COMUNI DI GELA
PROVINCIA DI CALTANISSETTA
REGIONE SICILIA

PROGETTO DEFINITIVO DI UN IMPIANTO AGRI-FOTOVOLTAICO DI POTENZA DI PICCO P=83'051.28 kWp CON SISTEMA DI ACCUMULO PER UNA POTENZA DI IMMISSIONE COMPLESSIVA PARI A 100'000 kW

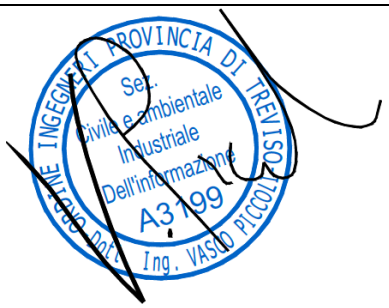
Proponente

Gela Solar Power Srl

CF e PI: 11947660961

Via Dante 7 (20123) - Milano (MI)

Progettazione



Preparato	*Verificato*	*Approvato*
Dario Ing. Bertani	**Gianandrea Ing. Bertinazzo**	**Vasco Ing. Piccoli**

PROGETTAZIONE DEFINITIVA

Titolo elaborato

IMPIANTO AGRI-FOTOVOLTAICO
STIMA PRODUCIBILITA' IMPIANTO AGRI-FV

Elaborato N. **R015**	*Data emissione* 28/02/2022			
	Nome file **RS06REL0015A0**			
N. Progetto **ENE059**	*Pagina* COVER	00	28/02/22	PRIMA EMISSIONE
		REV.	DATA	DESCRIZIONE

Version 7.2.8

PVsyst - Simulation report

Grid-Connected System

Project: ENE 059 - Gela

Variant: Layout def

Trackers single array, with backtracking

System power: 83.05 MWp

Gela - Italy

Author

GSB Consulting Srl (Italy)

Project: ENE 059 - Gela

Variant: Layout def

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Project summary

Geographical Site
Gela
Italy

Situation

Latitude	37.11 °N
Longitude	14.24 °E
Altitude	43 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Gela
PVGIS-SARAH averages 01/01/05 to 31/12/16 - Synthetic

System summary

Grid-Connected System

Trackers single array, with backtracking

PV Field Orientation
Tracking plane, horizontal N-S axis
Axis azimuth 0 °

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

System information

PV Array

Nb. of modules	145704 units
Pnom total	83.05 MWp

Inverters

Nb. of units	288 units
Pnom total	64.80 MWac
Pnom ratio	1.282

Results summary

Produced Energy	184260 MWh/year	Specific production	2219 kWh/kWp/year	Perf. Ratio PR	89.72 %

Table of contents

General parameters

Grid-Connected System — **Trackers single array, with backtracking**

PV Field Orientation

Orientation

Tracking plane, horizontal N-S axis	
Axis azimuth	0 °

Backtracking strategy

Nb. of trackers	180 units
Single array	

Sizes

Tracker Spacing	5.50 m
Collector width	2.41 m
Ground Cov. Ratio (GCR)	43.8 %
Phi min / max.	-/+ 55.0 °

Backtracking limit angle

Phi limits	+/- 63.8 °

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

Bifacial system

Model	2D Calculation unlimited trackers

Bifacial model geometry

Tracker Spacing	5.50 m
Tracker width	2.41 m
GCR	43.8 %
Axis height above ground	3.20 m

Bifacial model definitions

Ground albedo	0.20
Bifaciality factor	70 %
Rear shading factor	5.0 %
Rear mismatch loss	10.0 %
Shed transparent fraction	0.0 %

PV Array Characteristics

PV module

Manufacturer	Jinkosolar
Model	JKM570M-7RL4-TV
(Custom parameters definition)	
Unit Nom. Power	570 Wp
Number of PV modules	145704 units
Nominal (STC)	83.05 MWp
Modules	5604 Strings x 26 In series
At operating cond. (50°C)	
Pmpp	75.75 MWp
U mpp	1043 V
I mpp	72630 A

Inverter

Manufacturer	Sungrow
Model	SG250HX-30
(Custom parameters definition)	
Unit Nom. Power	225 kWac
Number of inverters	288 units
Total power	64800 kWac
Operating voltage	500-1500 V
Max. power (=>30°C)	250 kWac
Pnom ratio (DC:AC)	1.28

Total PV power

Nominal (STC)	83051 kWp
Total	145704 modules
Module area	398366 m²
Cell area	375269 m²

Total inverter power

Total power	64800 kWac
Nb. of inverters	288 units
Pnom ratio	1.28

Array losses

Array Soiling Losses
Loss Fraction 2.0 %

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

DC wiring losses
Global array res. 0.16 mΩ
Loss Fraction 1.0 % at STC

LID - Light Induced Degradation
Loss Fraction 1.2 %

Module Quality Loss
Loss Fraction -0.8 %

Module mismatch losses
Loss Fraction 1.0 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

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

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	0.999	0.989	0.964	0.922	0.729	0.000

System losses

Auxiliaries loss
Proportionnal to Power 5.0 W/kW
0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo
Inverter voltage 800 Vac tri
Loss Fraction 0.70 % at STC
Inverter: SG250HX-30
Wire section (288 Inv.) Alu 288 x 3 x 300 mm²
Average wires length 150 m

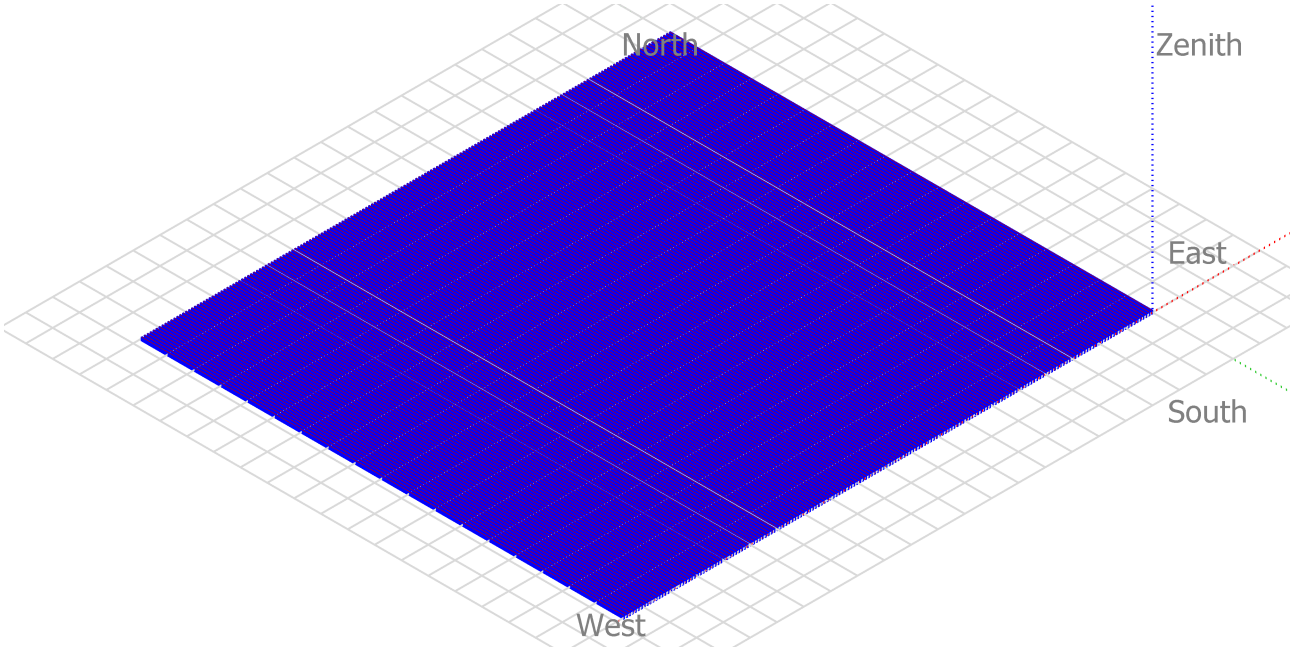
MV line up to Injection
MV Voltage 36 kV
Average each inverter
Wires Copper 3 x 1500 mm²
Length 11600 m
Loss Fraction 0.04 % at STC

AC losses in transformers

MV transfo
Grid voltage 36 kV
Operating losses at STC
Nominal power at STC 81740 kVA
Iron loss (24/24 Connexion) 3.41 kW/Inv.
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 1.88 mΩ/inv.
Loss Fraction 1.00 % at STC

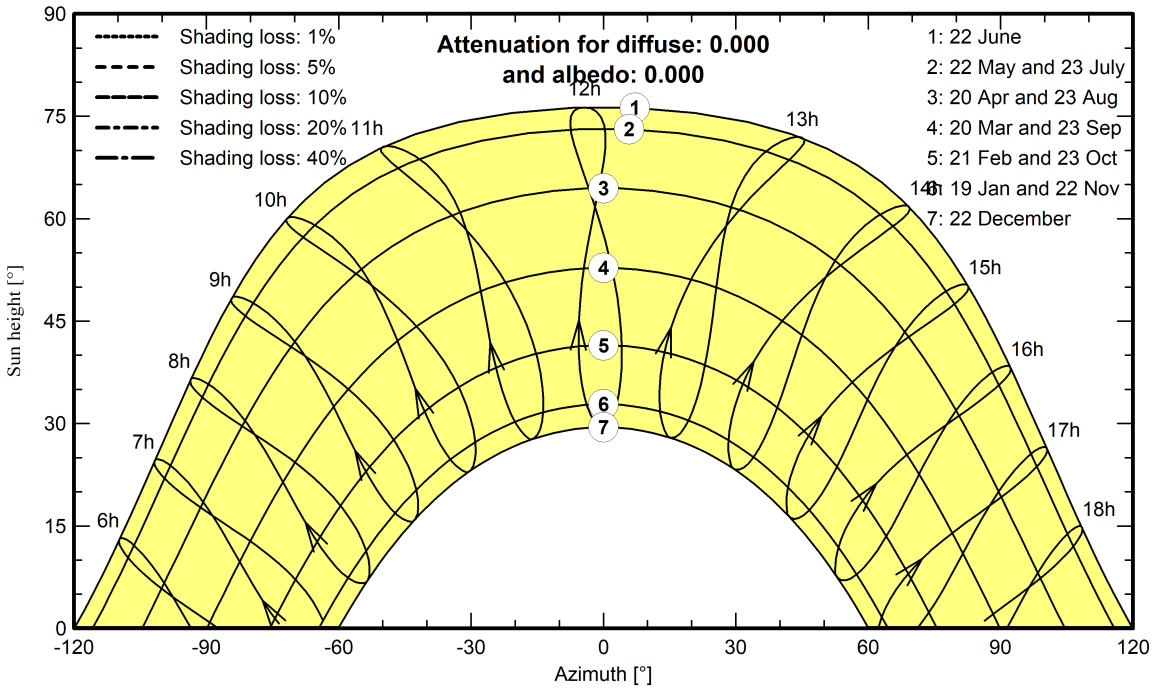
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

ENE 059 - Gela - Legal Time



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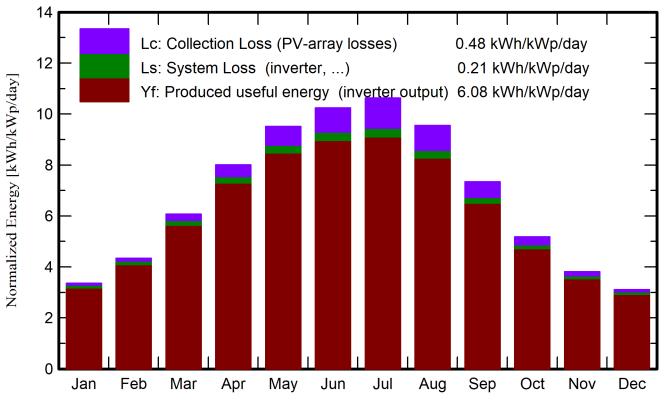
Main results

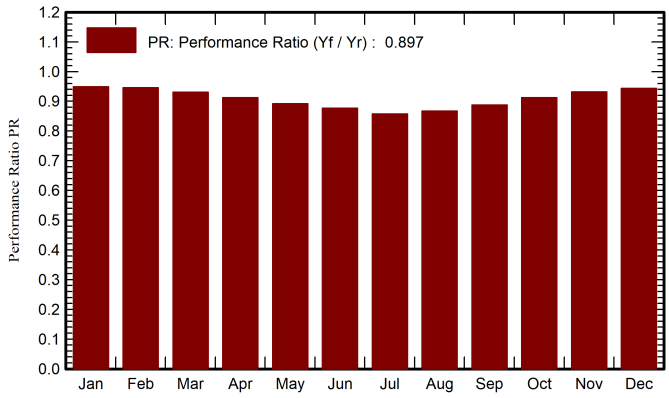
System Production

Produced Energy	184260 MWh/year	Specific production	2219 kWh/kWp/year
		Performance Ratio PR	89.72 %

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 MWh	E_Grid MWh	PR ratio
January	78.4	31.07	11.90	104.1	99.8	8473	8200	0.948
February	93.1	37.84	11.54	121.4	116.5	9843	9529	0.945
March	144.1	54.64	12.84	188.1	181.0	15027	14538	0.931
April	182.9	63.01	15.38	240.1	231.5	18833	18201	0.913
May	225.9	68.47	18.44	294.8	284.6	22621	21843	0.892
June	235.3	65.31	21.95	307.3	297.0	23165	22371	0.877
July	250.1	59.13	24.88	329.6	318.8	24319	23467	0.857
August	223.3	57.26	25.33	296.2	286.2	22103	21325	0.867
September	166.4	51.81	23.36	220.1	212.2	16791	16227	0.888
October	122.6	45.57	20.29	160.5	154.3	12571	12164	0.913
November	86.1	32.92	16.73	114.2	109.6	9130	8838	0.932
December	72.6	29.50	13.15	96.5	92.5	7819	7559	0.943
Year	1880.7	596.53	18.02	2472.7	2384.0	190696	184260	0.897

Legends

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

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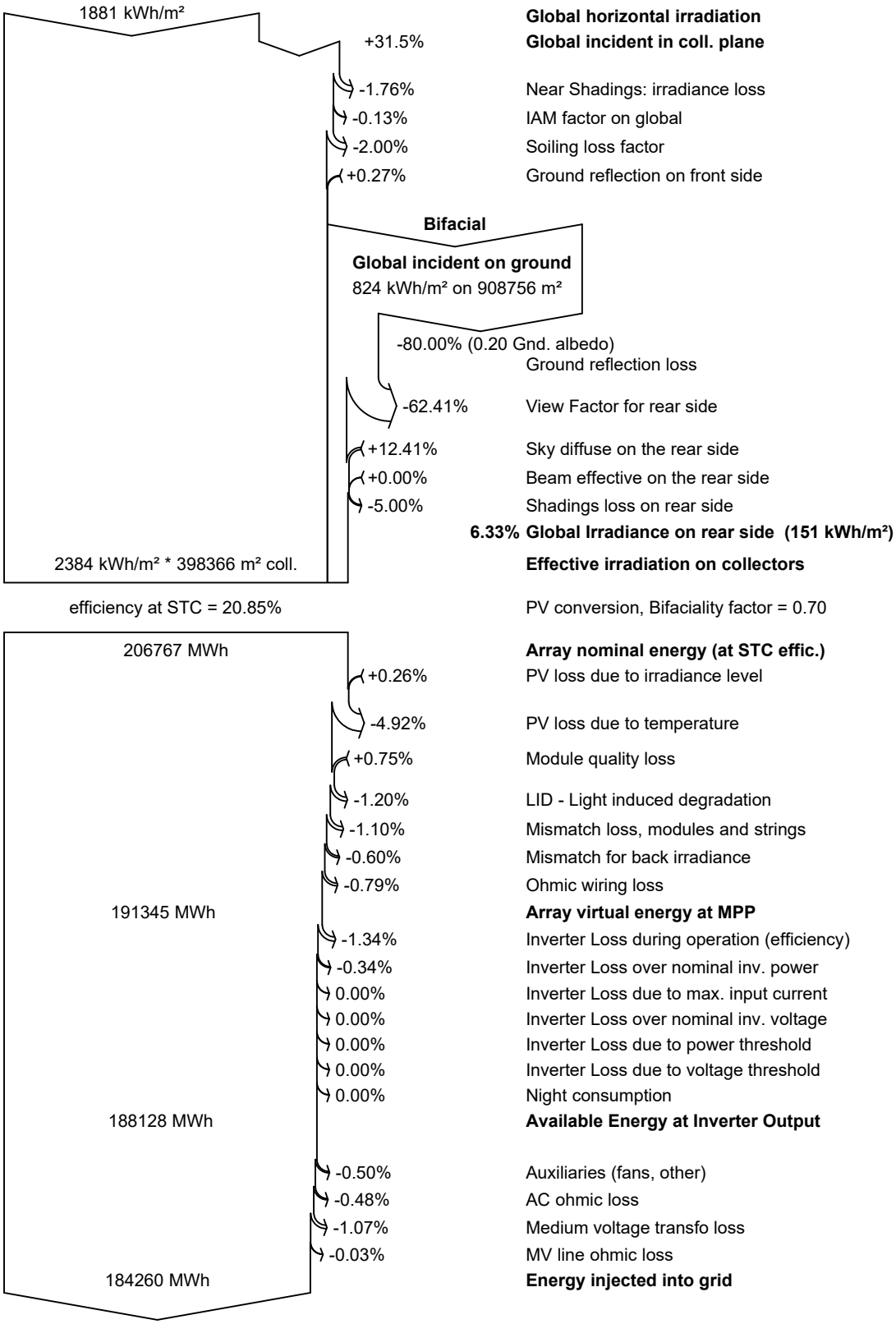
Loss diagram



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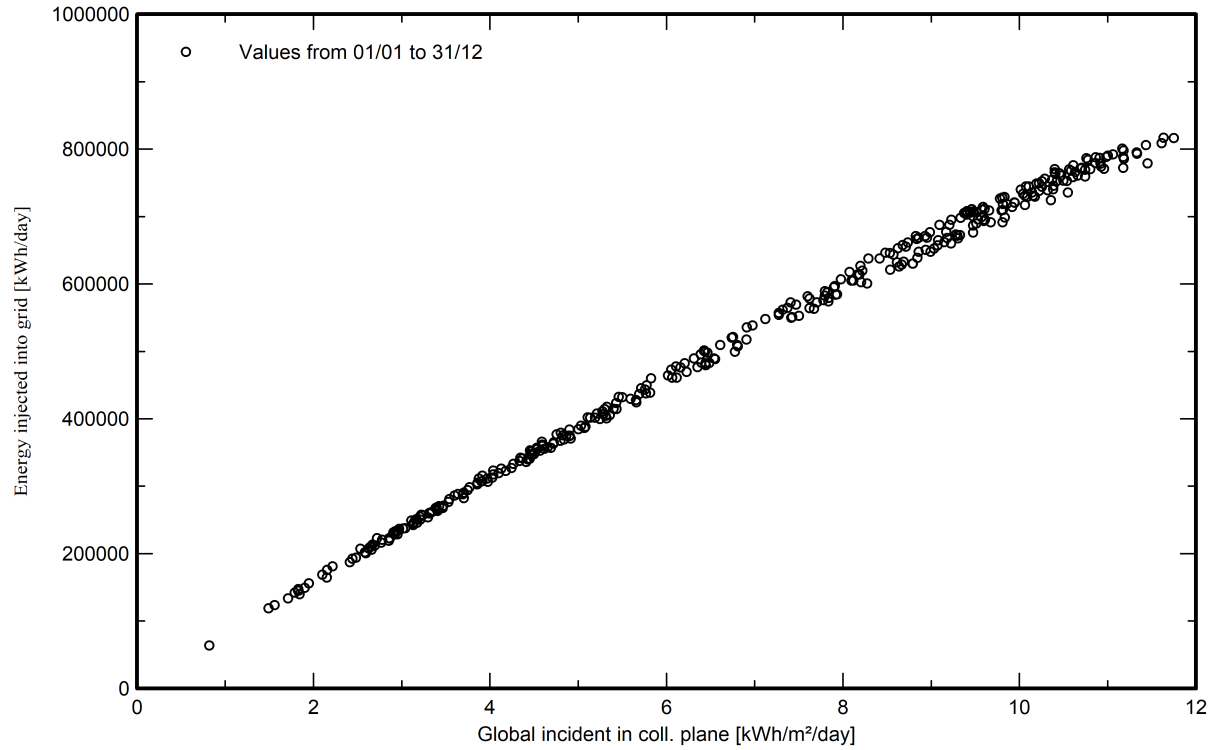
Special graphs

Daily Input/Output diagram



System Output Power Distribution