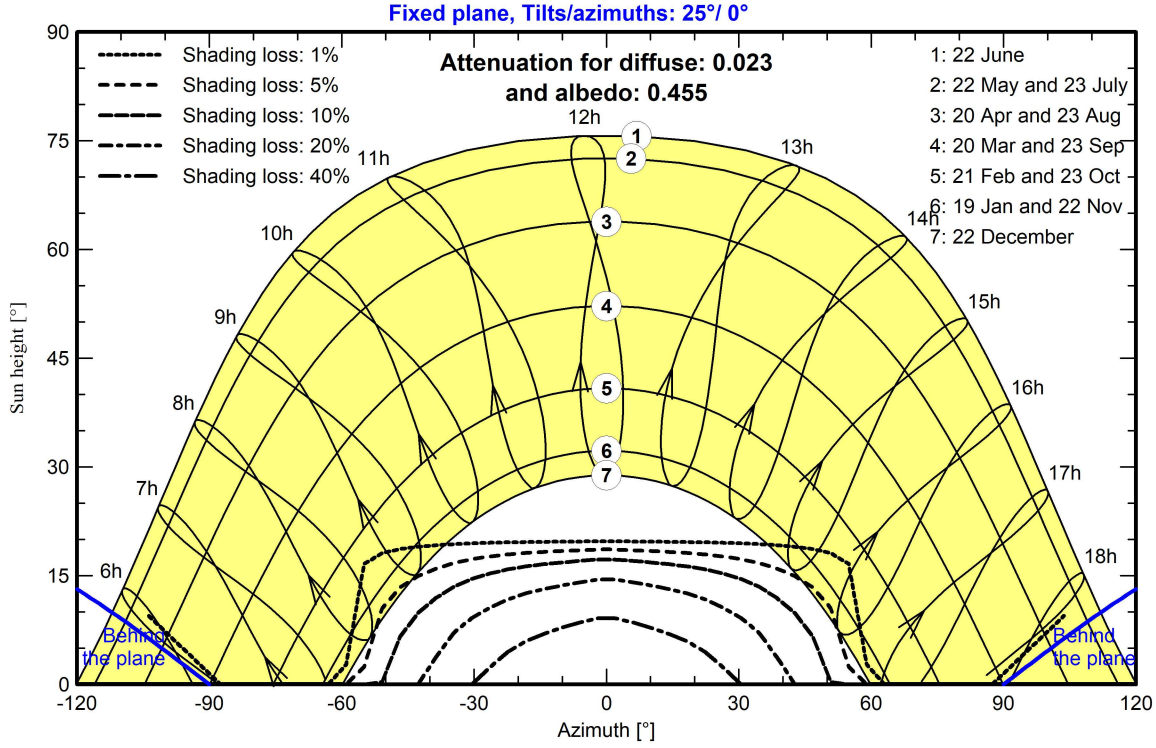
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 25°/ 0°

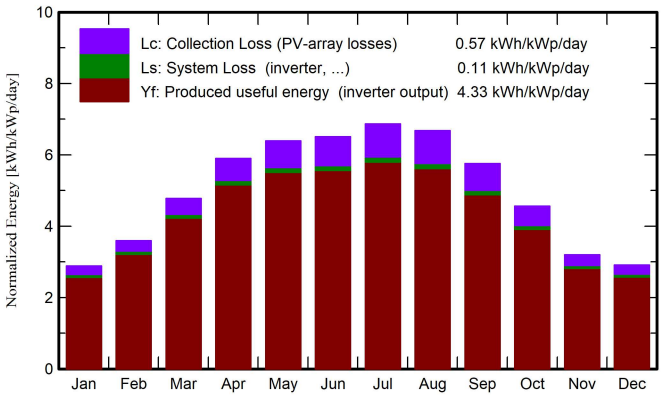


Main results

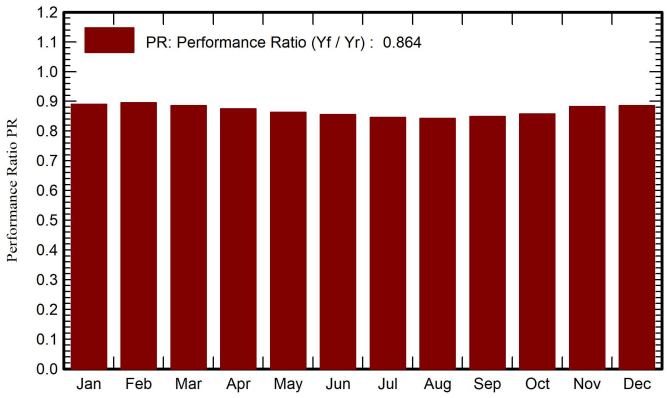
System Production

Produced Energy	13 GWh/year	Specific production	1580 kWh/kWp/year
		Performance Ratio PR	86.41 %

Normalized productions (per installed kWp)



Performance Ratio PR



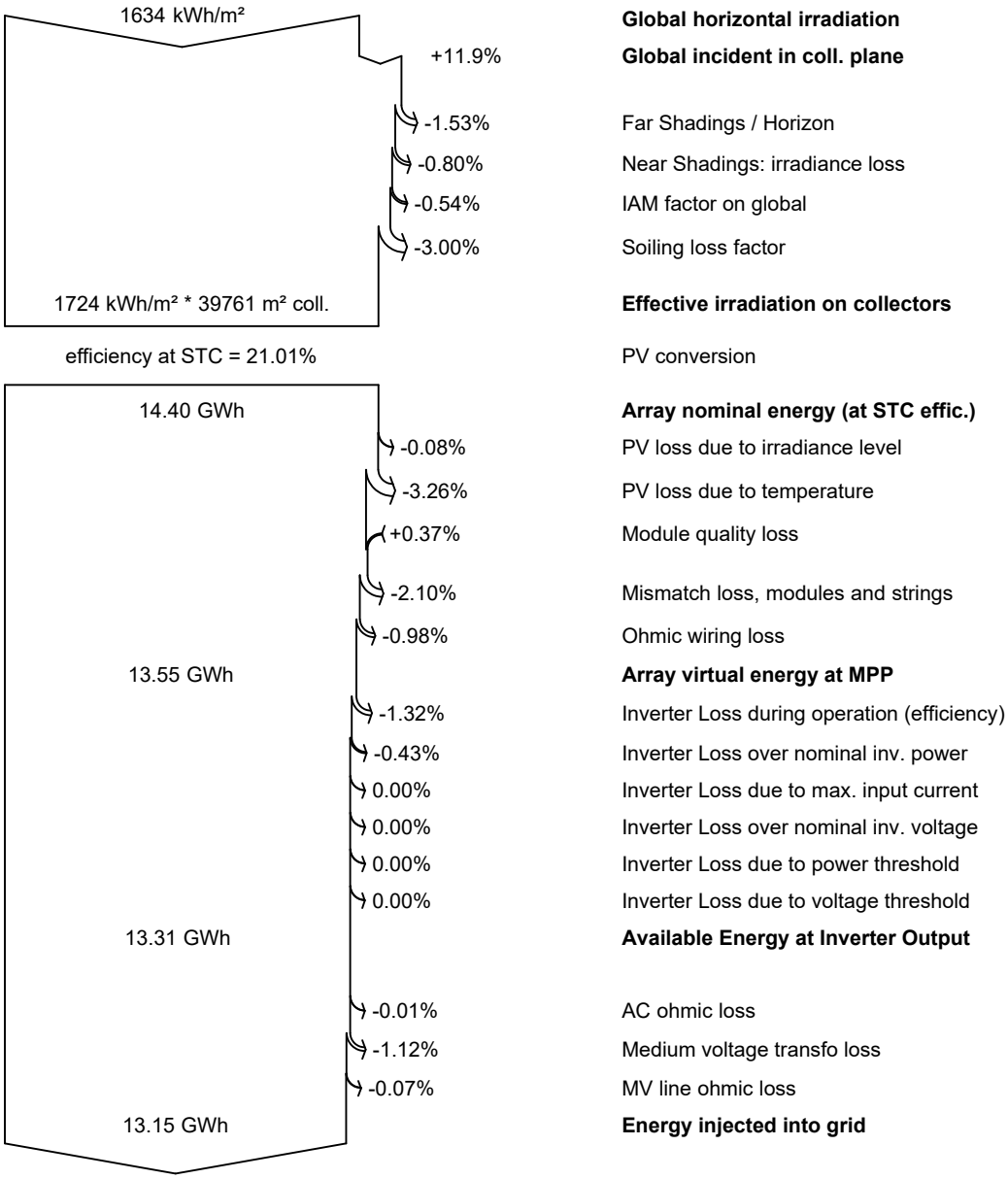
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray GWh	E_Grid GWh	PR ratio
January	60.2	25.26	7.79	89.5	83.5	0.683	0.663	0.890
February	78.5	42.54	7.70	100.7	94.0	0.770	0.750	0.895
March	125.7	57.77	10.01	148.1	139.0	1.119	1.091	0.885
April	163.4	68.24	12.21	177.1	166.9	1.320	1.288	0.875
May	200.7	71.62	16.45	198.1	187.8	1.457	1.422	0.862
June	204.6	76.14	20.38	195.2	185.0	1.423	1.389	0.856
July	219.4	70.74	23.45	212.8	202.1	1.533	1.496	0.845
August	196.9	65.62	23.71	207.0	196.2	1.486	1.450	0.842
September	148.4	52.75	20.23	172.7	162.8	1.250	1.219	0.849
October	109.3	42.46	17.16	141.5	132.3	1.037	1.010	0.858
November	69.1	35.49	12.79	96.1	89.8	0.725	0.705	0.882
December	57.6	21.92	9.29	90.4	84.2	0.686	0.666	0.886
Year	1633.8	630.56	15.14	1829.0	1723.7	13.488	13.149	0.864

Legends

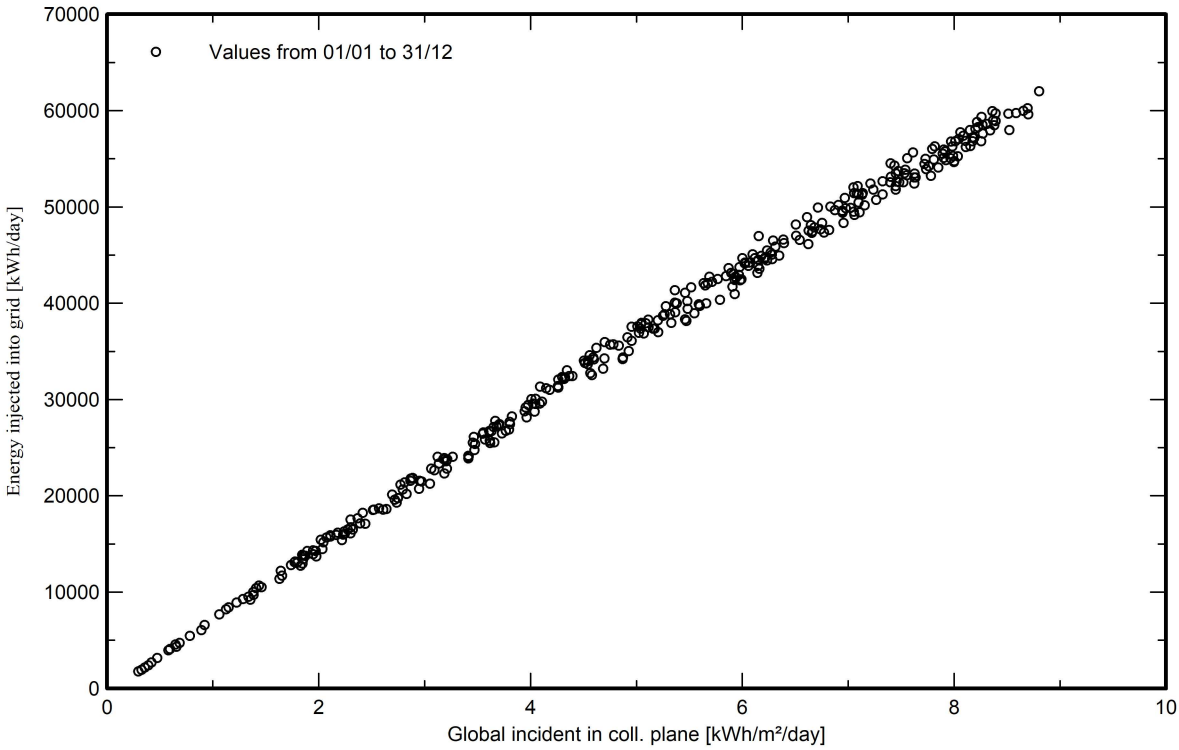
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		

Loss diagram

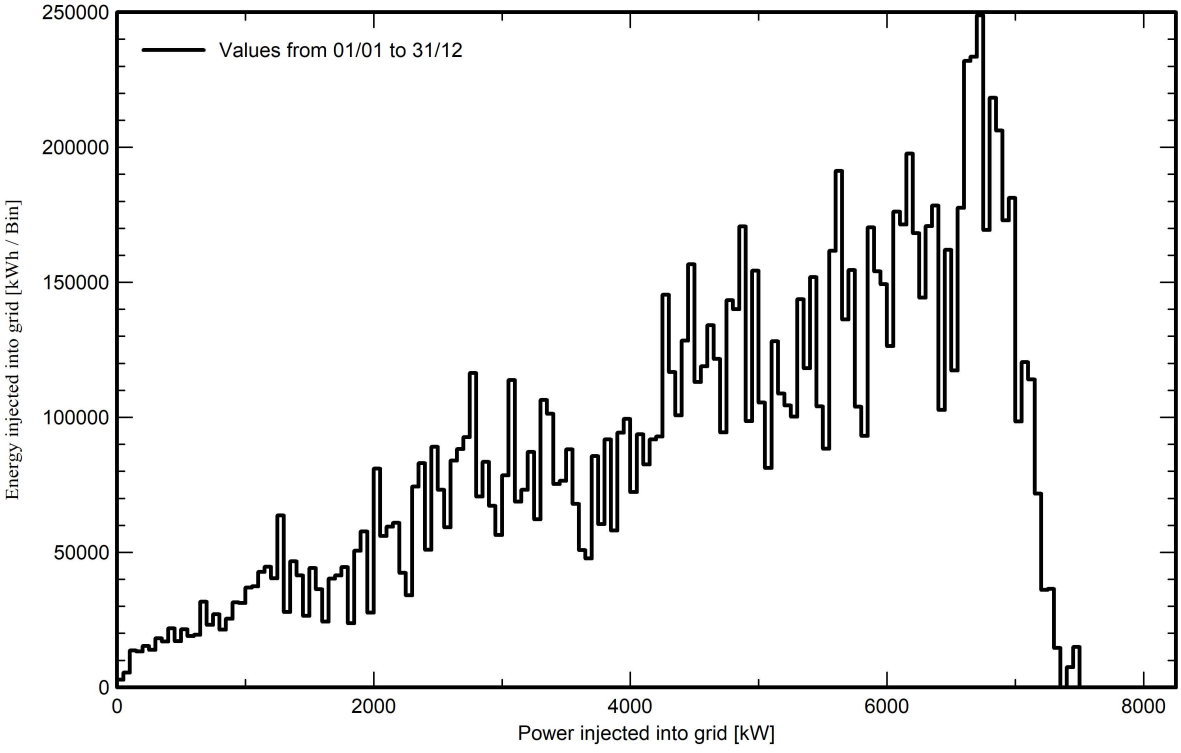


Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



Version 7.2.16

PVsyst - Simulation report

Grid-Connected System

Project: CONTRADA ALBERI LOTTO3

Variant: Nuova variante di simulazione

Sheds, single array

System power: 8320 kWp

Contrada Case Alberì - Italy

Author

AENNE INGEGNERIA di AGOSTINO Ing. NICODEMO (Italy)

Project summary

Geographical Site
Contrada Case Alberì
Italy

Situation

Latitude	37.72 °N
Longitude	14.00 °E
Altitude	769 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Contrada Case Alberì
Meteonorm 8.0 (1986-2005), Sat=100% - Sintetico

System summary

Grid-Connected System
Sheds, single array

PV Field Orientation
Fixed plane
Tilt/Azimuth 25 / 0 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	12800 units
Pnom total	8320 kWp

Inverters

Nb. of units	40 units
Pnom total	8000 kWac
Pnom ratio	1.040

Results summary

Produced Energy	13 GWh/year	Specific production	1580 kWh/kWp/year	Perf. Ratio PR	86.41 %

Table of contents

General parameters

Grid-Connected System

Sheds, single array

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	25 / 0 °

Sheds configuration	
Nb. of sheds	800 units
Single array	
Sizes	
Sheds spacing	10.00 m
Collector width	4.79 m
Ground Cov. Ratio (GCR)	47.9 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m
Shading limit angle	
Limit profile angle	19.8 °

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon

Average Height 4.7 °

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS7N-650MB-AG 1500V
(Custom parameters definition)	
Unit Nom. Power	650 Wp
Number of PV modules	12800 units
Nominal (STC)	8320 kWp

Inverter

Manufacturer	Huawei Technologies
Model	SUN 2000-215KTL-H3
(Custom parameters definition)	
Unit Nom. Power	200 kWac
Number of inverters	40 units
Total power	8000 kWac

Array #1 - Sottocampo #1

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #2 - Sottocampo #2

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #3 - Sottocampo #3

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #4 - Sottocampo #4

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #5 - Sottocampo #5

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #6 - Sottocampo #6

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #7 - Sottocampo #7

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #8 - Sottocampo #8

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #9 - Sottocampo #9

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #10 - Sottocampo #10

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #11 - Sottocampo #11

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #12 - Sottocampo #12

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #13 - Sottocampo #13

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #14 - Sottocampo #14

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #15 - Sottocampo #15

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #16 - Sottocampo #16

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #17 - Sottocampo #17

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #18 - Sottocampo #18

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #19 - Sottocampo #19

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #20 - Sottocampo #20

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #21 - Sottocampo #21

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #22 - Sottocampo #22

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #23 - Sottocampo #23

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #24 - Sottocampo #24

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #25 - Sottocampo #25

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #26 - Sottocampo #26

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #27 - Sottocampo #27

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #28 - Sottocampo #28

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #29 - Sottocampo #29

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #30 - Sottocampo #30

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #31 - Sottocampo #31

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #32 - Sottocampo #32

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #33 - Sottocampo #33

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #34 - Sottocampo #34

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #35 - Sottocampo #35

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #36 - Sottocampo #36

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #37 - Sottocampo #37

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #38 - Sottocampo #38

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #39 - Sottocampo #39

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #40 - Sottocampo #40

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Total PV power

Nominal (STC)	8320 kWp
Total	12800 modules
Module area	39761 m²

Total inverter power

Total power	8000 kWac
Number of inverters	40 units
Pnom ratio	1.04

Array losses

Array Soiling Losses

Loss Fraction 3.0 %

Thermal Loss factor

Module temperature according to irradiance

Uc (const)	29.0 W/m²K
Uv (wind)	0.0 W/m²K/m/s

DC wiring losses

Global array res.	101 mΩ
Global wiring resistance	2.5 mΩ
Loss Fraction	1.5 % at STC

Module Quality Loss

Loss Fraction -0.4 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

IAM loss factor

Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage	800 Vac tri
Loss Fraction	0.02 % at STC

Inverter: SUN 2000-215KTL-H3		**Inverter: SUN 2000-215KTL-H3**	
Wire section (1 Inv.)	Alu 1 x 3 x 240 mm²	Wire section (39 Inv.)	Alu 39 x 3 x 70 mm²
Wires length	200 m	Average wires length	0 m

MV line up to Injection

MV Voltage	20 kV
Average each inverter	
Wires	Alu 3 x 150 mm²
Length	800 m
Loss Fraction	0.11 % at STC

AC losses in transformers

MV transfo

Grid voltage	20 kV
Operating losses at STC	
Nominal power at STC	8212 kVA
Iron loss (24/24 Connexion)	2.74 kW/Inv.
Loss Fraction	0.10 % at STC
Coils equivalent resistance	3 x 2.34 mΩ/inv.
Loss Fraction	1.00 % at STC

Horizon definition

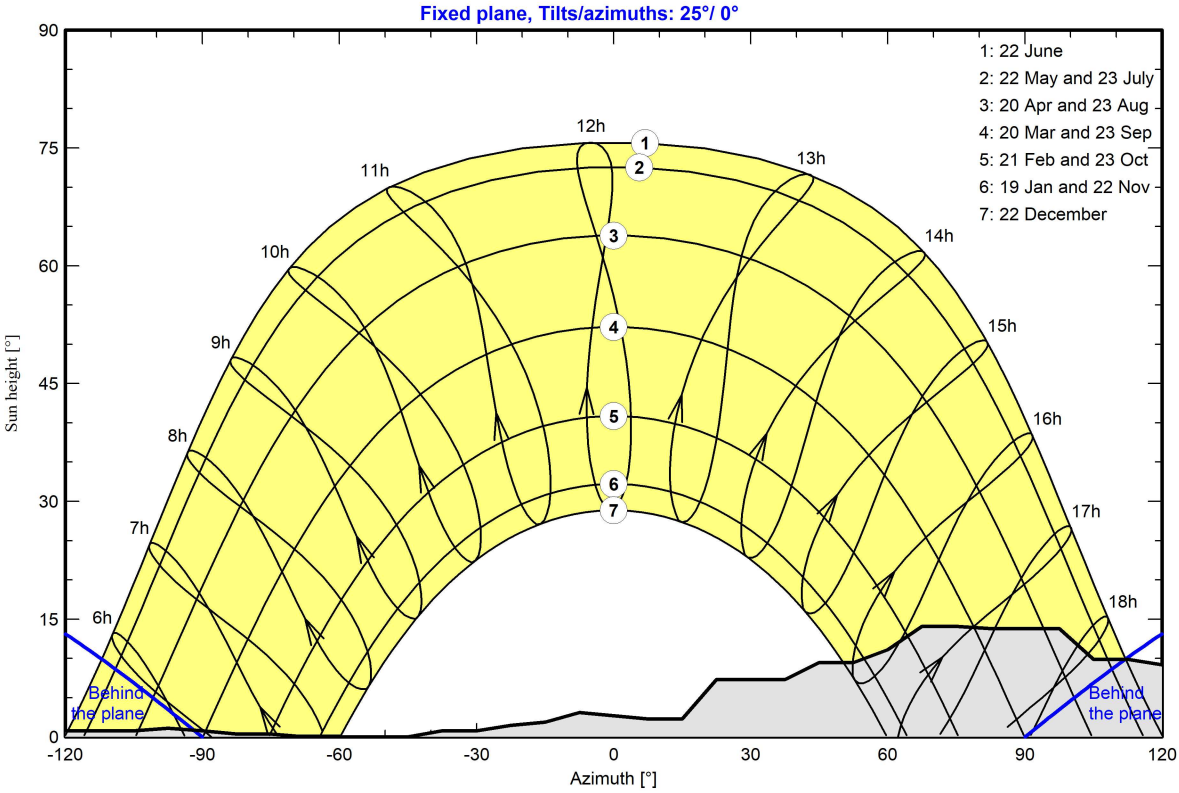
Horizon from PVGIS website API, Lat=37°43"2', Long=13°59"48', Alt=769m

Average Height	4.7 °	Albedo Factor	0.81
Diffuse Factor	0.97	Albedo Fraction	100 %

Horizon profile

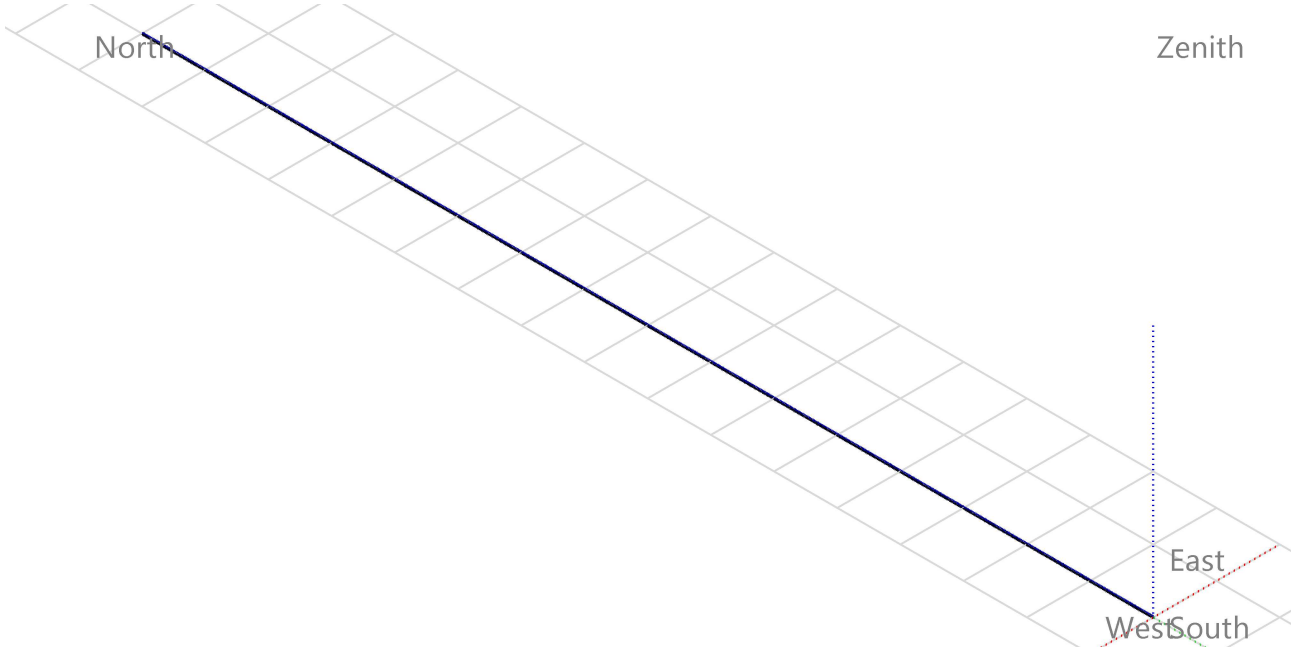
Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-105	-98
Height [°]	2.7	3.4	4.2	3.8	1.9	2.7	1.5	1.1	0.8	0.8	1.1
Azimuth [°]	-90	-83	-75	-68	-45	-38	-30	-23	-15	-8	0
Height [°]	0.8	0.4	0.4	0.0	0.0	0.8	0.8	1.5	1.9	3.1	2.7
Azimuth [°]	8	15	23	38	45	53	60	68	75	83	98
Height [°]	2.3	2.3	7.3	7.3	9.5	9.5	11.1	14.1	14.1	13.8	13.8
Azimuth [°]	105	113	120	128	135	143	150	158	165	173	180
Height [°]	9.9	9.9	9.2	7.6	7.6	4.6	4.6	3.8	2.7	3.1	2.7

Sun Paths (Height / Azimuth diagram)



Near shadings parameter

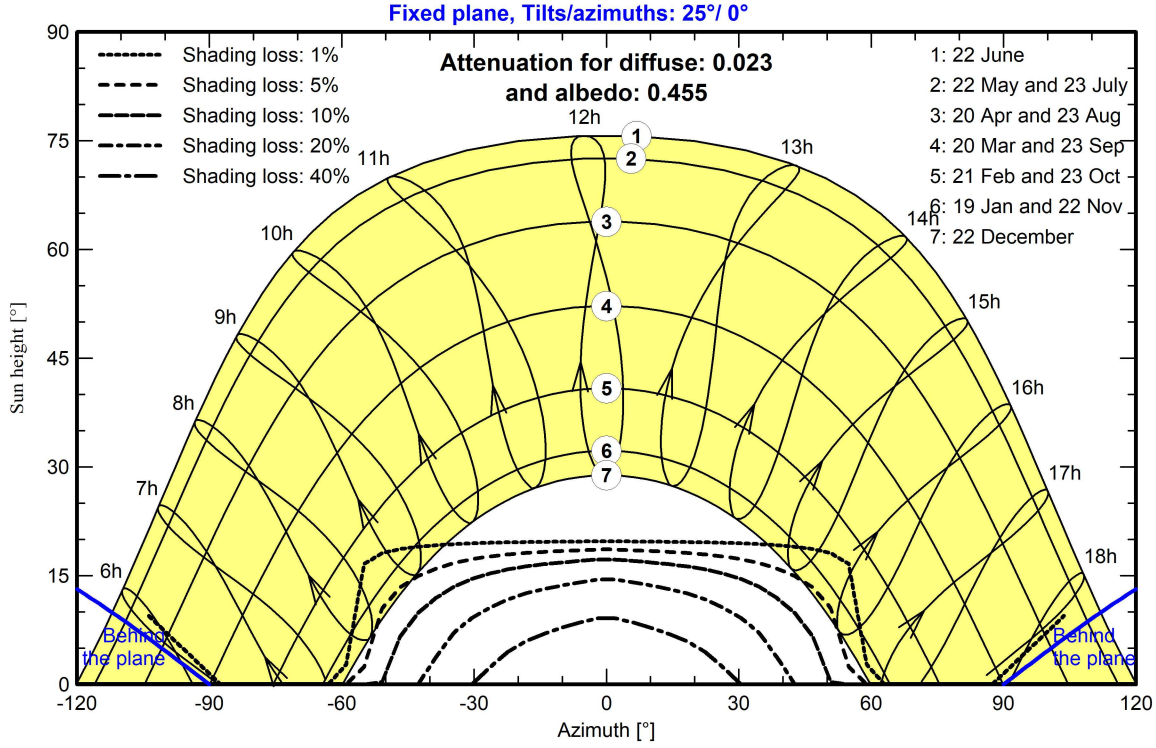
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 25°/ 0°

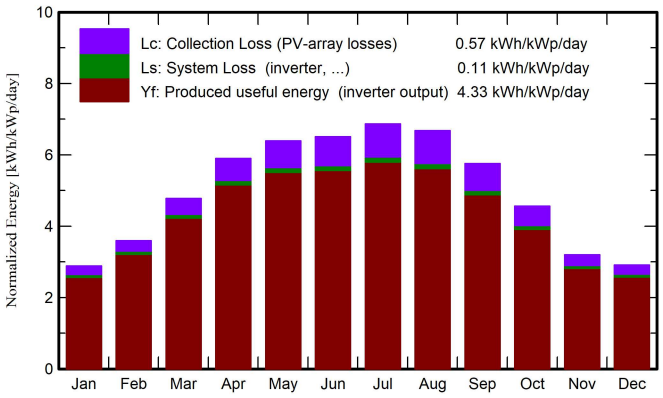


Main results

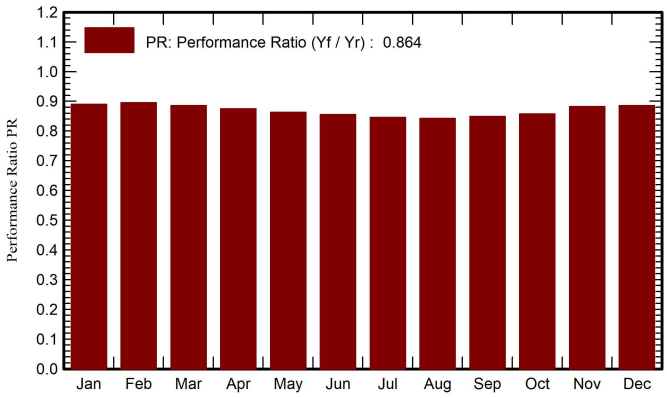
System Production

Produced Energy	13 GWh/year	Specific production	1580 kWh/kWp/year
		Performance Ratio PR	86.41 %

Normalized productions (per installed kWp)



Performance Ratio PR



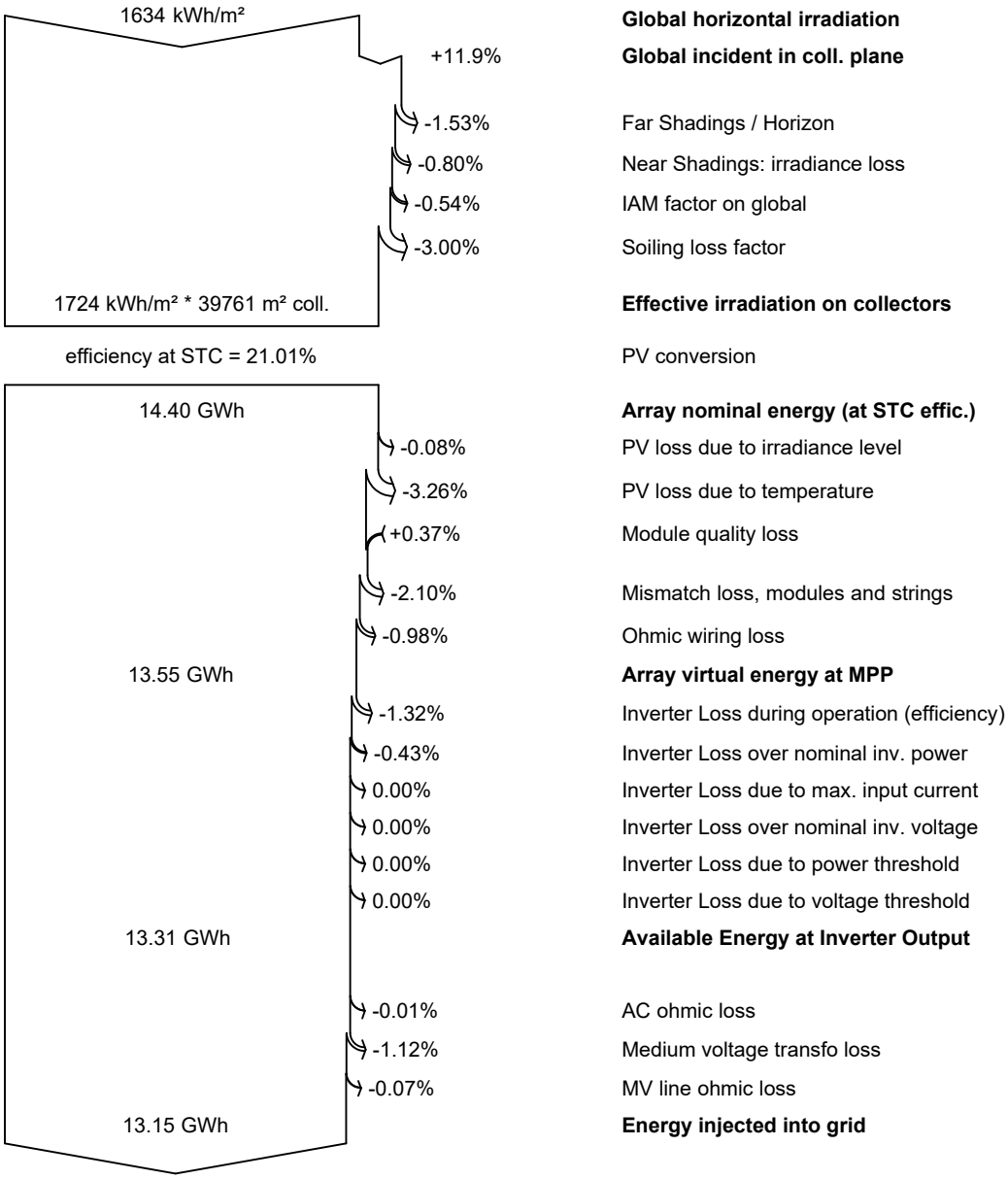
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray GWh	E_Grid GWh	PR ratio
January	60.2	25.26	7.79	89.5	83.5	0.683	0.663	0.890
February	78.5	42.54	7.70	100.7	94.0	0.770	0.750	0.895
March	125.7	57.77	10.01	148.1	139.0	1.119	1.091	0.885
April	163.4	68.24	12.21	177.1	166.9	1.320	1.288	0.875
May	200.7	71.62	16.45	198.1	187.8	1.457	1.422	0.862
June	204.6	76.14	20.38	195.2	185.0	1.423	1.389	0.856
July	219.4	70.74	23.45	212.8	202.1	1.533	1.496	0.845
August	196.9	65.62	23.71	207.0	196.2	1.486	1.450	0.842
September	148.4	52.75	20.23	172.7	162.8	1.250	1.219	0.849
October	109.3	42.46	17.16	141.5	132.3	1.037	1.010	0.858
November	69.1	35.49	12.79	96.1	89.8	0.725	0.705	0.882
December	57.6	21.92	9.29	90.4	84.2	0.686	0.666	0.886
Year	1633.8	630.56	15.14	1829.0	1723.7	13.488	13.149	0.864

Legends

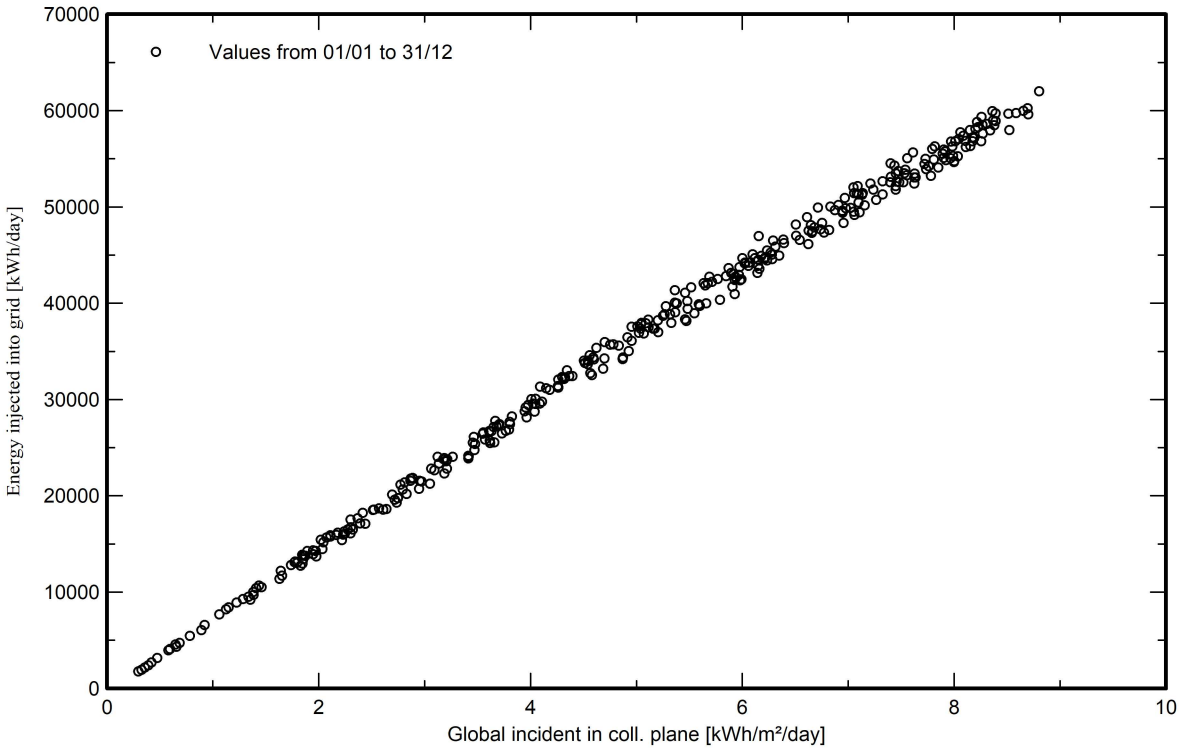
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		

Loss diagram

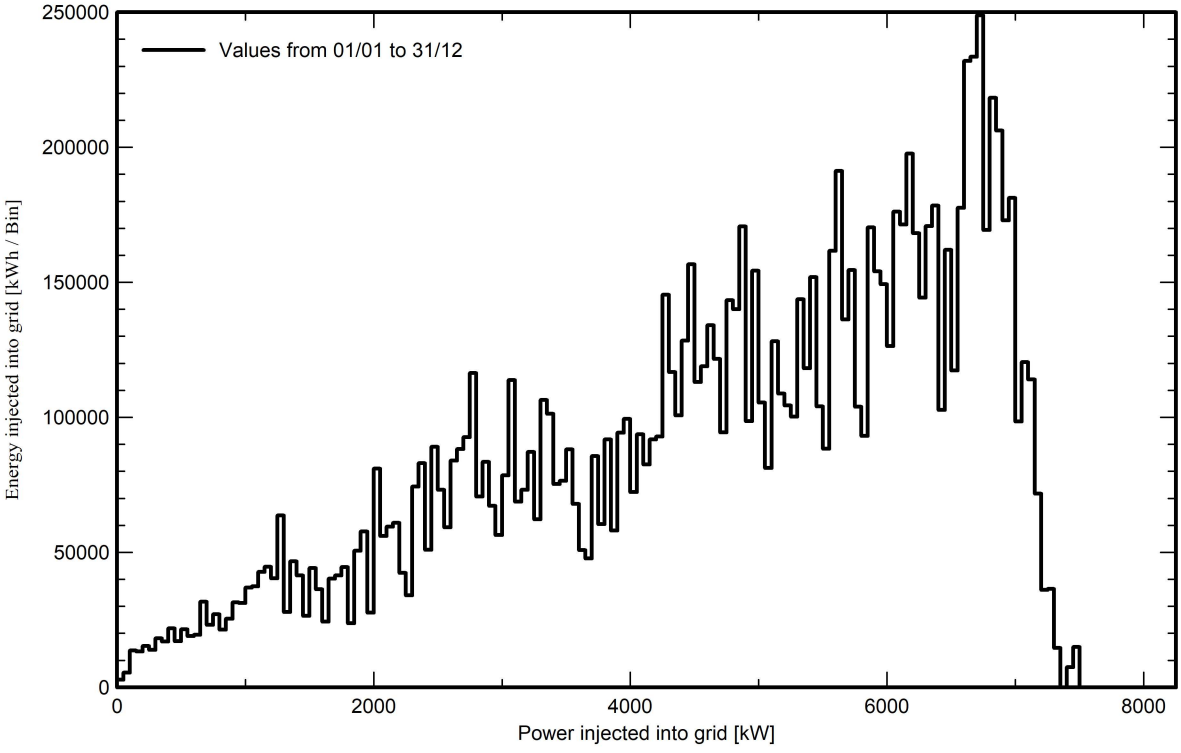


Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



Version 7.2.16

PVsyst - Simulation report

Grid-Connected System

Project: CONTRADA ALBERI LOTTO 4

Variant: Nuova variante di simulazione

Sheds, single array

System power: 8861 kWp

Contrada Case Alberì - Italy

Author

AENNE INGEGNERIA di AGOSTINO Ing. NICODEMO (Italy)

PVsyst V7.2.16
VC0, Simulation date:
07/07/22 10:16
with v7.2.16

Project summary

Geographical Site
Contrada Case Alberì
Italy

Situation

Latitude	37.72 °N
Longitude	14.00 °E
Altitude	769 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Contrada Case Alberì
Meteonorm 8.0 (1986-2005), Sat=100% - Sintetico

System summary

Grid-Connected System
Sheds, single array

PV Field Orientation
Fixed plane
Tilt/Azimuth 25 / 0 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	13632 units
Pnom total	8861 kWp

Inverters

Nb. of units	38 units
Pnom total	7600 kWac
Pnom ratio	1.166

Results summary

Produced Energy	14 GWh/year	Specific production	1574 kWh/kWp/year	Perf. Ratio PR	86.06 %

Table of contents

General parameters

Grid-Connected System

Sheds, single array

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	25 / 0 °

Sheds configuration	
Nb. of sheds	800 units
Single array	
Sizes	
Sheds spacing	10.00 m
Collector width	4.79 m
Ground Cov. Ratio (GCR)	47.9 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m
Shading limit angle	
Limit profile angle	19.8 °

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon

Average Height 4.7 °

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS7N-650MB-AG 1500V
(Custom parameters definition)	
Unit Nom. Power	650 Wp
Number of PV modules	13632 units
Nominal (STC)	8861 kWp

Inverter

Manufacturer	Huawei Technologies
Model	SUN 2000-215KTL-H3
(Custom parameters definition)	
Unit Nom. Power	200 kWac
Number of inverters	38 units
Total power	7600 kWac

Array #1 - Sottocampo #1

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #2 - Sottocampo #2

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #3 - Sottocampo #3

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

PV Array Characteristics

Array #4 - Sottocampo #4

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #5 - Sottocampo #5

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #6 - Sottocampo #6

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #7 - Sottocampo #7

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #8 - Sottocampo #8

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #9 - Sottocampo #9

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

PV Array Characteristics

Array #10 - Sottocampo #10

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #11 - Sottocampo #11

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #12 - Sottocampo #12

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #13 - Sottocampo #13

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #14 - Sottocampo #14

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #15 - Sottocampo #15

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

PV Array Characteristics

Array #16 - Sottocampo #16

Number of PV modules	384 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	250 kWp	Total power	200 kWac
Modules	12 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	229 kWp	Pnom ratio (DC:AC)	1.25
U mpp	1085 V		
I mpp	211 A		

Array #17 - Sottocampo #17

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #18 - Sottocampo #18

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #19 - Sottocampo #19

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #20 - Sottocampo #20

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #21 - Sottocampo #21

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

PV Array Characteristics

Array #22 - Sottocampo #22

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #23 - Sottocampo #23

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #24 - Sottocampo #24

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #25 - Sottocampo #25

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #26 - Sottocampo #26

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #27 - Sottocampo #27

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #28 - Sottocampo #28

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #29 - Sottocampo #29

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #30 - Sottocampo #30

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #31 - Sottocampo #31

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #32 - Sottocampo #32

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #33 - Sottocampo #33

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

PV Array Characteristics

Array #34 - Sottocampo #34

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #35 - Sottocampo #35

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #36 - Sottocampo #36

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #37 - Sottocampo #37

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #38 - Sottocampo #38

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Total PV power

Nominal (STC)	8861 kWp
Total	13632 modules
Module area	42346 m²

Total inverter power

Total power	7600 kWac
Number of inverters	38 units
Pnom ratio	1.17

Array losses

Array Soiling Losses
Loss Fraction 3.0 %

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

Module Quality Loss
Loss Fraction -0.4 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

IAM loss factor
Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

DC wiring losses

Global wiring resistance 2.4 mΩ
Loss Fraction 1.5 % at STC

Array #1 - Sottocampo #1
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #2 - Sottocampo #2
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #3 - Sottocampo #3
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #4 - Sottocampo #4
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #5 - Sottocampo #5
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #6 - Sottocampo #6
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #7 - Sottocampo #7
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #8 - Sottocampo #8
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #9 - Sottocampo #9
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #10 - Sottocampo #10
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #11 - Sottocampo #11
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #12 - Sottocampo #12
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #13 - Sottocampo #13
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #14 - Sottocampo #14
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #15 - Sottocampo #15
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #16 - Sottocampo #16
Global array res. 85 mΩ
Loss Fraction 1.5 % at STC

Array #17 - Sottocampo #17
Global array res. 92 mΩ
Loss Fraction 1.5 % at STC

Array #18 - Sottocampo #18
Global array res. 92 mΩ
Loss Fraction 1.5 % at STC

Array #19 - Sottocampo #19
Global array res. 92 mΩ
Loss Fraction 1.5 % at STC

Array #20 - Sottocampo #20
Global array res. 92 mΩ
Loss Fraction 1.5 % at STC

Array #21 - Sottocampo #21
Global array res. 92 mΩ
Loss Fraction 1.5 % at STC

Array #22 - Sottocampo #22
Global array res. 92 mΩ
Loss Fraction 1.5 % at STC

Array #23 - Sottocampo #23
Global array res. 92 mΩ
Loss Fraction 1.5 % at STC

Array #24 - Sottocampo #24
Global array res. 101 mΩ
Loss Fraction 1.5 % at STC

DC wiring losses

Array #25 - Sottocampo #25		**Array #26 - Sottocampo #26**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #27 - Sottocampo #27		**Array #28 - Sottocampo #28**	
Global array res.	101 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #29 - Sottocampo #29		**Array #30 - Sottocampo #30**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #31 - Sottocampo #31		**Array #32 - Sottocampo #32**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #33 - Sottocampo #33		**Array #34 - Sottocampo #34**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #35 - Sottocampo #35		**Array #36 - Sottocampo #36**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #37 - Sottocampo #37		**Array #38 - Sottocampo #38**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage	800 Vac tri
Loss Fraction	0.03 % at STC

Inverter: SUN 2000-215KTL-H3		**Inverter: SUN 2000-215KTL-H3**	
Wire section (1 Inv.)	Alu 1 x 3 x 240 mm²	Wire section (37 Inv.)	Alu 37 x 3 x 70 mm²
Wires length	200 m	Average wires length	0 m

MV line up to Injection

MV Voltage	20 kV
Average each inverter	
Wires	Alu 3 x 150 mm²
Length	800 m
Loss Fraction	0.12 % at STC

AC losses in transformers

MV transfo

Grid voltage	20 kV
Operating losses at STC	
Nominal power at STC	8742 kVA
Iron loss (24/24 Connexion)	2.91 kW/Inv.
Loss Fraction	0.10 % at STC
Coils equivalent resistance	3 x 2.20 mΩ/inv.
Loss Fraction	1.00 % at STC

Horizon definition

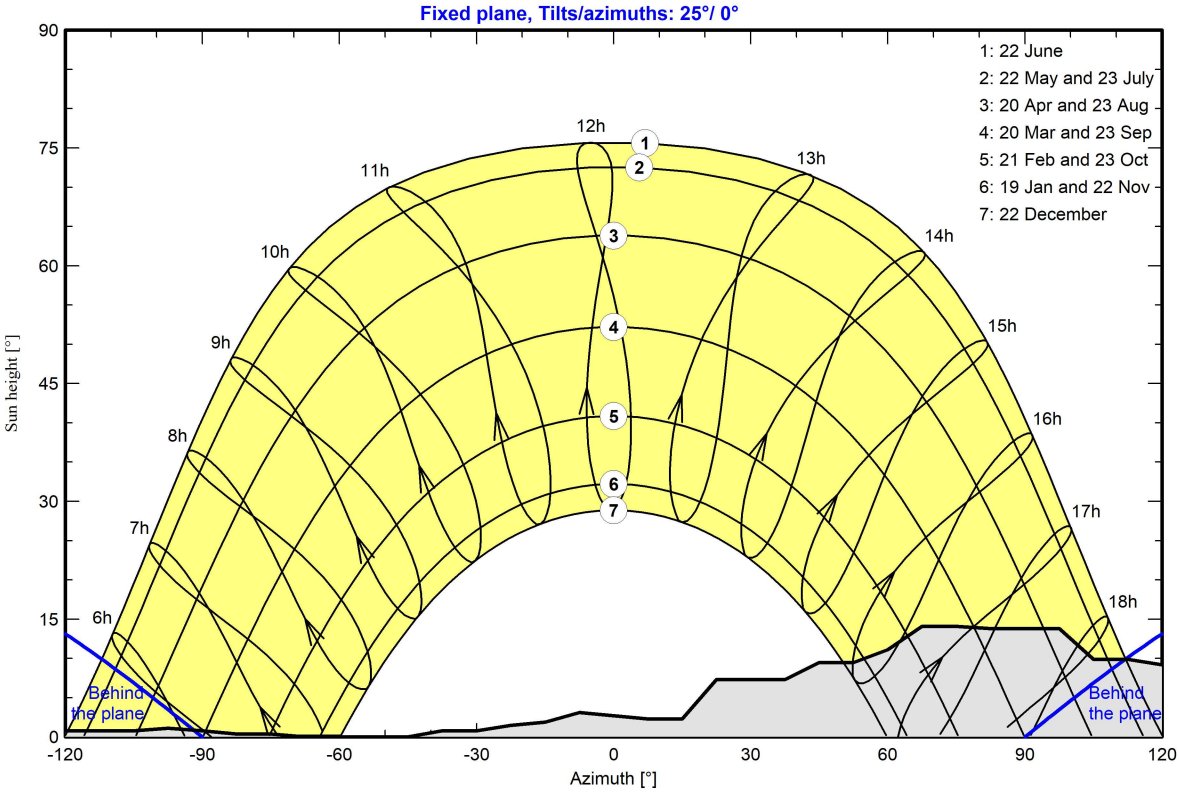
Horizon from PVGIS website API, Lat=37°43"2', Long=13°59"48', Alt=769m

Average Height	4.7 °	Albedo Factor	0.81
Diffuse Factor	0.97	Albedo Fraction	100 %

Horizon profile

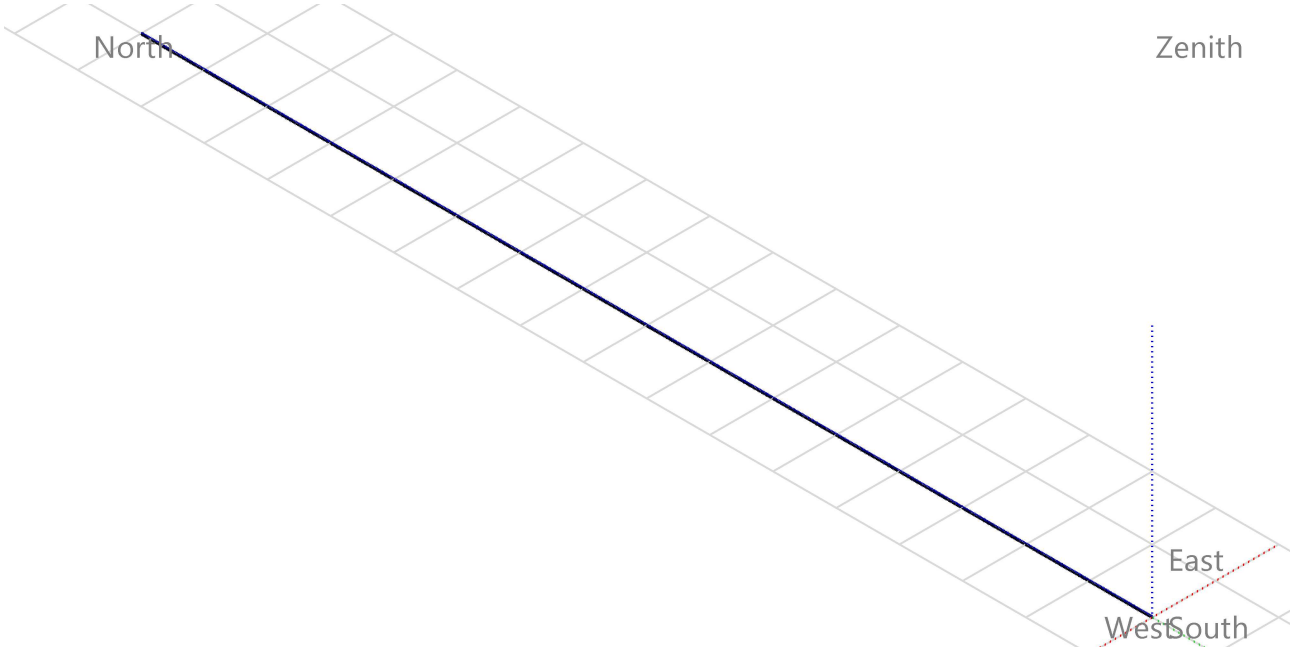
Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-105	-98
Height [°]	2.7	3.4	4.2	3.8	1.9	2.7	1.5	1.1	0.8	0.8	1.1
Azimuth [°]	-90	-83	-75	-68	-45	-38	-30	-23	-15	-8	0
Height [°]	0.8	0.4	0.4	0.0	0.0	0.8	0.8	1.5	1.9	3.1	2.7
Azimuth [°]	8	15	23	38	45	53	60	68	75	83	98
Height [°]	2.3	2.3	7.3	7.3	9.5	9.5	11.1	14.1	14.1	13.8	13.8
Azimuth [°]	105	113	120	128	135	143	150	158	165	173	180
Height [°]	9.9	9.9	9.2	7.6	7.6	4.6	4.6	3.8	2.7	3.1	2.7

Sun Paths (Height / Azimuth diagram)



Near shadings parameter

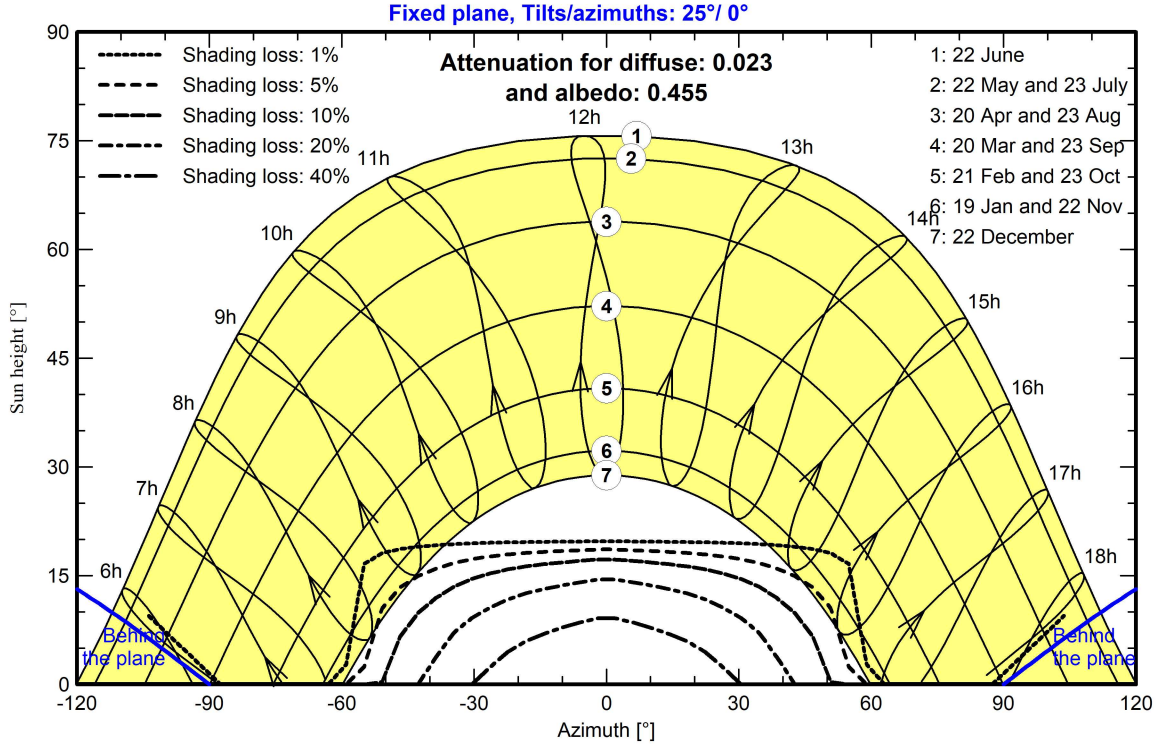
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 25°/ 0°

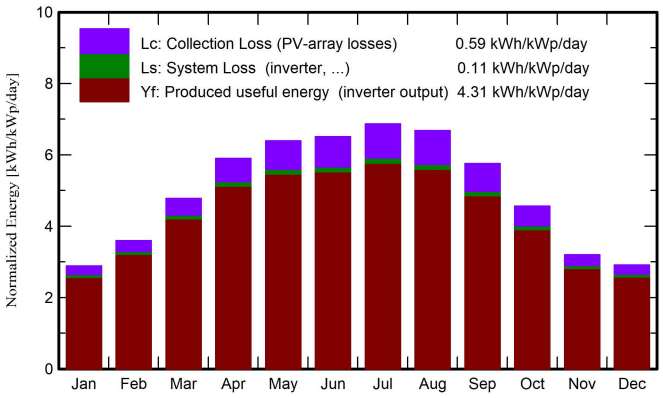


Main results

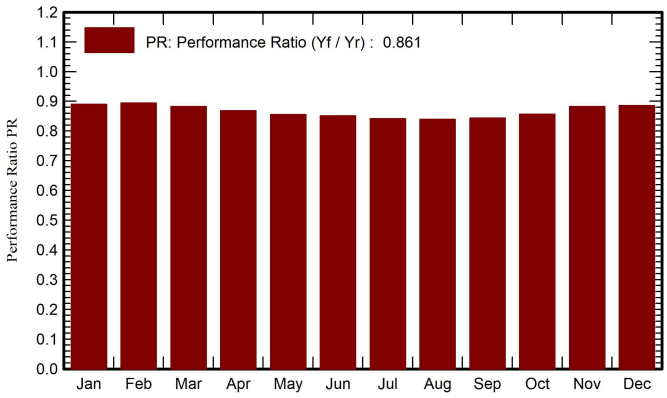
System Production

Produced Energy	14 GWh/year	Specific production	1574 kWh/kWp/year
		Performance Ratio PR	86.06 %

Normalized productions (per installed kWp)



Performance Ratio PR



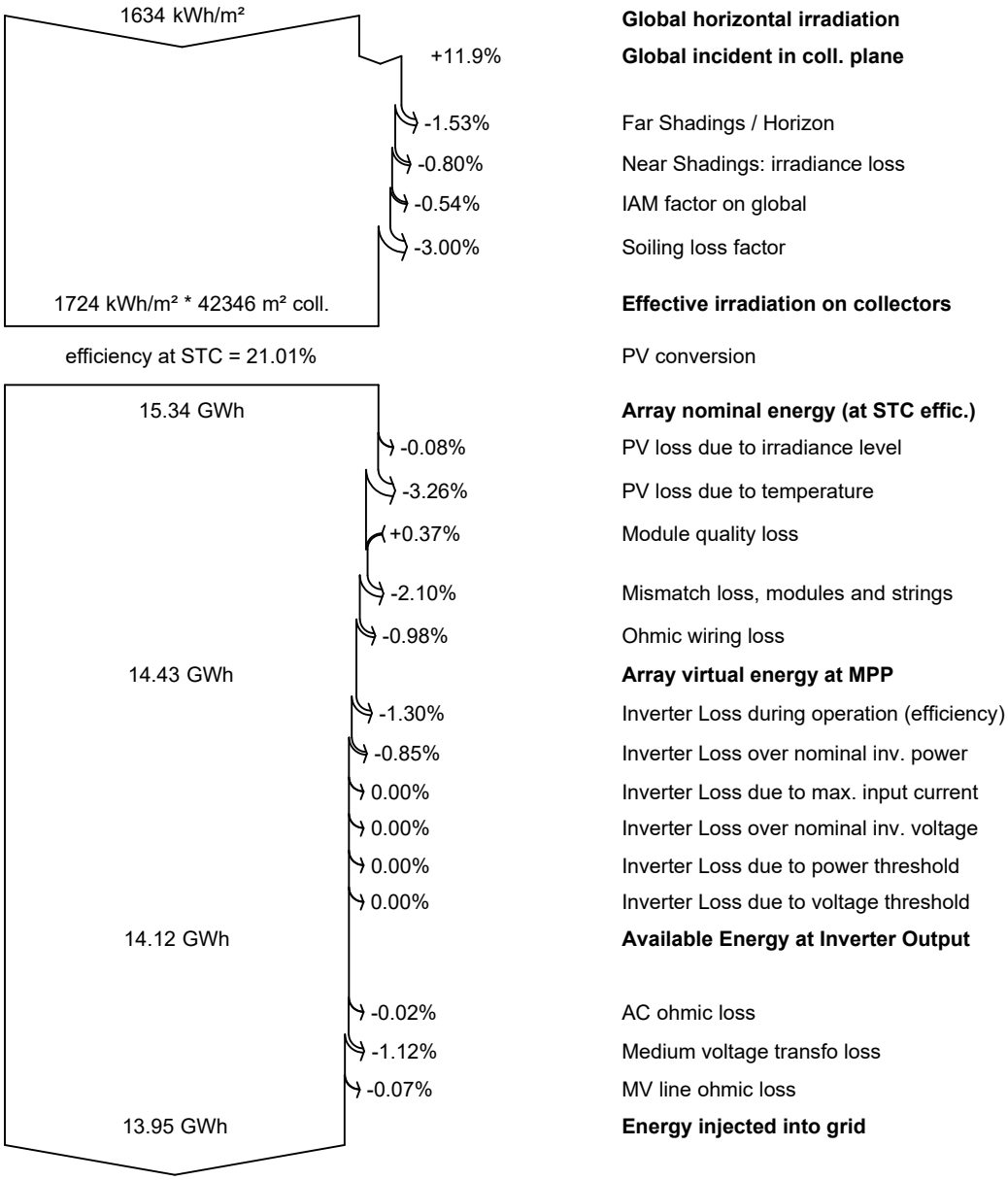
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray GWh	E_Grid GWh	PR ratio
January	60.2	25.26	7.79	89.5	83.5	0.727	0.706	0.890
February	78.5	42.54	7.70	100.7	94.0	0.819	0.797	0.894
March	125.7	57.77	10.01	148.1	139.0	1.188	1.158	0.882
April	163.4	68.24	12.21	177.1	166.9	1.396	1.362	0.868
May	200.7	71.62	16.45	198.1	187.8	1.539	1.502	0.855
June	204.6	76.14	20.38	195.2	185.0	1.507	1.471	0.851
July	219.4	70.74	23.45	212.8	202.1	1.625	1.586	0.841
August	196.9	65.62	23.71	207.0	196.2	1.576	1.538	0.839
September	148.4	52.75	20.23	172.7	162.8	1.324	1.291	0.844
October	109.3	42.46	17.16	141.5	132.3	1.102	1.074	0.856
November	69.1	35.49	12.79	96.1	89.8	0.772	0.751	0.882
December	57.6	21.92	9.29	90.4	84.2	0.731	0.709	0.886
Year	1633.8	630.56	15.14	1829.0	1723.7	14.305	13.946	0.861

Legends

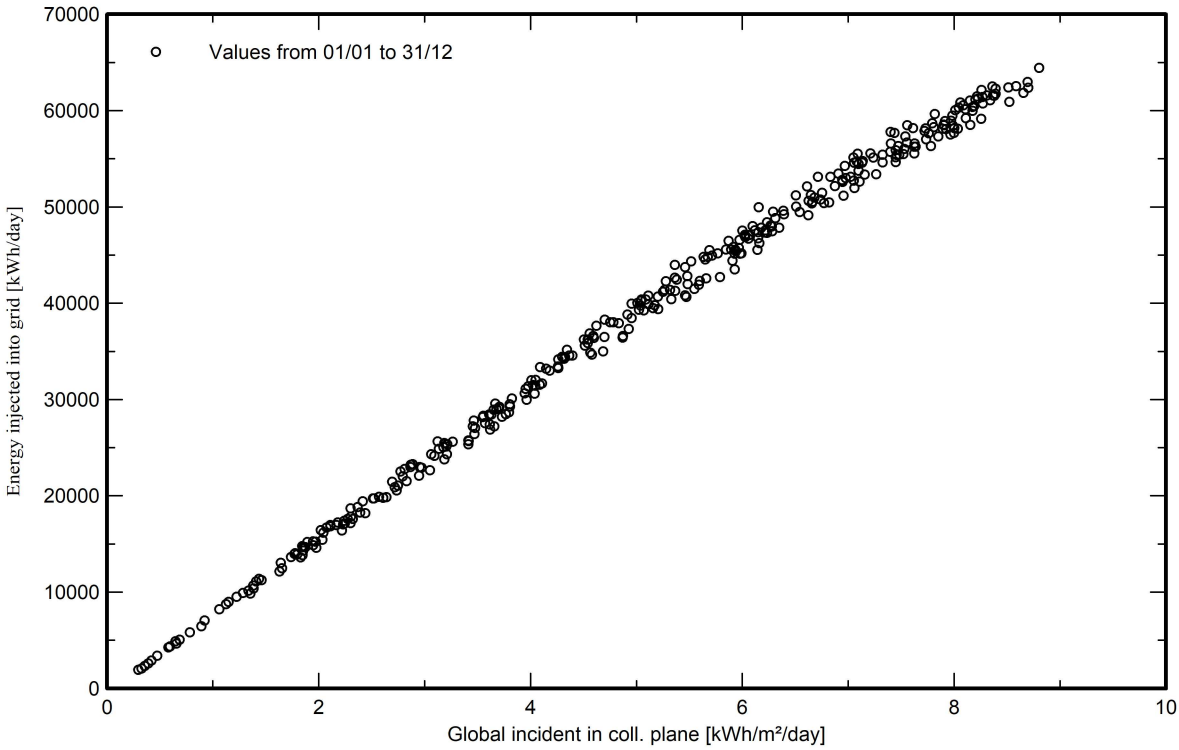
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		

Loss diagram

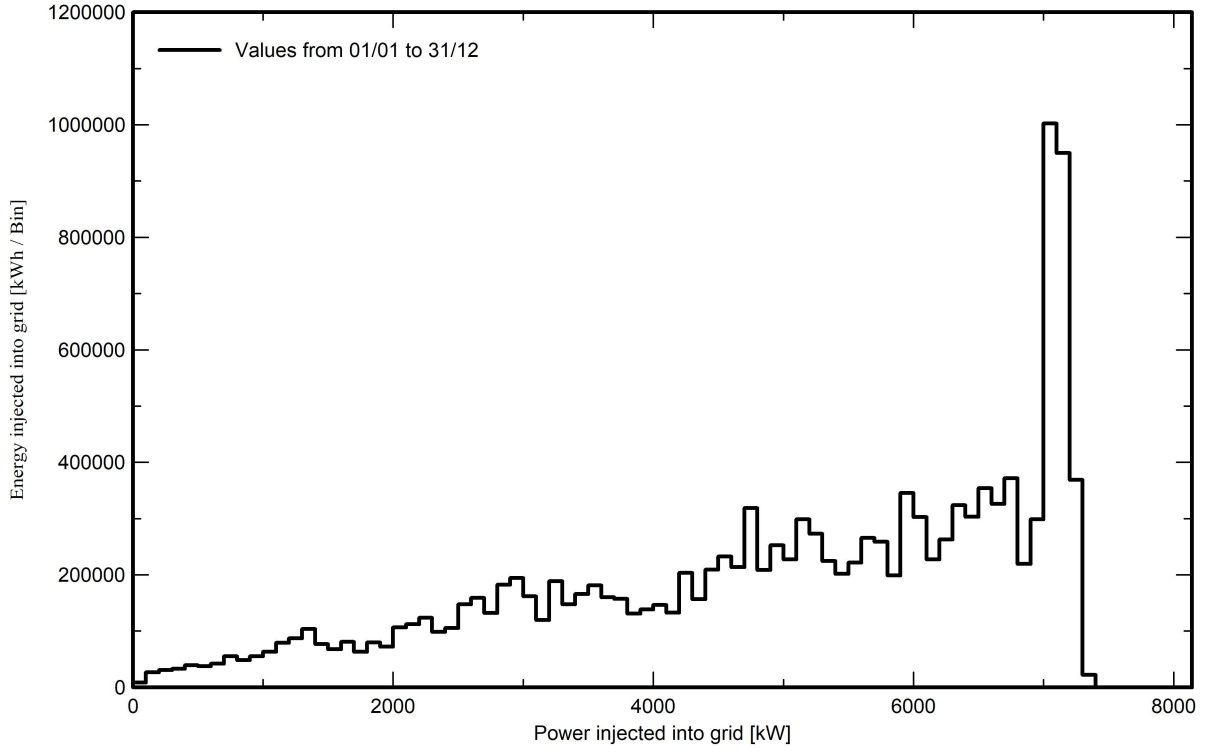


Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



Version 7.2.16

PVsyst - Simulation report

Grid-Connected System

Project: CONTRADA ALBERI LOTTO 5

Variant: Nuova variante di simulazione

Sheds, single array

System power: 8674 kWp

Contrada Case Alberì - Italy

Author

AENNE INGEGNERIA di AGOSTINO Ing. NICODEMO (Italy)

Project summary

Geographical Site
Contrada Case Alberì
Italy

Situation

Latitude	37.72 °N
Longitude	14.00 °E
Altitude	769 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Contrada Case Alberì
Meteonorm 8.0 (1986-2005), Sat=100% - Sintetico

System summary

Grid-Connected System
Sheds, single array

PV Field Orientation
Fixed plane
Tilt/Azimuth 25 / 0 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	13344 units
Pnom total	8674 kWp

Inverters

Nb. of units	40 units
Pnom total	8000 kWac
Pnom ratio	1.084

Results summary

Produced Energy	14 GWh/year	Specific production	1578 kWh/kWp/year	Perf. Ratio PR	86.28 %

Table of contents

General parameters

Grid-Connected System

Sheds, single array

PV Field Orientation

Orientation	
Fixed plane	
Tilt/Azimuth	25 / 0 °

Sheds configuration	
Nb. of sheds	800 units
Single array	
Sizes	
Sheds spacing	10.00 m
Collector width	4.79 m
Ground Cov. Ratio (GCR)	47.9 %
Top inactive band	0.02 m
Bottom inactive band	0.02 m
Shading limit angle	
Limit profile angle	19.8 °

Models used	
Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon

Average Height 4.7 °

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS7N-650MB-AG 1500V
(Custom parameters definition)	
Unit Nom. Power	650 Wp
Number of PV modules	13344 units
Nominal (STC)	8674 kWp

Inverter

Manufacturer	Huawei Technologies
Model	SUN 2000-215KTL-H3
(Custom parameters definition)	
Unit Nom. Power	200 kWac
Number of inverters	40 units
Total power	8000 kWac

Array #1 - Sottocampo #1

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #2 - Sottocampo #2

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #3 - Sottocampo #3

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

PV Array Characteristics

Array #4 - Sottocampo #4

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #5 - Sottocampo #5

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #6 - Sottocampo #6

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #7 - Sottocampo #7

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #8 - Sottocampo #8

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #9 - Sottocampo #9

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #10 - Sottocampo #10

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #11 - Sottocampo #11

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #12 - Sottocampo #12

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #13 - Sottocampo #13

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #14 - Sottocampo #14

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #15 - Sottocampo #15

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

PV Array Characteristics

Array #16 - Sottocampo #16

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #17 - Sottocampo #17

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #18 - Sottocampo #18

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #19 - Sottocampo #19

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #20 - Sottocampo #20

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #21 - Sottocampo #21

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #22 - Sottocampo #22

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #23 - Sottocampo #23

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #24 - Sottocampo #24

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #25 - Sottocampo #25

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #26 - Sottocampo #26

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #27 - Sottocampo #27

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

PV Array Characteristics

Array #28 - Sottocampo #28

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #29 - Sottocampo #29

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #30 - Sottocampo #30

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #31 - Sottocampo #31

Number of PV modules	352 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	229 kWp	Total power	200 kWac
Modules	11 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	210 kWp	Pnom ratio (DC:AC)	1.14
U mpp	1085 V		
I mpp	194 A		

Array #32 - Sottocampo #32

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #33 - Sottocampo #33

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #34 - Sottocampo #34

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #35 - Sottocampo #35

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #36 - Sottocampo #36

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #37 - Sottocampo #37

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #38 - Sottocampo #38

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Array #39 - Sottocampo #39

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

PV Array Characteristics

Array #40 - Sottocampo #40

Number of PV modules	320 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	208 kWp	Total power	200 kWac
Modules	10 Strings x 32 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	191 kWp	Pnom ratio (DC:AC)	1.04
U mpp	1085 V		
I mpp	176 A		

Total PV power

Nominal (STC)	8674 kWp
Total	13344 modules
Module area	41451 m²

Total inverter power

Total power	8000 kWac
Number of inverters	40 units
Pnom ratio	1.08

Array losses

Array Soiling Losses
Loss Fraction 3.0 %

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

Module Quality Loss
Loss Fraction -0.4 %

Module mismatch losses
Loss Fraction 2.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

IAM loss factor
Incidence effect (IAM): User defined profile

20°	40°	60°	65°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.990	0.960	0.920	0.840	0.720	0.000

DC wiring losses

Global wiring resistance 2.4 mΩ
Loss Fraction 1.5 % at STC

Array #1 - Sottocampo #1		**Array #2 - Sottocampo #2**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #3 - Sottocampo #3		**Array #4 - Sottocampo #4**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #5 - Sottocampo #5		**Array #6 - Sottocampo #6**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #7 - Sottocampo #7		**Array #8 - Sottocampo #8**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #9 - Sottocampo #9		**Array #10 - Sottocampo #10**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #11 - Sottocampo #11		**Array #12 - Sottocampo #12**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #13 - Sottocampo #13		**Array #14 - Sottocampo #14**	
Global array res.	101 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC

DC wiring losses

Array #15 - Sottocampo #15		**Array #16 - Sottocampo #16**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #17 - Sottocampo #17		**Array #18 - Sottocampo #18**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #19 - Sottocampo #19		**Array #20 - Sottocampo #20**	
Global array res.	92 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #21 - Sottocampo #21		**Array #22 - Sottocampo #22**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #23 - Sottocampo #23		**Array #24 - Sottocampo #24**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #25 - Sottocampo #25		**Array #26 - Sottocampo #26**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #27 - Sottocampo #27		**Array #28 - Sottocampo #28**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #29 - Sottocampo #29		**Array #30 - Sottocampo #30**	
Global array res.	92 mΩ	Global array res.	92 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #31 - Sottocampo #31		**Array #32 - Sottocampo #32**	
Global array res.	92 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #33 - Sottocampo #33		**Array #34 - Sottocampo #34**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #35 - Sottocampo #35		**Array #36 - Sottocampo #36**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #37 - Sottocampo #37		**Array #38 - Sottocampo #38**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #39 - Sottocampo #39		**Array #40 - Sottocampo #40**	
Global array res.	101 mΩ	Global array res.	101 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage	800 Vac tri
Loss Fraction	0.02 % at STC

Inverter: SUN 2000-215KTL-H3		**Inverter: SUN 2000-215KTL-H3**	
Wire section (1 Inv.)	Alu 1 x 3 x 240 mm²	Wire section (39 Inv.)	Alu 39 x 3 x 70 mm²
Wires length	200 m	Average wires length	0 m

MV line up to Injection

MV Voltage	20 kV
Average each inverter	
Wires	Alu 3 x 150 mm²
Length	800 m
Loss Fraction	0.12 % at STC

AC losses in transformers

MV transfo		
Grid voltage	20	kV
Operating losses at STC		
Nominal power at STC	8560	kVA
Iron loss (24/24 Connexion)	2.85	kW/Inv.
Loss Fraction	0.10	% at STC
Coils equivalent resistance	3 x 2.24	mΩ/inv.
Loss Fraction	1.00	% at STC

Horizon definition

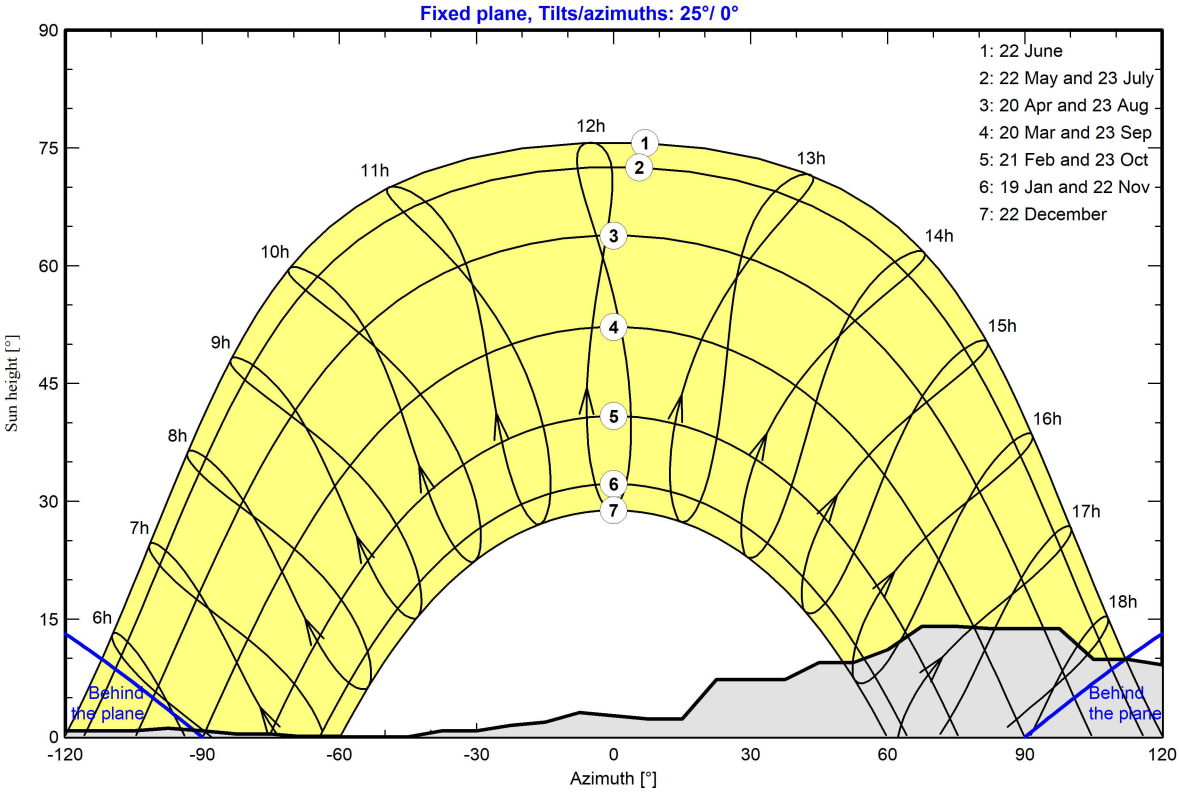
Horizon from PVGIS website API, Lat=37°43"2', Long=13°59"48', Alt=769m

Average Height	4.7 °	Albedo Factor	0.81
Diffuse Factor	0.97	Albedo Fraction	100 %

Horizon profile

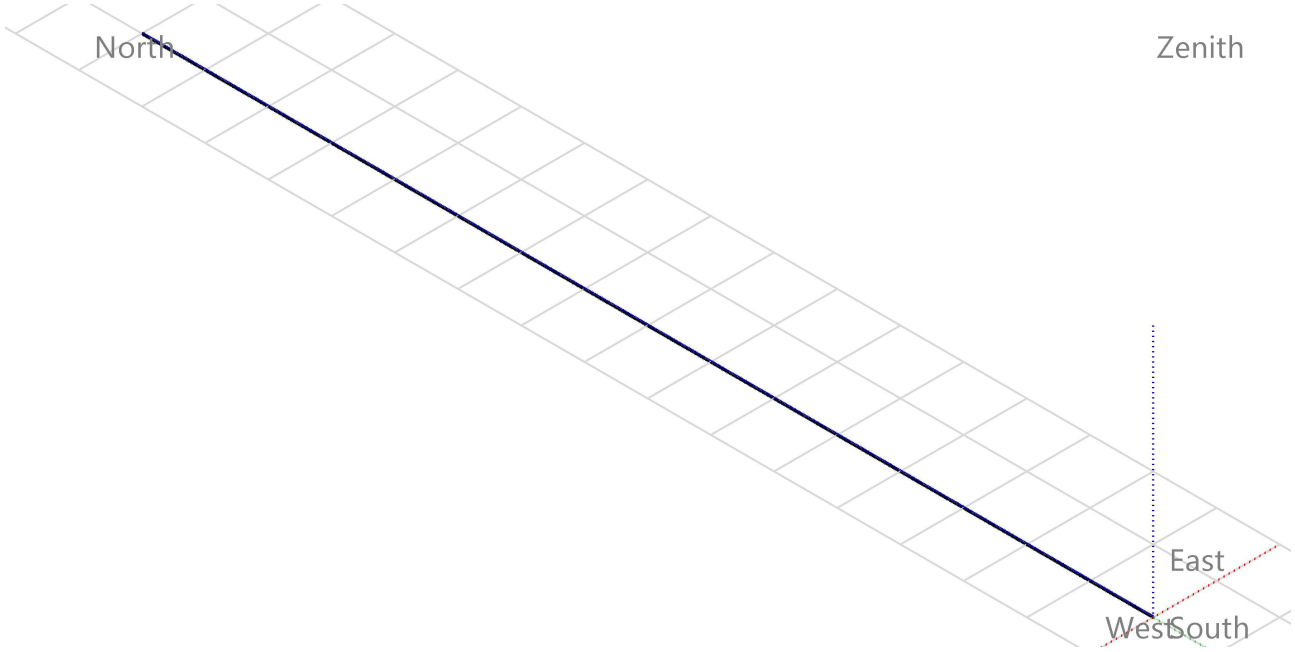
Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-105	-98
Height [°]	2.7	3.4	4.2	3.8	1.9	2.7	1.5	1.1	0.8	0.8	1.1
Azimuth [°]	-90	-83	-75	-68	-45	-38	-30	-23	-15	-8	0
Height [°]	0.8	0.4	0.4	0.0	0.0	0.8	0.8	1.5	1.9	3.1	2.7
Azimuth [°]	8	15	23	38	45	53	60	68	75	83	98
Height [°]	2.3	2.3	7.3	7.3	9.5	9.5	11.1	14.1	14.1	13.8	13.8
Azimuth [°]	105	113	120	128	135	143	150	158	165	173	180
Height [°]	9.9	9.9	9.2	7.6	7.6	4.6	4.6	3.8	2.7	3.1	2.7

Sun Paths (Height / Azimuth diagram)



Near shadings parameter

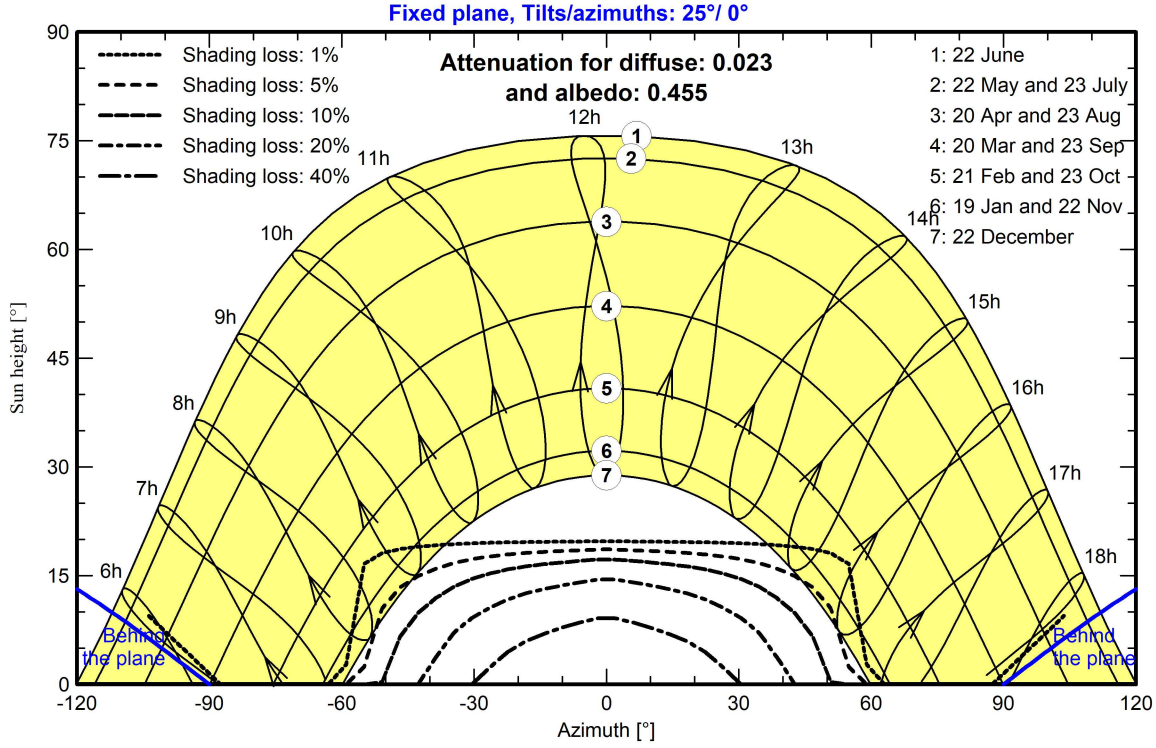
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 25°/ 0°

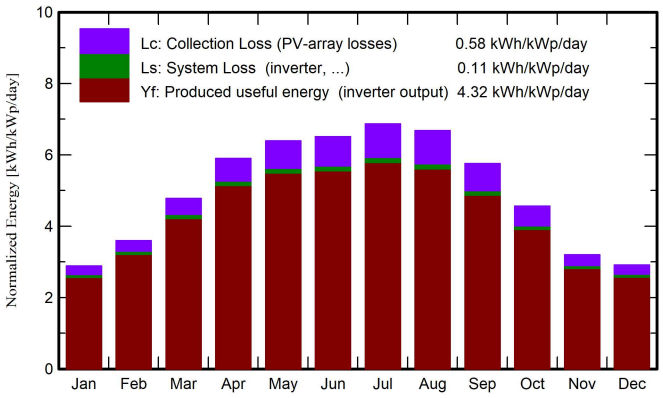


Main results

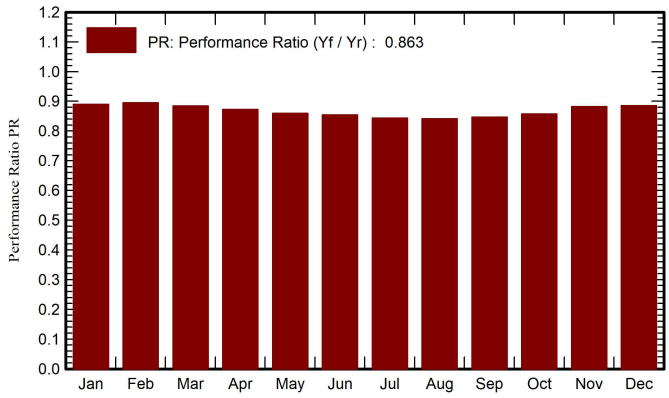
System Production

Produced Energy	14 GWh/year	Specific production	1578 kWh/kWp/year
		Performance Ratio PR	86.28 %

Normalized productions (per installed kWp)



Performance Ratio PR



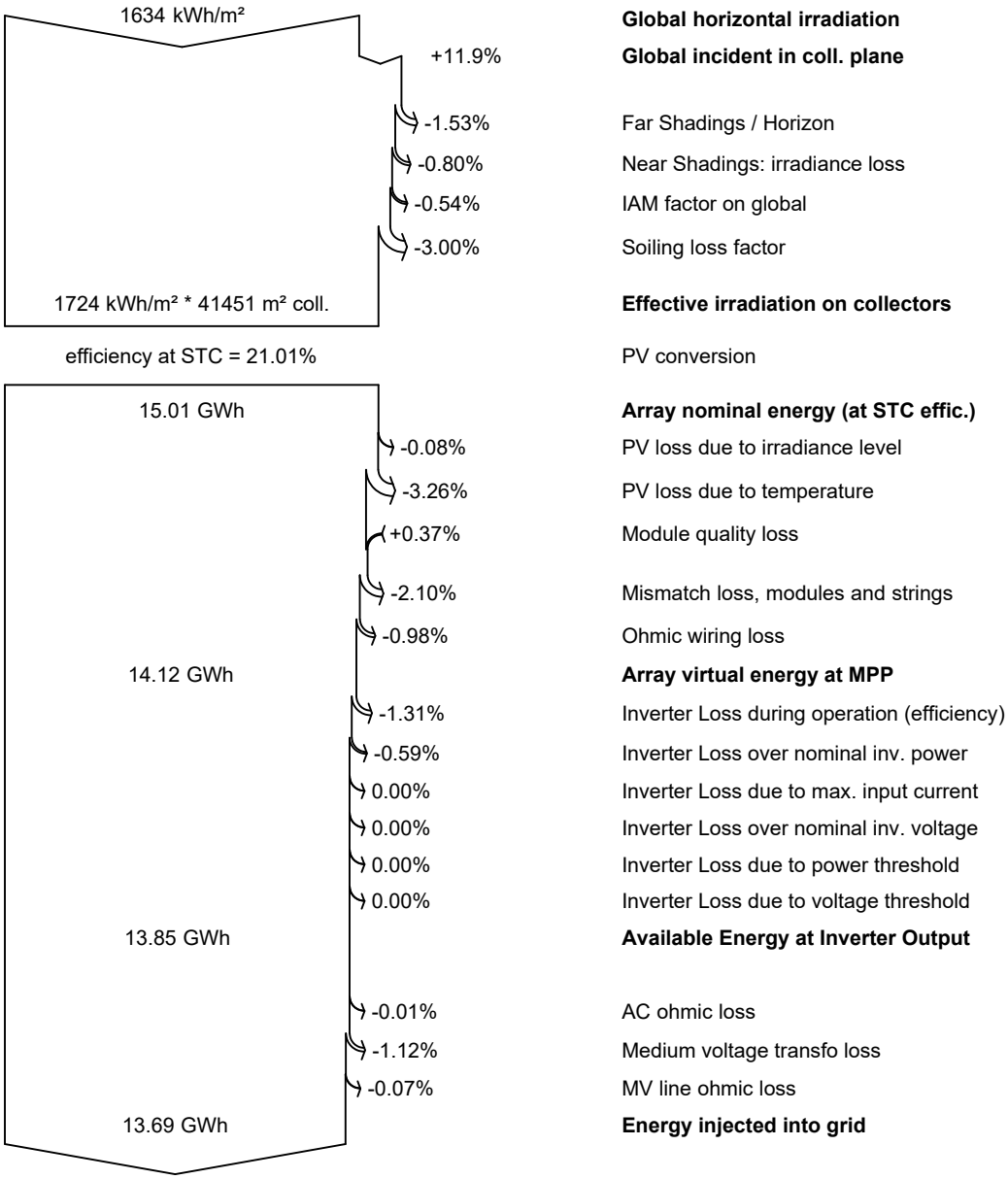
Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray GWh	E_Grid GWh	PR ratio
January	60.2	25.26	7.79	89.5	83.5	0.712	0.691	0.890
February	78.5	42.54	7.70	100.7	94.0	0.802	0.781	0.895
March	125.7	57.77	10.01	148.1	139.0	1.165	1.136	0.884
April	163.4	68.24	12.21	177.1	166.9	1.372	1.339	0.872
May	200.7	71.62	16.45	198.1	187.8	1.514	1.477	0.860
June	204.6	76.14	20.38	195.2	185.0	1.481	1.445	0.854
July	219.4	70.74	23.45	212.8	202.1	1.595	1.557	0.844
August	196.9	65.62	23.71	207.0	196.2	1.547	1.509	0.841
September	148.4	52.75	20.23	172.7	162.8	1.300	1.268	0.847
October	109.3	42.46	17.16	141.5	132.3	1.080	1.052	0.857
November	69.1	35.49	12.79	96.1	89.8	0.755	0.735	0.882
December	57.6	21.92	9.29	90.4	84.2	0.715	0.694	0.886
Year	1633.8	630.56	15.14	1829.0	1723.7	14.039	13.687	0.863

Legends

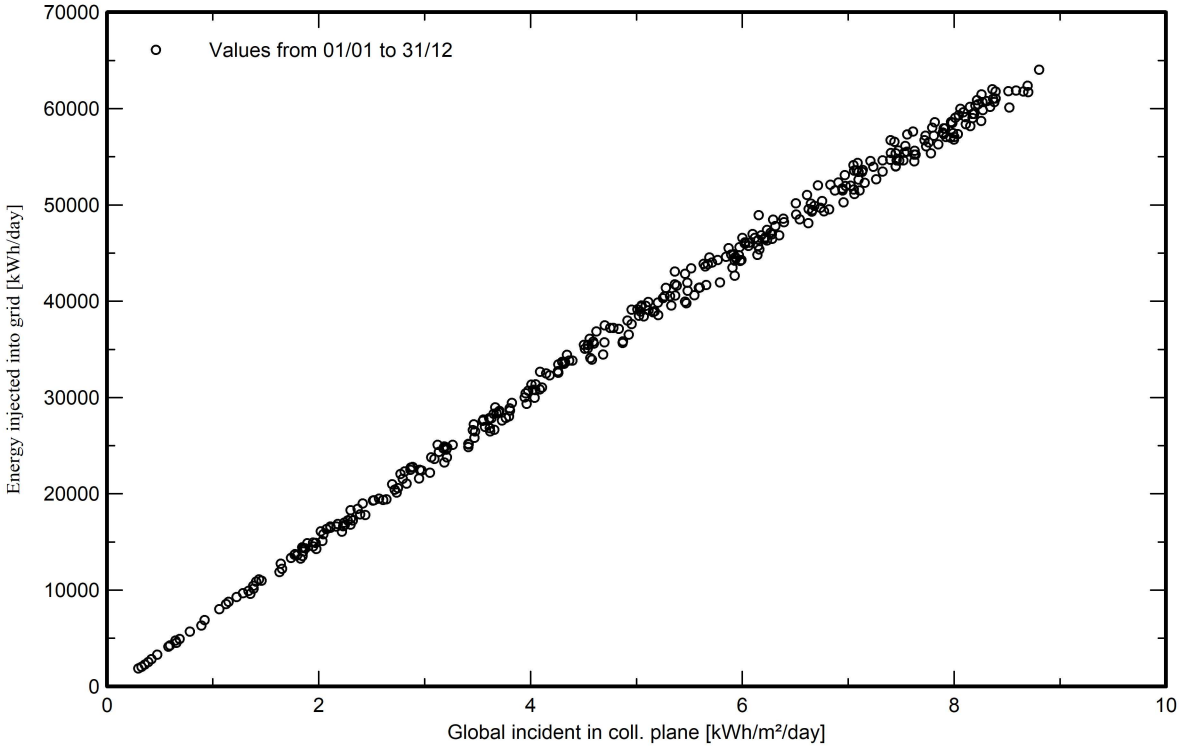
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		

Loss diagram



Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema