

IMPIANTO AGRIVOLTAICO DELLA POTENZA NOMINALE DI 48.916,56 kWp "LOTTO 9"

UBICATO NEL COMUNE DI LATIANO (BR)

CODICE IDENTIFICATIVO PRATICA AU REGIONALE: MU5A7M1

Titolo Elaborato:

ANALISI DELLA RISORSA SOLARE E STIMA DI PRODUZIONE ENERGIA

IDENTIFICAZIONE ELABORATO (MITE)

LIVELLO PROGETTAZIONE	TIPO DOCUMENTO	CODICE IDENTIFICATIVO	DATA	SCALA
PD	R	MU5A7M1_REL_12	DICEMBRE 2022	-

REVISIONI

REV.	DATA	DESCRIZIONE	ESEGUITO	VERIFICATO	APPROVATO
00	12/22	Prima emissione	Ing. Cosimo Totaro	Ing. Cosimo Totaro	Ing. Cosimo Totaro

TECNICO:

Ing. Cosimo Totaro
Ordine degli Ingegneri
Provincia di Brindisi n.1718



PROPONENTE:

ELETTRA SOL S.R.L.
Via Mercato, 3
20121, Milano (MI) - Italy



PROGETTAZIONE:

NEXTA PROJECT DEVELOPMENT
Via Dante, 7
20123, Milano - ITALY

APULIA ENERGIA S.R.L.
Via Sasso, 15b
72023, Mesagne (BR) - ITALY



NEXTA PROJECT DEVELOPMENT
NEXTA CAPITAL PARTNERS



PVsyst - Simulation report

Grid-Connected System

Project: Lotto 9

Variant: Nuova variante di simulazione

Tracking system with backtracking

System power: 48.92 MWp

Latiano - Lotto 9 - Italia



Project: Lotto 9

Variant: Nuova variante di simulazione

PVsyst V7.2.8

VCO, Simulation date:
21/11/22 11:17
with v7.2.8

Project summary

Geographical Site

Latiano - Lotto 9

Italia

Situation

Latitude 40.55 °N

Longitude 17.72 °E

Altitude 100 m

Time zone UTC+1

Meteo data

Latiano - Lotto 9

Meteonorm 8.0, Sat=100% - Sintetico

Monthly albedo values

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Albedo	0.14	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.14	0.14	0.14

System summary

Grid-Connected System

PV Field Orientation

Tracking plane, horizontal N-S axis

Axis azimuth 0 °

System information

PV Array

Nb. of modules

Pnom total

Tracking system with backtracking

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

Inverters

Nb. of units

Pnom total

Pnom ratio

205 units

41.00 MWac

1.193

Results summary

Produced Energy	81403 MWh/year	Specific production	1664 kWh/kWp/year	Perf. Ratio PR	85.39 %
-----------------	----------------	---------------------	-------------------	----------------	---------

Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Near shading definition - Iso-shadings diagram	6
Main results	7
Loss diagram	8
Special graphs	9

**PVsyst V7.2.8**

VCO, Simulation date:
21/11/22 11:17
with v7.2.8

General parameters**Grid-Connected System****PV Field Orientation****Orientation**

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

Horizon

Free Horizon

Bifacial system

Model 2D Calculation
unlimited trackers

Bifacial model geometry

Tracker Spacing 10.00 m
Tracker width 4.79 m
GCR 47.9 %
Axis height above ground 2.10 m

Tracking system with backtracking**Backtracking strategy**

Nb. of trackers 1325 units

Sizes

Tracker Spacing 10.00 m
Collector width 4.79 m
Ground Cov. Ratio (GCR) 47.9 %
Phi min / max. +/- 60.0 °

Backtracking limit angle

Phi limits +/- 61.2 °

Near Shadings

Linear shadings

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

User's needs

Unlimited load (grid)

Bifacial model definitions

Ground albedo 0.16
Bifaciality factor 70 %
Rear shading factor 5.0 %
Rear mismatch loss 10.0 %
Shed transparent fraction 0.0 %

PV Array Characteristics**PV module**

Manufacturer CSI Solar Co., Ltd.
Model CS7N-660MB-AG 1500V
(Custom parameters definition)

Unit Nom. Power 660 Wp
Number of PV modules 74116 units
Nominal (STC) 48.92 MWp
Modules 2647 Strings x 28 In series

At operating cond. (50°C)

Pmpp 44.94 MWp
U mpp 959 V
I mpp 46870 A

Total PV power

Nominal (STC) 48917 kWp
Total 74116 modules
Module area 230230 m²

Inverter

Manufacturer Huawei Technologies
Model SUN2000-215KTL-H3
(Custom parameters definition)

Unit Nom. Power 200 kWac
Number of inverters 205 units
Total power 41000 kWac
Operating voltage 500-1500 V
Max. power (=>33°C) 215 kWac
Pnom ratio (DC:AC) 1.19

Total inverter power

Total power 41000 kWac
Nb. of inverters 205 units
Pnom ratio 1.19

Array losses**Array Soiling Losses**

Loss Fraction 1.5 %

Serie Diode Loss

Voltage drop 0.7 V
Loss Fraction 0.1 % at STC

Thermal Loss factor

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

LID - Light Induced Degradation

Loss Fraction 2.0 %

DC wiring losses

Global array res. 0.34 mΩ
Loss Fraction 1.5 % at STC

Module Quality Loss

Loss Fraction -1.0 %



Project: Lotto 9

Variant: Nuova variante di simulazione

PVsyst V7.2.8

VC0, Simulation date:
21/11/22 11:17
with v7.2.8

Array losses

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

IAM loss factor

ASHRAE Param: $IAM = 1 - bo(1/cos i - 1)$
bo Param. 0.05



PVsyst V7.2.8

VCO, Simulation date:
21/11/22 11:17
with v7.2.8

System losses

Auxiliaries loss

Proportionnal to Power 2.0 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 0.36 % at STC

Inverter: SUN2000-215KTL-H3

Wire section (205 Inv.) Copper 205 x 3 x 95 mm²
Average wires length 50 m

MV line up to Injection

MV Voltage 30 kV
Average each inverter
Wires Copper 3 x 50 mm²
Length 2000 m
Loss Fraction 0.29 % at STC

AC losses in transformers

MV transfo

Grid voltage 30 kV

Operating losses at STC

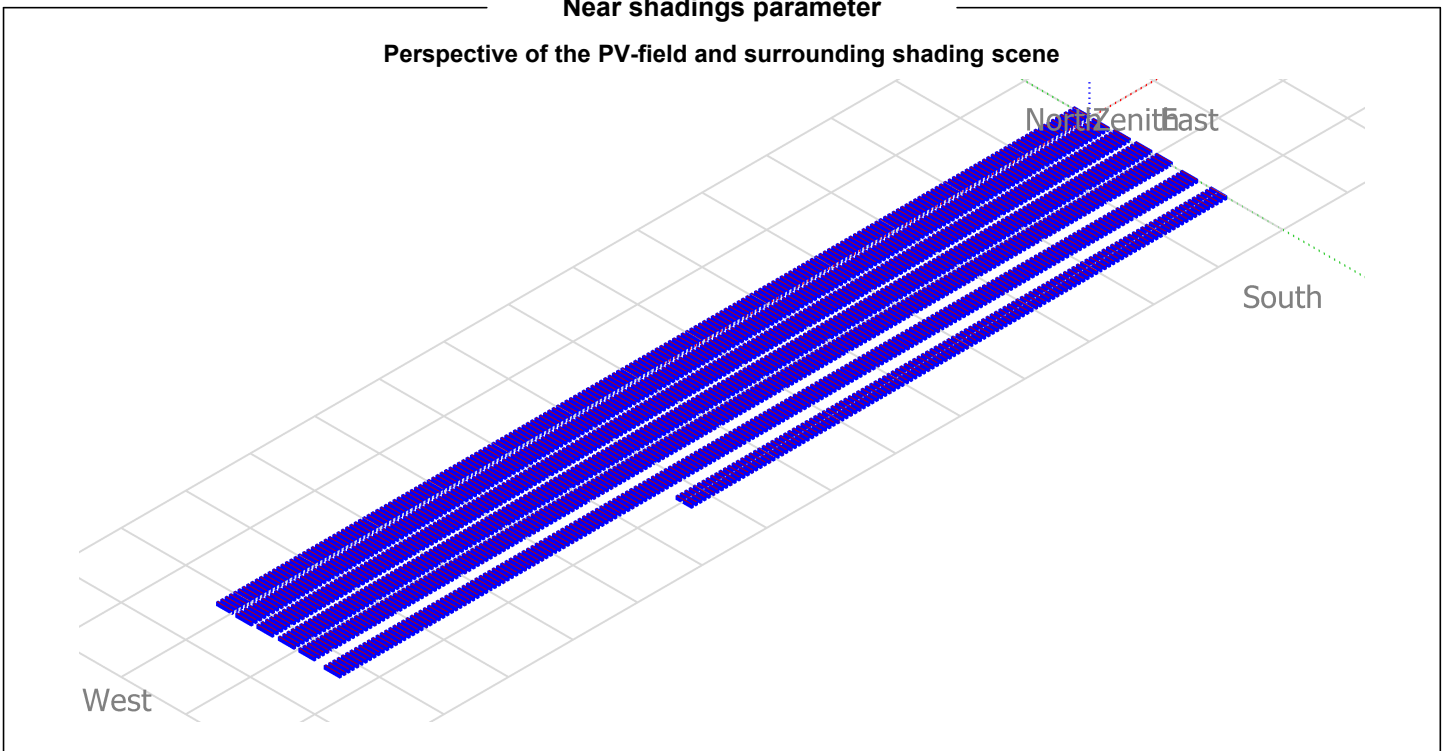
Nominal power at STC 48017 kVA
Iron loss (24/24 Connexion) 6.86 kW/Inv.
Loss Fraction 0.20 % at STC
Coils equivalent resistance 3 x 1.68 mΩ/inv.
Loss Fraction 0.90 % at STC



PVsyst V7.2.8

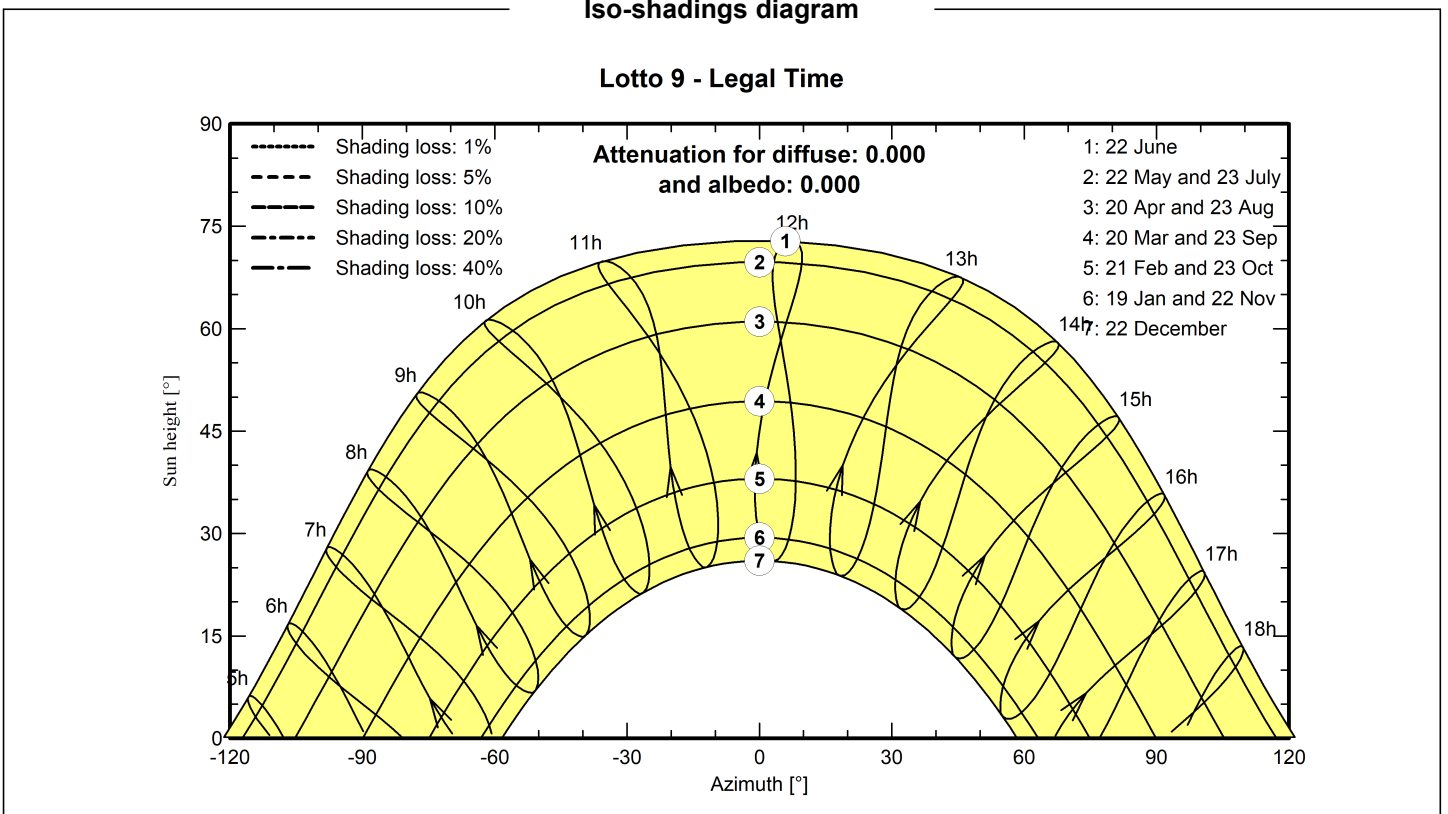
VCO, Simulation date:
21/11/22 11:17
with v7.2.8

Near shadings parameter



Iso-shadings diagram

Lotto 9 - Legal Time





PVsyst V7.2.8

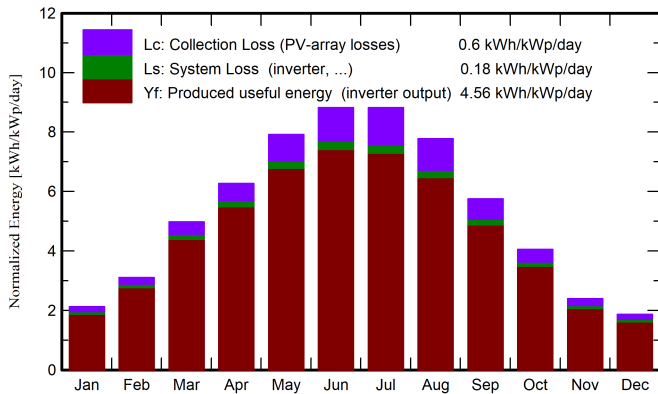
VCO, Simulation date:
21/11/22 11:17
with v7.2.8

Main results

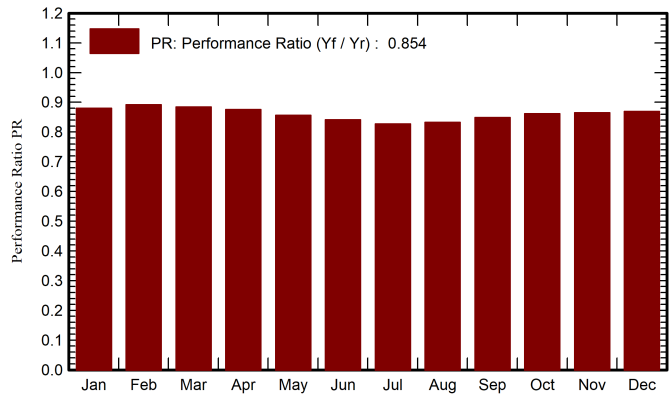
System Production

Produced Energy 81403 MWh/year Specific production 1664 kWh/kWp/year
Performance Ratio PR 85.39 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	PR ratio
January	53.5	31.82	9.53	66.0	60.7	2979	2841	0.880
February	70.5	39.16	10.25	87.1	81.2	3955	3799	0.892
March	122.0	55.95	13.22	154.3	146.0	6930	6676	0.884
April	151.1	68.65	16.18	188.2	179.3	8366	8062	0.876
May	194.8	79.30	21.13	245.6	235.2	10672	10285	0.856
June	208.4	80.33	25.93	264.8	254.1	11300	10892	0.841
July	213.2	72.56	29.18	273.5	262.6	11481	11062	0.827
August	188.8	73.62	28.97	241.3	231.3	10194	9823	0.832
September	135.3	57.16	23.53	172.6	164.0	7442	7167	0.849
October	98.1	47.39	19.45	125.5	117.9	5503	5293	0.862
November	57.6	30.85	14.92	72.0	66.5	3187	3044	0.865
December	46.1	26.60	10.92	57.8	53.0	2587	2458	0.869
Year	1539.5	663.39	18.65	1948.8	1851.8	84595	81403	0.854

Legends

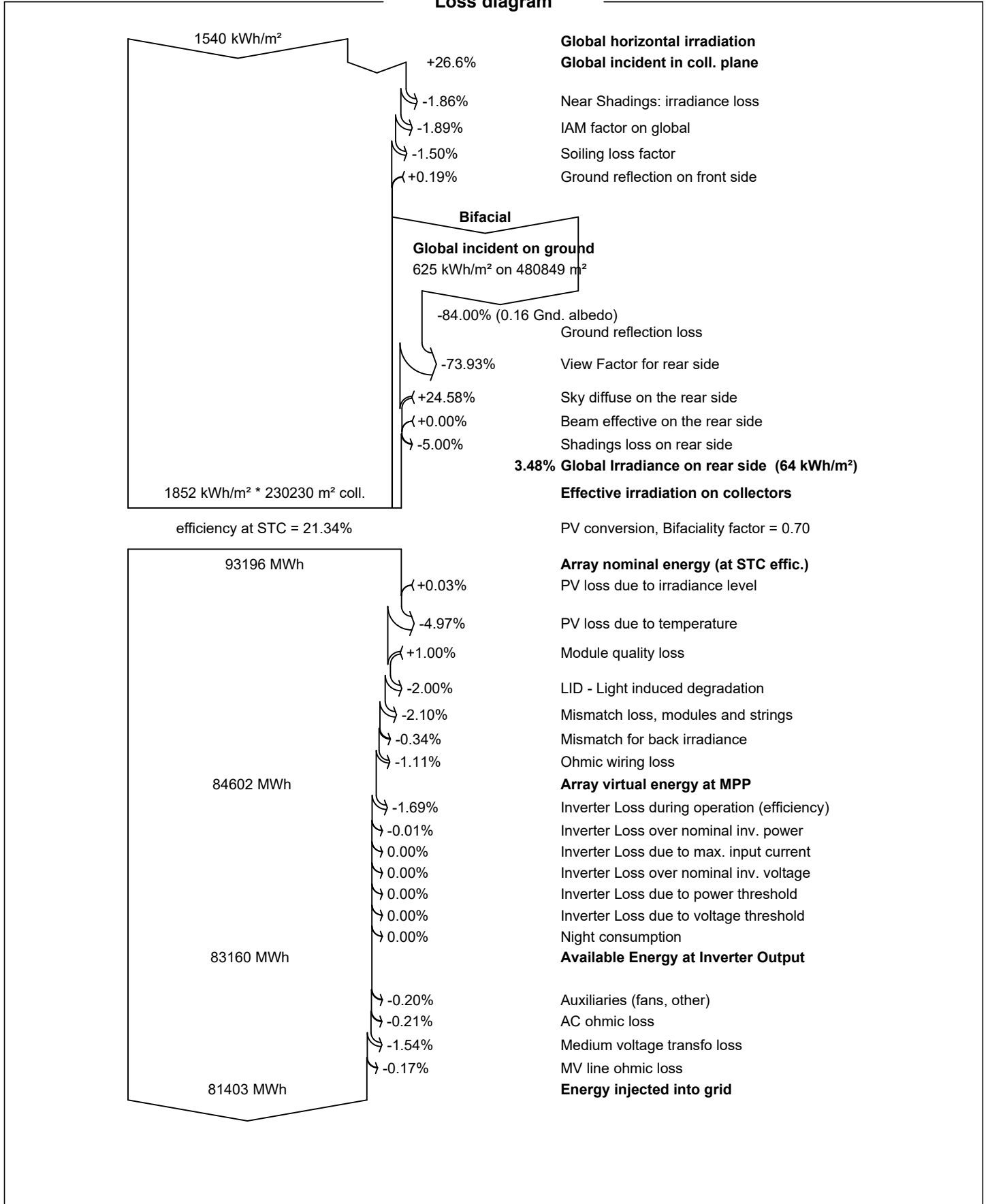
- | | | | |
|---------|--|--------|---|
| GlobHor | Global horizontal irradiation | EArray | Effective energy at the output of the array |
| DiffHor | Horizontal diffuse irradiation | E_Grid | Energy injected into grid |
| T_Amb | Ambient Temperature | PR | Performance Ratio |
| GlobInc | Global incident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



PVsyst V7.2.8

VCO, Simulation date:
21/11/22 11:17
with v7.2.8

Loss diagram



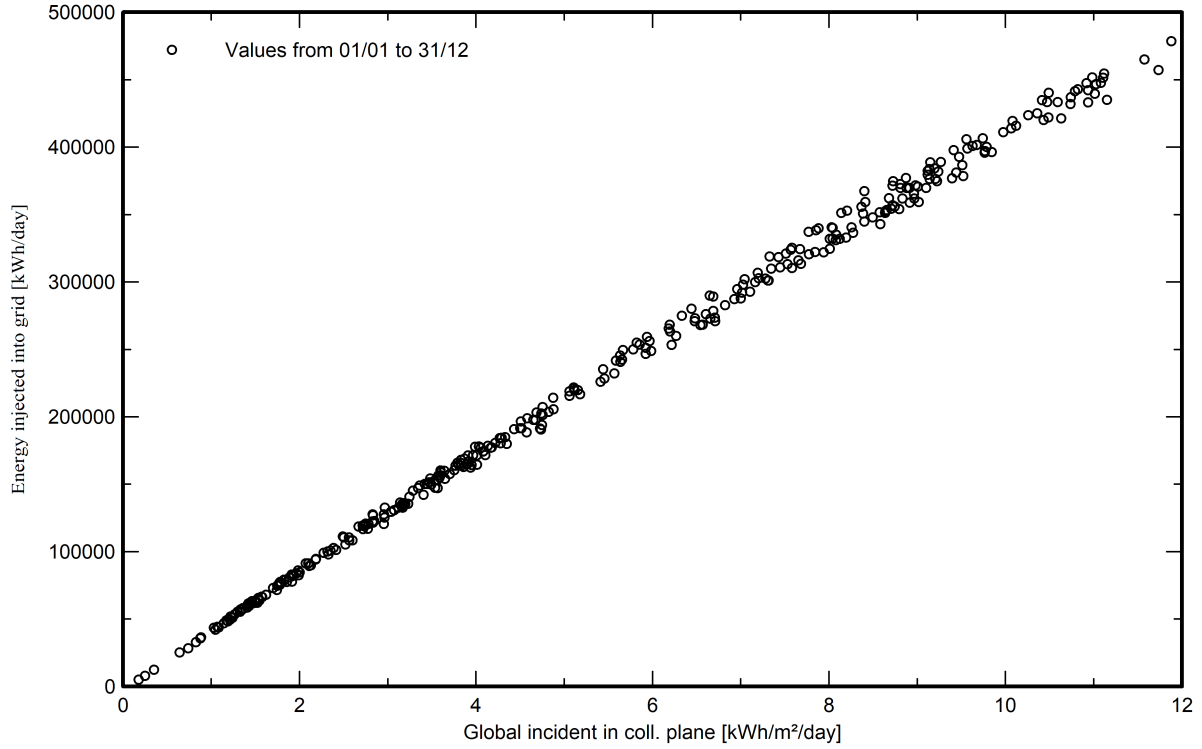


PVsyst V7.2.8

VCO, Simulation date:
21/11/22 11:17
with v7.2.8

Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema

