



Regione Siciliana



Città Metropolitana di Palermo



Comune di Monreale



Comune di Piana degli Albanesi

Proponente

FLYNIS PV 22 S.r.l.

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Progetto Definitivo

Denominazione progetto:

REALIZZAZIONE IMPIANTO AGRIVOLTAICO "MONREALE"

Potenza nominale complessiva = 14476,8 kWp

Sito in:

COMUNI DI MONREALE E PIANA DEGLI ALBANESI (PA)

Titolo elaborato:

Stima della producibilità dell'impianto fotovoltaico



Elaborato n. **EL08**

Scala --

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
Ing. Anastasia Budace



REV.:	REDAZIONE:	CONTROLLO:	APPROVAZIONE :	DATA:
00	Ing. N.Agostino	Ing. M.Marchica	Ing.M.Marchica / D.ssa E.Santoro	16/09/2022
01				
02				

FIRMA/TIMBRO
COMMITTENTE:



FLYREN
THE CULTURE OF CLEAN ENERGY

Andrea Pellegani



FLYREN
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PVsyst - Simulation report

Grid-Connected System

Project: MONREALE LOTTO 1

Variant: Nuova variante di simulazione

Sheds, single array

System power: 14.48 MWp

Ginestra - Italia

Author

AENNE INGEGNERIA di AGOSTINO Ing. NICODEMO (Italy)



Project: MONREALE LOTTO 1

Variant: Nuova variante di simulazione

PVsyst V7.2.18

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Project summary

Geographical Site		Situation		Project settings	
Ginestra		Latitude	37.94 °N	Albedo	0.20
Italia		Longitude	13.26 °E		
		Altitude	417 m		
		Time zone	UTC+1		
Meteo data					
Ginestra					
Meteonorm 8.0 (1986-2005), Sat=100% - Sintetico					

System summary

Grid-Connected System		Sheds, single array			
PV Field Orientation		Near Shadings		User's needs	
Fixed plane		Linear shadings		Unlimited load (grid)	
Tilt/Azimuth	25 / 0 °				
System information					
PV Array					
Nb. of modules	22272 units	Inverters		63 units	
Pnom total	14.48 MWp	Nb. of units		12.60 MWac	
		Pnom total		1.149	
		Pnom ratio			

Results summary

Produced Energy	23 GWh/year	Specific production	1579 kWh/kWp/year	Perf. Ratio PR	86.48 %
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Project: MONREALE LOTTO 1

Variant: Nuova variante di simulazione

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General parameters

Grid-Connected System		Sheds, single array			
PV Field Orientation		Sheds configuration		Models used	
Orientation		Nb. of sheds		Transposition	
Fixed plane		348 units		Perez	
Tilt/Azimuth		Single array		Diffuse	
25 / 0 °				Perez, Meteonorm	
		Sizes		Circumsolar	
		Sheds spacing		separate	
		6.50 m			
		Collector width			
		2.63 m			
		Ground Cov. Ratio (GCR)			
		40.4 %			
		Top inactive band			
		0.02 m			
		Bottom inactive band			
		0.02 m			
		Shading limit angle			
		Limit profile angle			
		15.2 °			
Horizon		Near Shadings		User's needs	
Average Height		Linear shadings		Unlimited load (grid)	
5.2 °					

PV Array Characteristics

PV module		Inverter	
Manufacturer	CSI Solar	Manufacturer	Huawei Technologies
Model	CS7N-650MS 1500V	Model	SUN 2000-215KTL-H3
(Original PVsyst database)		(Custom parameters definition)	
Unit Nom. Power	650 Wp	Unit Nom. Power	200 kWac
Number of PV modules	22272 units	Number of inverters	63 units
Nominal (STC)	14.48 MWp	Total power	12600 kWac
Array #1 - Campo FV		Array #1 - Campo FV	
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	Operating voltage	500-1500 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.14
Pmpp	210 kWp		
U mpp	1086 V		
I mpp	193 A		
Array #2 - Sottocampo #2		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	Operating voltage	500-1500 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.14
Pmpp	210 kWp		
U mpp	1086 V		
I mpp	193 A		
Array #3 - Sottocampo #3		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	Operating voltage	500-1500 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.14
Pmpp	210 kWp		
U mpp	1086 V		
I mpp	193 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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #7 - Sottocampo #7

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #8 - Sottocampo #8

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #9 - Sottocampo #9

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		



PV Array Characteristics

Array #10 - Sottocampo #10

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #11 - Sottocampo #11

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #12 - Sottocampo #12

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #13 - Sottocampo #13

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #14 - Sottocampo #14

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #15 - Sottocampo #15

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14



PV Array Characteristics

Array #16 - Sottocampo #16

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #17 - Sottocampo #17

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #18 - Sottocampo #18

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #19 - Sottocampo #19

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #20 - Sottocampo #20

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #21 - Sottocampo #21

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14



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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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #24 - Sottocampo #24

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #25 - Sottocampo #25

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #26 - Sottocampo #26

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		



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PV Array Characteristics

Array #28 - Sottocampo #28

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #29 - Sottocampo #29

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #30 - Sottocampo #30

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #31 - Sottocampo #31

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #32 - Sottocampo #32

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #33 - Sottocampo #33

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14



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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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #35 - Sottocampo #35

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #36 - Sottocampo #36

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #37 - Sottocampo #37

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #38 - Sottocampo #38

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #39 - Sottocampo #39

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		



PV Array Characteristics

Array #40 - Sottocampo #40

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #41 - Sottocampo #41

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #42 - Sottocampo #42

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #43 - Sottocampo #43

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #44 - Sottocampo #44

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #45 - Sottocampo #45

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14



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PV Array Characteristics

Array #46 - Sottocampo #46

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #47 - Sottocampo #47

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #48 - Sottocampo #48

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #49 - Sottocampo #49

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #50 - Sottocampo #50

Number of PV modules 352 units
Nominal (STC) 229 kWp
Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
U mpp 1086 V
I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.14

Array #51 - Sottocampo #51

Number of PV modules 384 units
Nominal (STC) 250 kWp
Modules 12 Strings x 32 In series

At operating cond. (50°C)

Pmpp 229 kWp
U mpp 1086 V
I mpp 211 A

Number of inverters 3 * MPPT 33% 1 unit
Total power 200 kWac

Operating voltage 500-1500 V
Pnom ratio (DC:AC) 1.25



PV Array Characteristics

Array #52 - Sottocampo #52

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)			
Pmpp	229 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.25
I mpp	211 A		

Array #53 - Sottocampo #53

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)			
Pmpp	229 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.25
I mpp	211 A		

Array #54 - Sottocampo #54

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #55 - Sottocampo #55

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #56 - Sottocampo #56

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		

Array #57 - Sottocampo #57

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)			
Pmpp	210 kWp	Operating voltage	500-1500 V
U mpp	1086 V	Pnom ratio (DC:AC)	1.14
I mpp	193 A		



PV Array Characteristics

Array #58 - Sottocampo #58

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #59 - Sottocampo #59

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #60 - Sottocampo #60

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #61 - Sottocampo #61

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #62 - Sottocampo #62

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14

Array #63 - Sottocampo #63

Number of PV modules 352 units
 Nominal (STC) 229 kWp
 Modules 11 Strings x 32 In series

At operating cond. (50°C)

Pmpp 210 kWp
 U mpp 1086 V
 I mpp 193 A

Number of inverters 3 * MPPT 33% 1 unit
 Total power 200 kWac

Operating voltage 500-1500 V
 Pnom ratio (DC:AC) 1.14



Project: MONREALE LOTTO 1

Variant: Nuova variante di simulazione

PVsyst V7.2.18

VC0, Simulation date:
19/09/22 12:34
with v7.2.18

AENNE INGEGNERIA di AGOSTINO Ing. NICODEMO (Italy)

PV Array Characteristics

Total PV power		Total inverter power	
Nominal (STC)	14477 kWp	Total power	12600 kWac
Total	22272 modules	Number of inverters	63 units
Module area	69185 m ²	Pnom ratio	1.15

Array losses

Thermal Loss factor		Module Quality Loss		Module mismatch losses				
Module temperature according to irradiance		Loss Fraction	-0.4 %	Loss Fraction	2.0 % at MPP			
Uc (const)	29.0 W/m ² K							
Uv (wind)	0.0 W/m ² K/m/s							
Strings Mismatch loss								
Loss Fraction	0.1 %							
IAM loss factor								
Incidence effect (IAM): User defined profile								
10°	20°	30°	40°	50°	60°	70°	80°	90°
0.998	0.998	0.995	0.992	0.986	0.970	0.917	0.763	0.000

DC wiring losses

Global wiring resistance	1.5 mΩ		
Loss Fraction	1.5 % at STC		
Array #1 - Campo FV		Array #2 - Sottocampo #2	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #3 - Sottocampo #3		Array #4 - Sottocampo #4	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #5 - Sottocampo #5		Array #6 - Sottocampo #6	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #7 - Sottocampo #7		Array #8 - Sottocampo #8	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #9 - Sottocampo #9		Array #10 - Sottocampo #10	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #11 - Sottocampo #11		Array #12 - Sottocampo #12	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #13 - Sottocampo #13		Array #14 - Sottocampo #14	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #15 - Sottocampo #15		Array #16 - Sottocampo #16	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #17 - Sottocampo #17		Array #18 - Sottocampo #18	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #19 - Sottocampo #19		Array #20 - Sottocampo #20	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC



DC wiring losses

Array #21 - Sottocampo #21		Array #22 - Sottocampo #22	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #23 - Sottocampo #23		Array #24 - Sottocampo #24	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #25 - Sottocampo #25		Array #26 - Sottocampo #26	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #27 - Sottocampo #27		Array #28 - Sottocampo #28	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #29 - Sottocampo #29		Array #30 - Sottocampo #30	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #31 - Sottocampo #31		Array #32 - Sottocampo #32	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #33 - Sottocampo #33		Array #34 - Sottocampo #34	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #35 - Sottocampo #35		Array #36 - Sottocampo #36	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #37 - Sottocampo #37		Array #38 - Sottocampo #38	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #39 - Sottocampo #39		Array #40 - Sottocampo #40	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #41 - Sottocampo #41		Array #42 - Sottocampo #42	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #43 - Sottocampo #43		Array #44 - Sottocampo #44	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #45 - Sottocampo #45		Array #46 - Sottocampo #46	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #47 - Sottocampo #47		Array #48 - Sottocampo #48	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #49 - Sottocampo #49		Array #50 - Sottocampo #50	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #51 - Sottocampo #51		Array #52 - Sottocampo #52	
Global array res.	85 mΩ	Global array res.	85 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #53 - Sottocampo #53		Array #54 - Sottocampo #54	
Global array res.	85 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #55 - Sottocampo #55		Array #56 - Sottocampo #56	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC



DC wiring losses

Array #57 - Sottocampo #57		Array #58 - Sottocampo #58	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #59 - Sottocampo #59		Array #60 - Sottocampo #60	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #61 - Sottocampo #61		Array #62 - Sottocampo #62	
Global array res.	93 mΩ	Global array res.	93 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC
Array #63 - Sottocampo #63			
Global array res.	93 mΩ		
Loss Fraction	1.5 % at STC		

AC wiring losses

Inv. output line up to MV transfo			
Inverter voltage	800 Vac tri		
Loss Fraction	0.60 % at STC		
Inverter: SUN 2000-215KTL-H3		Inverter: SUN 2000-215KTL-H3	
Wire section (1 Inv.)	Alu 1 x 3 x 240 mm ²	Wire section (62 Inv.)	Alu 62 x 3 x 185 mm ²
Wires length	100 m	Average wires length	100 m
MV line up to Injection			
MV Voltage	20 kV		
Average each inverter			
Wires	Copper 3 x 240 mm ²		
Length	6500 m		
Loss Fraction	0.36 % at STC		

AC losses in transformers

MV transfo	
Grid voltage	20 kV
Operating losses at STC	
Nominal power at STC	14284 kVA
Iron loss (24/24 Connexion)	2.86 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°56'29', Long=13°15'43', Alt=417m

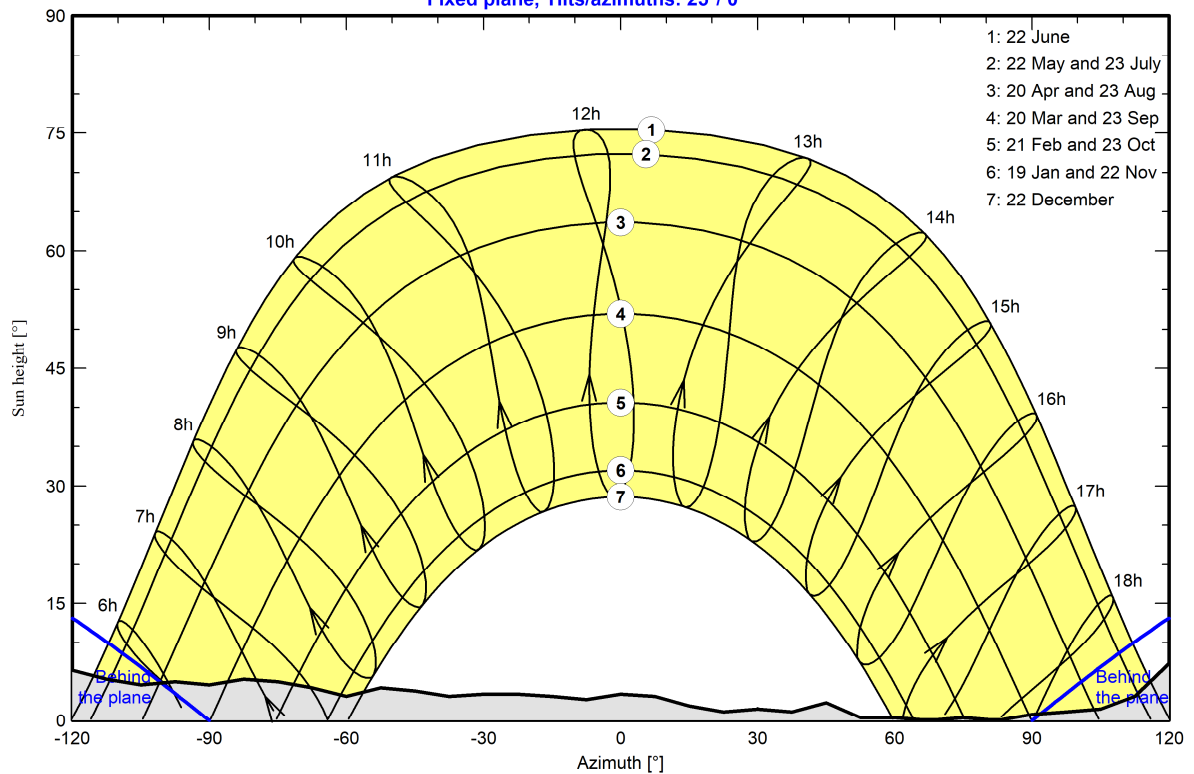
Average Height	5.2 °	Albedo Factor	0.87
Diffuse Factor	0.99	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-113	-105	-98	-90
Height [°]	14.9	14.1	12.6	11.5	8.8	8.0	7.6	7.6	5.3	4.6	5.0	4.6
Azimuth [°]	-83	-75	-68	-60	-53	-45	-38	-30	-23	-15	-8	0
Height [°]	5.3	5.0	4.2	3.1	4.2	3.8	3.1	3.4	3.4	3.1	2.7	3.4
Azimuth [°]	8	15	23	30	38	45	53	60	68	75	83	90
Height [°]	3.1	1.9	1.1	1.5	1.1	2.3	0.4	0.4	0.0	0.4	0.0	0.8
Azimuth [°]	98	105	113	120	135	143	150	158	173	180		
Height [°]	1.1	1.5	3.1	7.3	7.3	8.0	9.9	10.3	14.1	14.9		

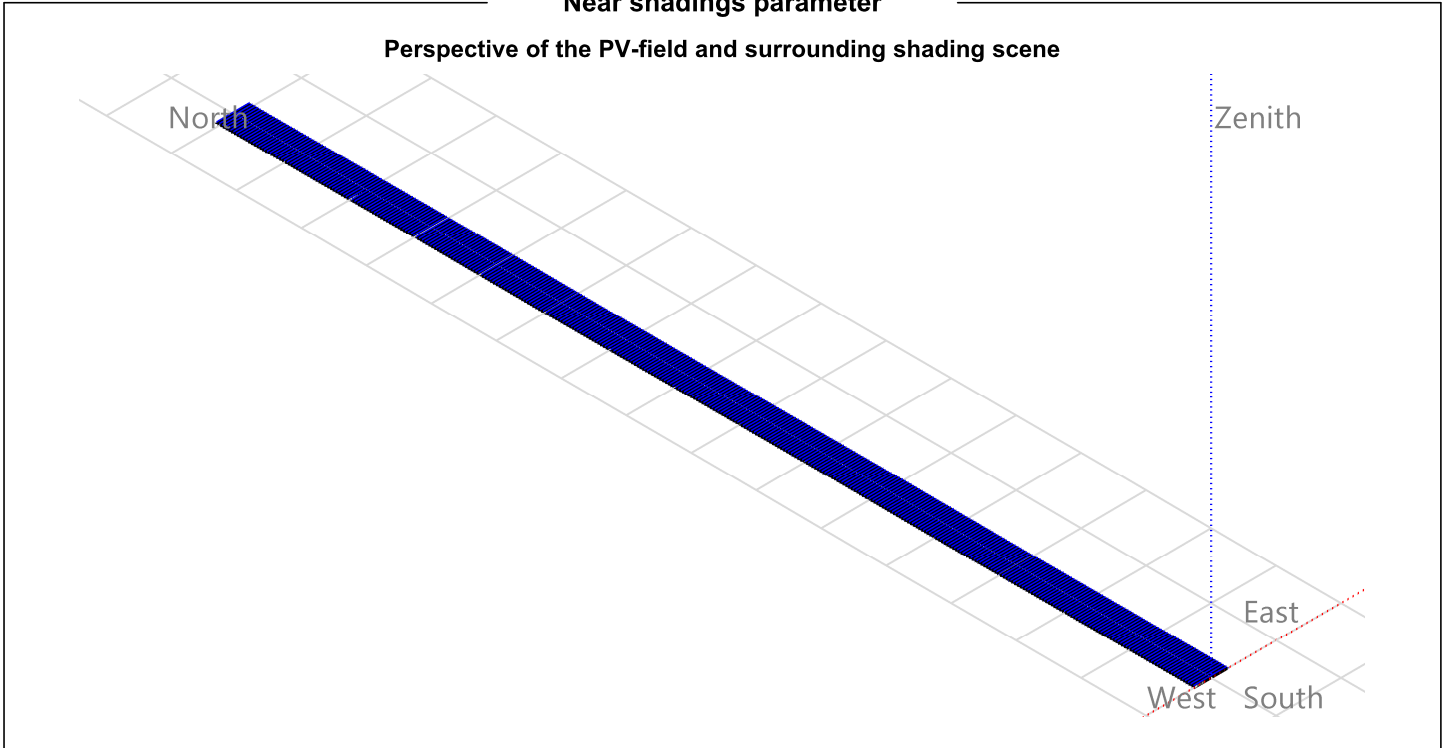
Sun Paths (Height / Azimuth diagram)

Fixed plane, Tilts/azimuths: 25°/ 0°

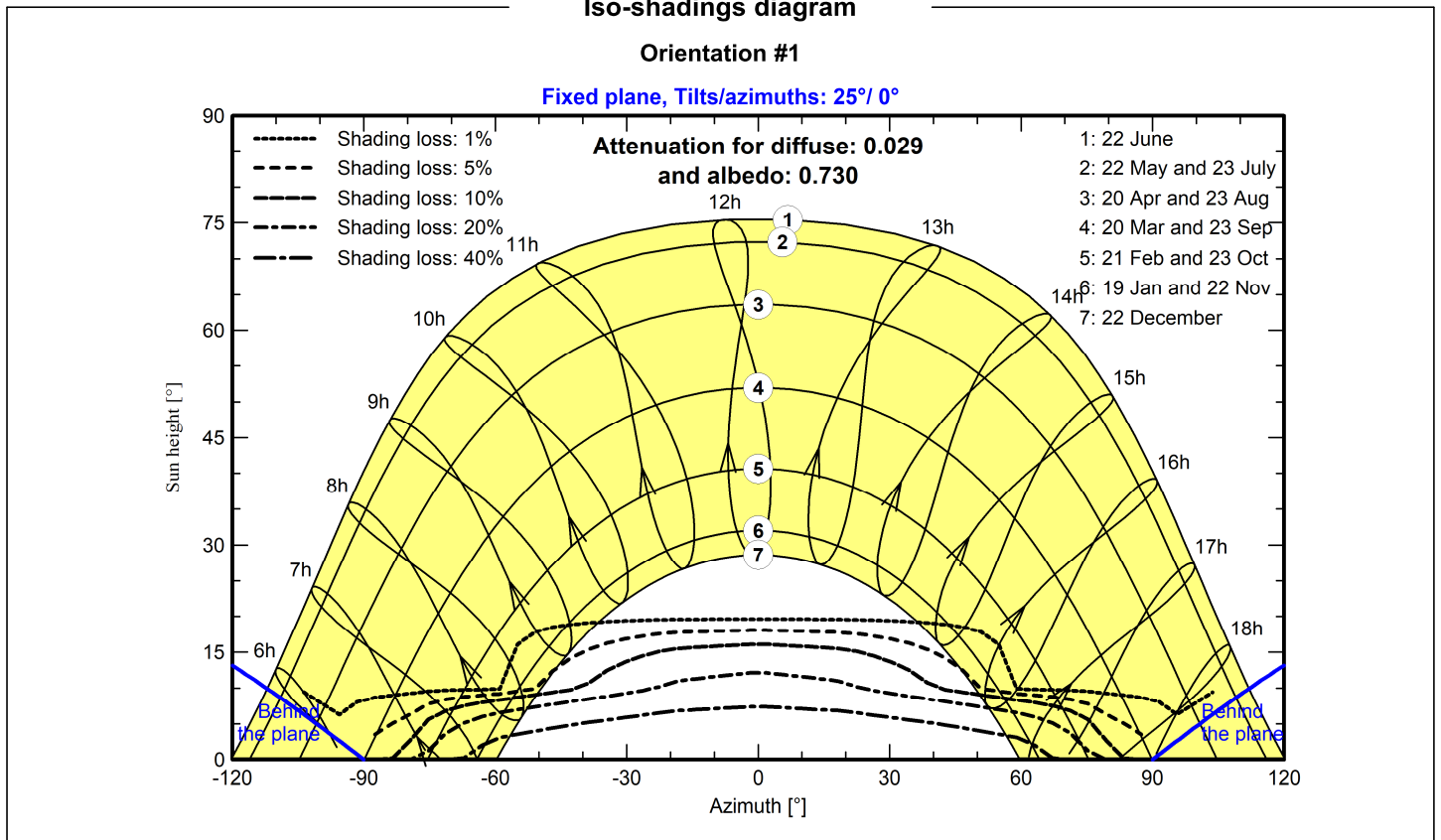




Near shadings parameter



Iso-shadings diagram





Main results

System Production

Produced Energy 23 GWh/year

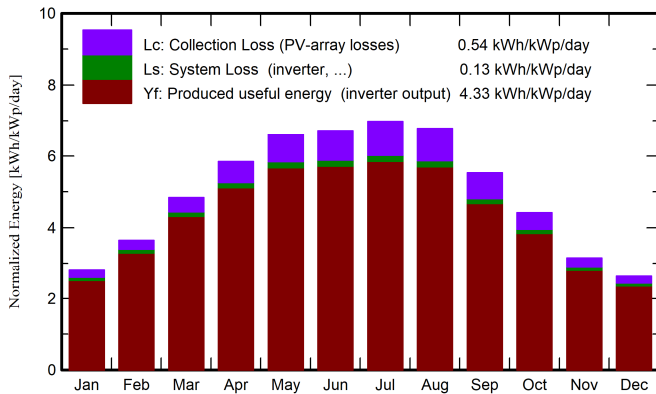
Specific production

1579 kWh/kWp/year

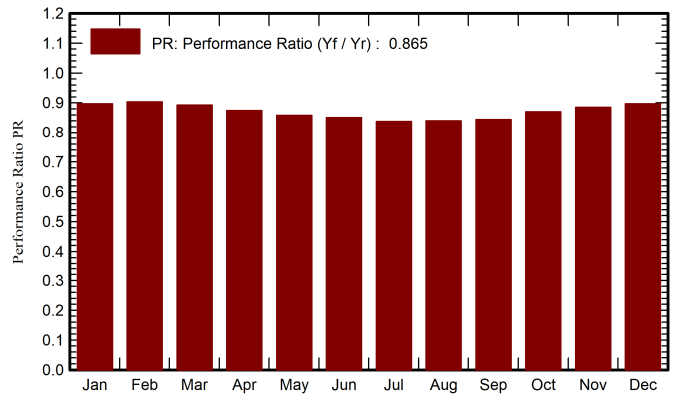
Performance Ratio PR

86.48 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

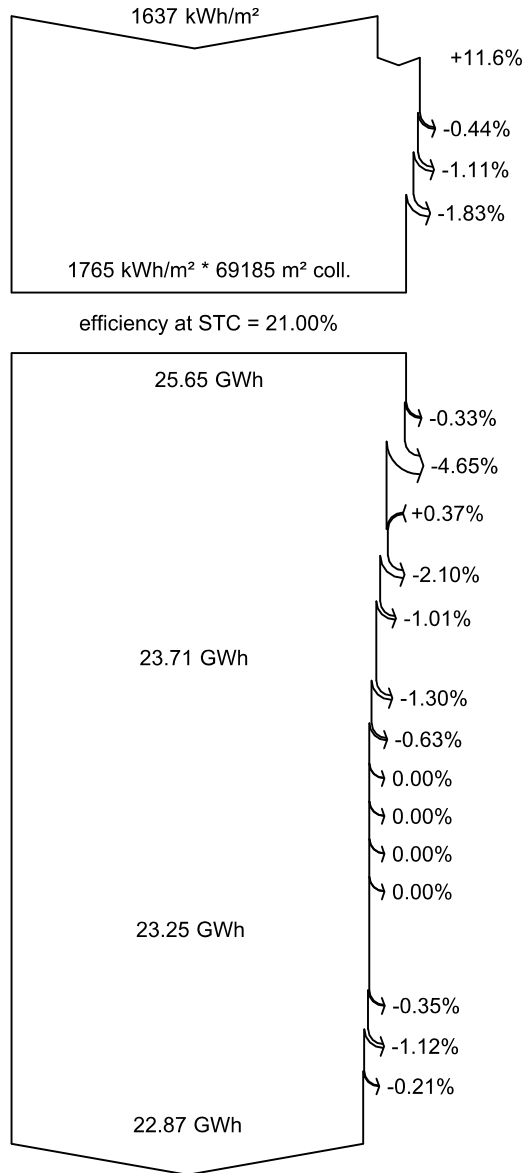
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	GWh	GWh	ratio
January	59.5	27.09	11.57	86.7	83.4	1.165	1.127	0.897
February	77.3	35.39	11.25	102.1	98.9	1.380	1.337	0.904
March	127.1	63.97	13.67	150.0	145.0	1.996	1.939	0.893
April	163.4	73.31	15.91	175.4	169.3	2.286	2.221	0.875
May	204.9	74.65	20.39	204.9	198.2	2.622	2.546	0.858
June	210.2	78.55	24.17	201.6	194.9	2.558	2.485	0.851
July	221.6	73.69	27.33	216.4	209.3	2.704	2.626	0.838
August	199.3	67.64	27.61	210.4	203.8	2.636	2.560	0.840
September	144.7	53.56	23.69	166.0	160.3	2.092	2.030	0.845
October	107.9	47.66	21.09	136.9	132.8	1.779	1.726	0.871
November	66.9	32.20	16.63	94.6	91.1	1.253	1.213	0.886
December	54.3	25.86	13.04	81.3	78.3	1.092	1.056	0.897
Year	1637.1	653.57	18.91	1826.5	1765.4	23.563	22.866	0.865

Legends

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



Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Far Shadings / Horizon

Near Shadings: irradiance loss

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Available Energy at Inverter Output

AC ohmic loss

Medium voltage transfo loss

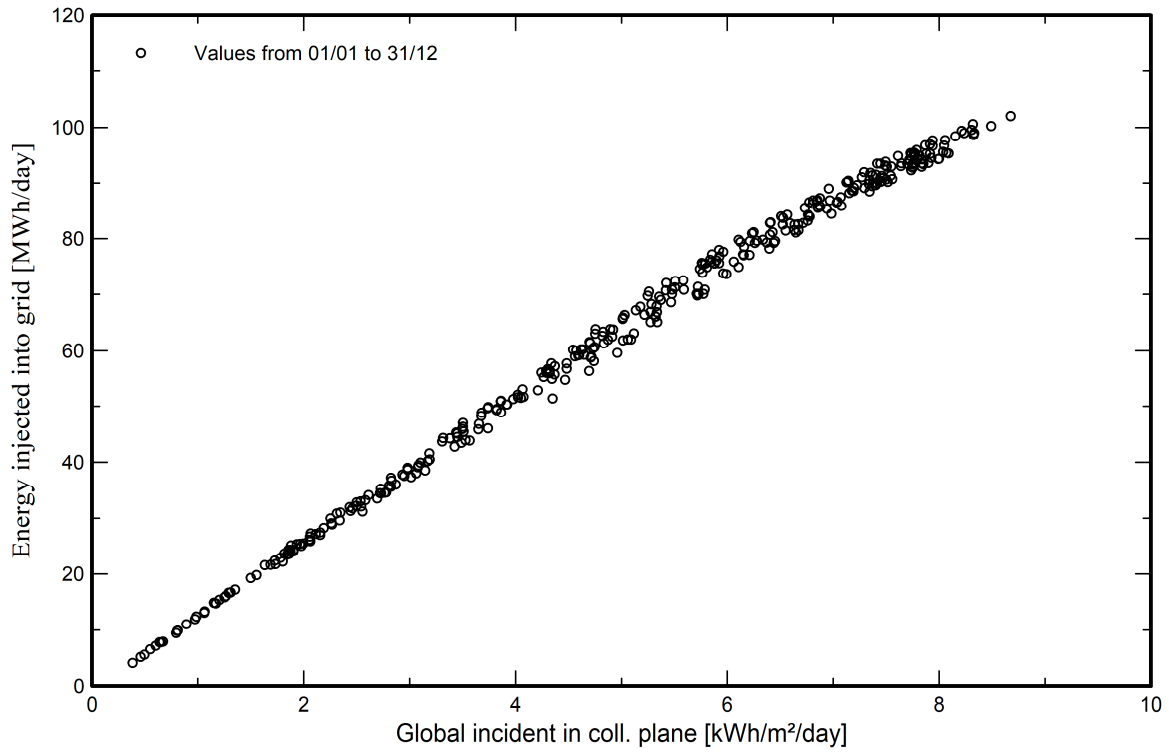
MV line ohmic loss

Energy injected into grid



Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema

