



REGIONE  
PUGLIA



Provincia di Brindisi



Comune di San Pancrazio Salentino

Committente:

**SUNCO SUN GREEN SRL**

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**SUNCO.**  
CAPITAL

Progetto definitivo:

**PROVVEDIMENTO AUTORIZZATIVO UNICO REGIONALE  
ai sensi dell' art. 27 bis del D.Lgs. 152/06 e del D.M. 52/2015**

Denominazione progetto:

**REALIZZAZIONE IMPIANTO AGRIVOLTAICO  
"SAN PANCRAZIO"**

Potenza nominale complessiva = 14.647,2 kWp

Sito in:

**COMUNE DI SAN PANCRAZIO SALENTINO (BR)**

Titolo elaborato:

**Stima della producibilità  
dell'impianto**

Elaborato n. REL 09

Scala -



Responsabile Coordinamento progetto : dott.ssa agr. Eliana Santoro

Progettisti :

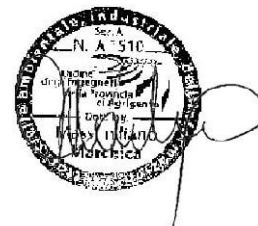


**FLYREN**  
THE CULTURE OF CLEAN ENERGY

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Collaboratori :

TIMBRI E FIRME:



REV.:	REDAZIONE:	CONTROLLO:	APPROVAZIONE :	DATA:
00	Matteo Pradotto	Ing. Massimiliano Marchica	Ing. Massimiliano Marchica	28/11/2023
01				
02				
03				
04				
05				

FIRMA/TIMBRO  
COMMITTENTE:

**SUNCO.**  
CAPITAL



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# PVsyst - Simulation report

## Grid-Connected System

Project: San Pancrazio Salentino

Variant: Agrivoltaico REV01

Tracking system with backtracking

System power: 14.65 MWp

San Pancrazio Salentino - Italy

**Author**

flyRen Development srl (Italy)

**PVsyst V7.3.1**

VC2, Simulation date:  
24/11/23 11:46  
with v7.3.1

**Project: San Pancrazio Salentino**

Variant: Agrivoltaico REV01

flyRen Development srl (Italy)

**Project summary**

**Geographical Site**  
**San Pancrazio Salentino**  
Italy

**Situation**  
Latitude 40.43 °N  
Longitude 17.83 °E  
Altitude 57 m  
Time zone UTC+1

**Project settings**  
Albedo 0.20

**Meteo data**  
San Pancrazio Salentino  
Meteonorm 8.1, Sat=100% - Synthetic

**System summary**

**Grid-Connected System**  
Simulation for year no 1

**Tracking system with backtracking**

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

**Tracking algorithm**  
Astronomic calculation  
Backtracking activated

**Near Shadings**  
Linear shadings

**System information****PV Array**

Nb. of modules 21540 units  
Pnom total 14.65 MWp

**Inverters**

Nb. of units 39 units  
Pnom total 11.70 MWac  
Pnom ratio 1.252

**User's needs**  
Unlimited load (grid)

**Results summary**

Produced Energy	26219940 kWh/year	Specific production	1790 kWh/kWp/year	Perf. Ratio PR	87.61 %
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## PVsyst V7.3.1

VC2, Simulation date:  
24/11/23 11:46  
with v7.3.1

flyRen Development srl (Italy)

## General parameters

## Grid-Connected System

## PV Field Orientation

## Orientation

Tracking plane, horizontal N-S axis

Axis azimuth 0 °

## Models used

Transposition Perez

Diffuse Perez, Meteorism

Circumsolar separate

## Horizon

Free Horizon

## Bifacial system

Model 2D Calculation  
unlimited trackers

## Bifacial model geometry

Tracker Spacing 12.00 m

Tracker width 4.79 m

GCR 39.9 %

Axis height above ground 2.50 m

## Tracking system with backtracking

## Tracking algorithm

Astronomic calculation

Backtracking activated

## Backtracking array

Nb. of trackers 718 units

## Sizes

Tracker Spacing 12.0 m

Collector width 4.79 m

Ground Cov. Ratio (GCR) 39.9 %

Phi min / max. -/+ 60.0 °

## Backtracking strategy

Phi limits for BT -/+ 66.4 °

Backtracking pitch 12.0 m

Backtracking width 4.79 m

## Near Shadings

Linear shadings

## User's needs

Unlimited load (grid)

## PV Array Characteristics

## PV module

Manufacturer CSI Solar Co., Ltd.

Model CS7N-680TB-AG 1500V

(Custom parameters definition)

Unit Nom. Power 680 Wp

Number of PV modules 21540 units

Nominal (STC) 14.65 MWp

Modules 718 Strings x 30 In series

## At operating cond. (50°C)

Pmpp 13.55 MWp

U mpp 1079 V

I mpp 12557 A

## Total PV power

Nominal (STC) 14647 kWp

Total 21540 modules

Module area 66911 m<sup>2</sup>

## Inverter

Manufacturer Huawei Technologies

Model SUN2000-330KTL-H1

(Custom parameters definition)

Unit Nom. Power 300 kWac

Number of inverters 39 units

Total power 11700 kWac

Operating voltage 500-1500 V

Max. power (=&gt;30°C) 330 kWac

Pnom ratio (DC:AC) 1.25

Power sharing within this inverter

## Total inverter power

Total power 11700 kWac

Number of inverters 39 units

Pnom ratio 1.25



## Array losses

## Array Soiling Losses

Loss Fraction 3.5 %

## Serie Diode Loss

Voltage drop 0.7 V

Loss Fraction 0.1 % at STC

## Module mismatch losses

Loss Fraction 0.9 % at MPP

## 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 1.5 %

## Strings Mismatch loss

Loss Fraction 0.1 %

## DC wiring losses

Global array res. 0.30 mΩ

Loss Fraction 0.3 % at STC

## Module Quality Loss

Loss Fraction -0.4 %

## Module average degradation

Year no 1

Loss factor 0.4 %/year

## Mismatch due to degradation

Imp RMS dispersion 0.4 %/year

Vmp RMS dispersion 0.4 %/year

## IAM loss factor

Incidence effect (IAM): User defined profile

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

## System losses

## Unavailability of the system

Time fraction 1.0 %  
3.7 days,  
3 periods

## Auxiliaries loss

Proportionnal to Power 3.0 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 0.58 % at STC

## Inverter: SUN2000-330KTL-H1

Wire section (39 Inv.) Copper 39 x 3 x 150 mm²

Average wires length 81 m

## MV line up to Injection

MV Voltage 20 kV

Average each inverter

Wires Alu 3 x 120 mm²

Length 732 m

Loss Fraction 0.35 % at STC

## AC losses in transformers

## MV transfo

Medium voltage 20 kV

## One transfo parameters

Nominal power at STC 7.19 MVA

Iron Loss (24/24 Connexion) 7.19 kVA

Iron loss fraction 0.10 % at STC

Copper loss 71.92 kVA

Copper loss fraction 1.00 % at STC

Coils equivalent resistance 3 x 0.89 mΩ

## Operating losses at STC (full system)

Nb. identical MV transfos 2

Nominal power at STC 14.38 MVA

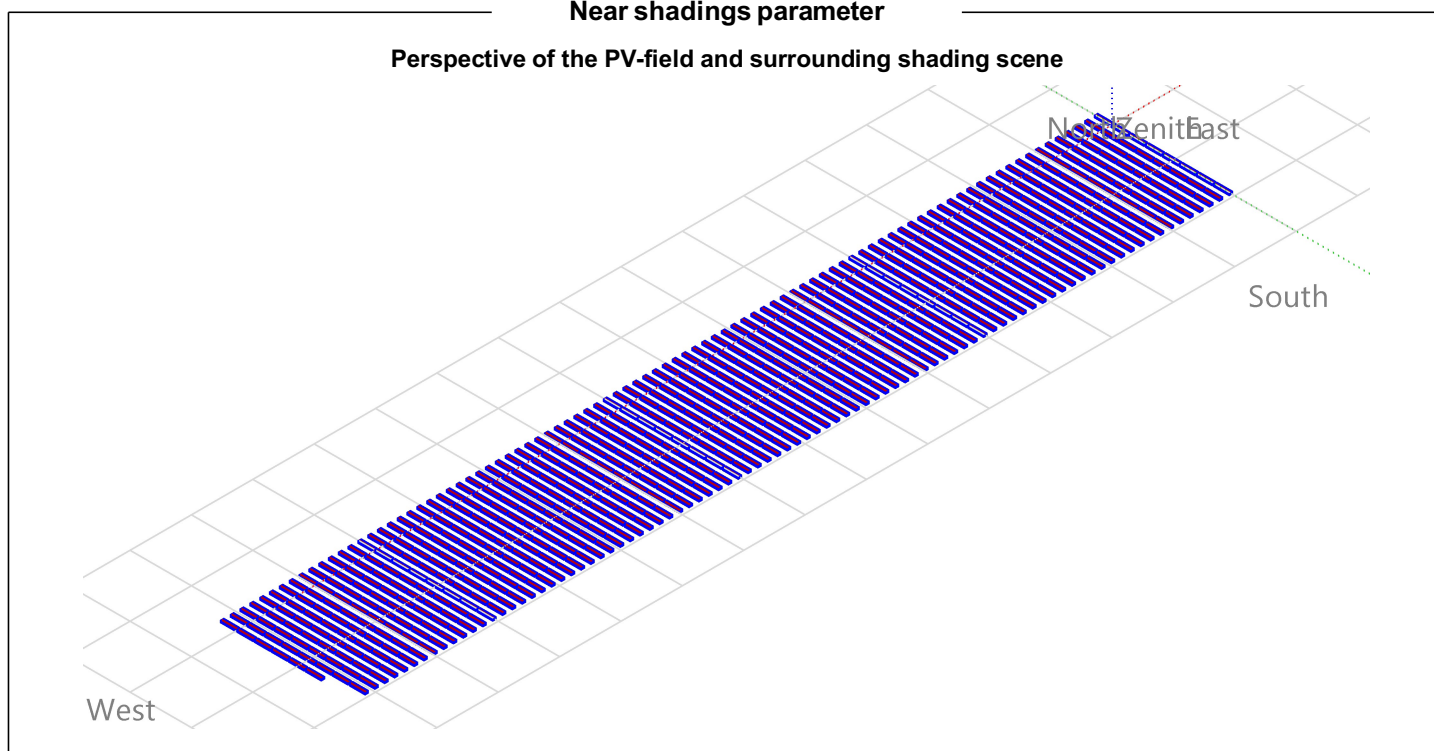
Iron loss (24/24 Connexion) 14.38 kVA

Copper loss 143.84 kVA



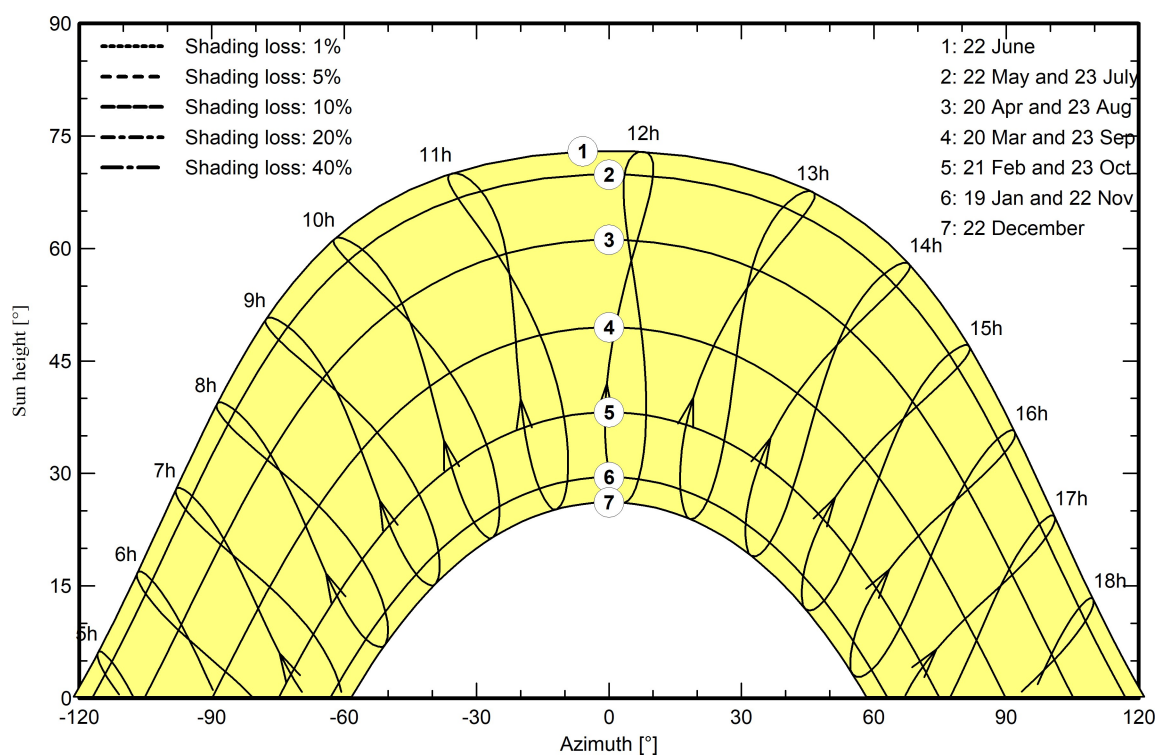
### Near shadings parameter

#### Perspective of the PV-field and surrounding shading scene



### Iso-shadings diagram

#### Orientation #1





## Main results

## System Production

Produced Energy

26219940 kWh/year

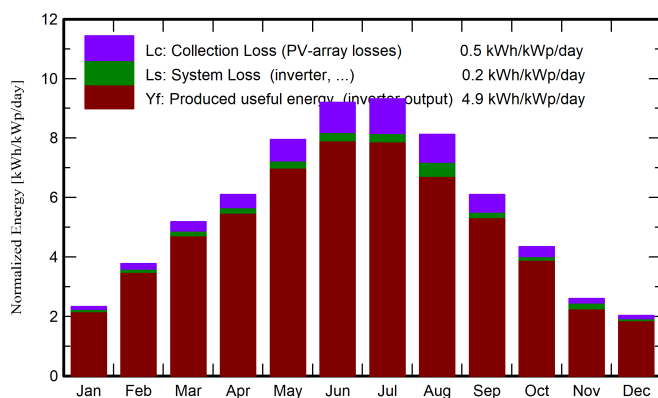
Specific production

1790 kWh/kWp/year

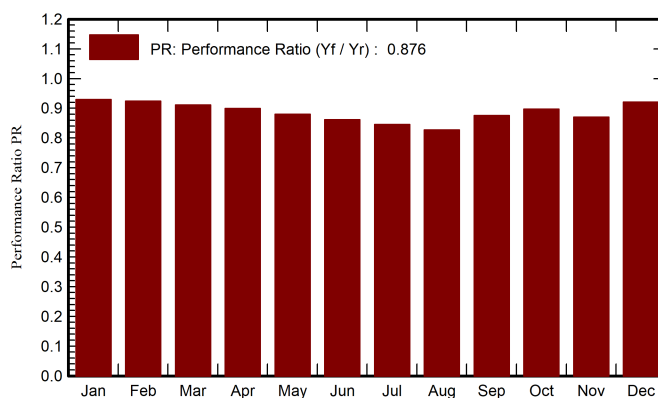
Performance Ratio PR

87.61 %

## Normalized productions (per installed kWp)



## Performance Ratio PR



## Balances and main results

	GlobHor kWh/m <sup>2</sup>	DiffHor kWh/m <sup>2</sup>	T_Amb °C	GlobInc kWh/m <sup>2</sup>	GlobEff kWh/m <sup>2</sup>	EArray kWh	E_Grid kWh	PR ratio
January	56.2	28.02	9.33	72.4	68.0	1018783	985154	0.929
February	79.1	36.84	10.05	105.8	99.6	1477300	1432025	0.924
March	122.6	53.27	12.80	160.6	151.6	2215396	2145005	0.912
April	145.4	70.76	15.68	182.9	172.5	2489865	2409441	0.899
May	192.6	84.46	20.50	246.5	233.1	3286227	3177474	0.880
June	211.8	79.34	25.42	275.9	261.6	3602539	3480809	0.861
July	218.1	71.24	28.82	288.9	274.1	3705539	3578397	0.846
August	192.7	74.24	28.70	251.8	238.6	3267442	3051588	0.827
September	138.9	56.84	23.18	182.9	172.8	2424593	2345181	0.875
October	102.5	46.55	19.16	134.6	126.9	1827565	1770238	0.898
November	59.7	31.72	14.72	78.2	73.2	1078598	995979	0.870
December	48.0	25.46	10.83	62.9	58.9	878474	848649	0.921
Year	1567.6	658.75	18.32	2043.4	1930.9	27272321	26219940	0.876

## 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

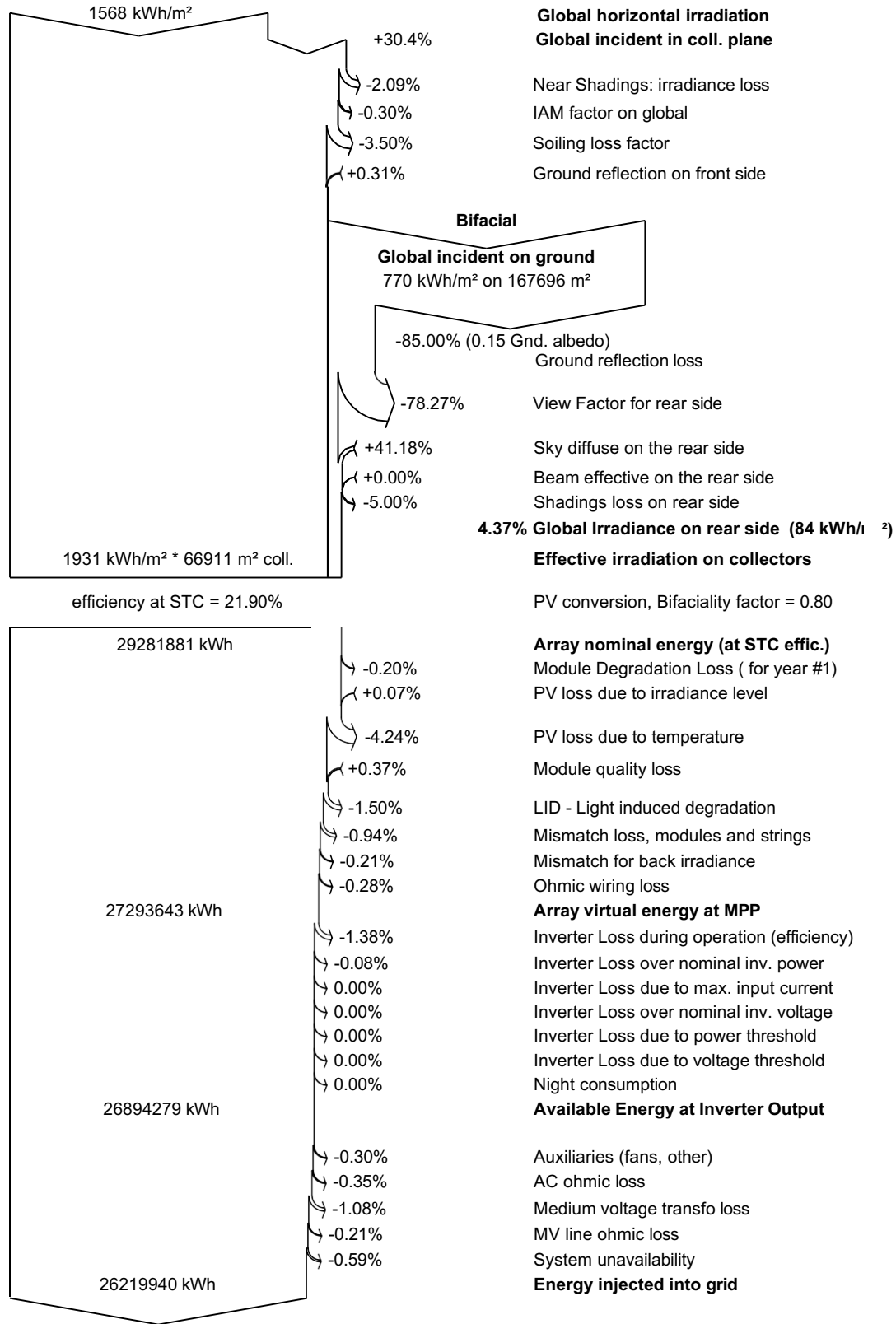
EArray Effective energy at the output of the array

E\_Grid Energy injected into grid

PR Performance Ratio



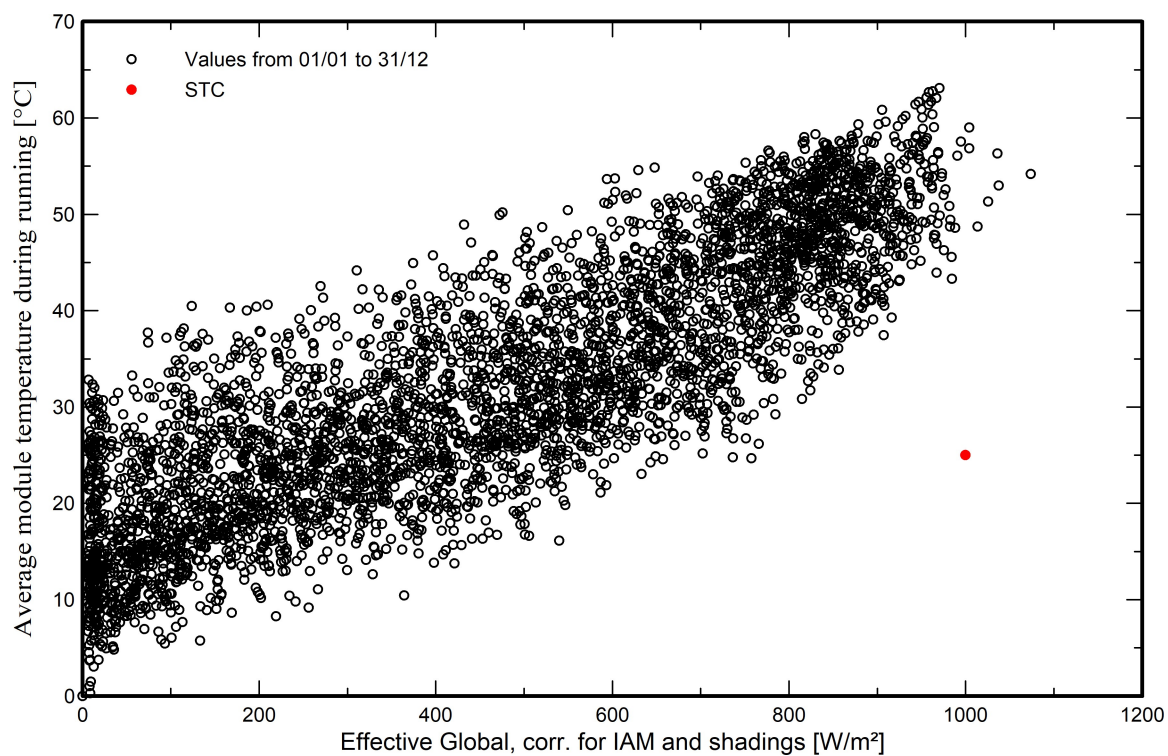
### Loss diagram



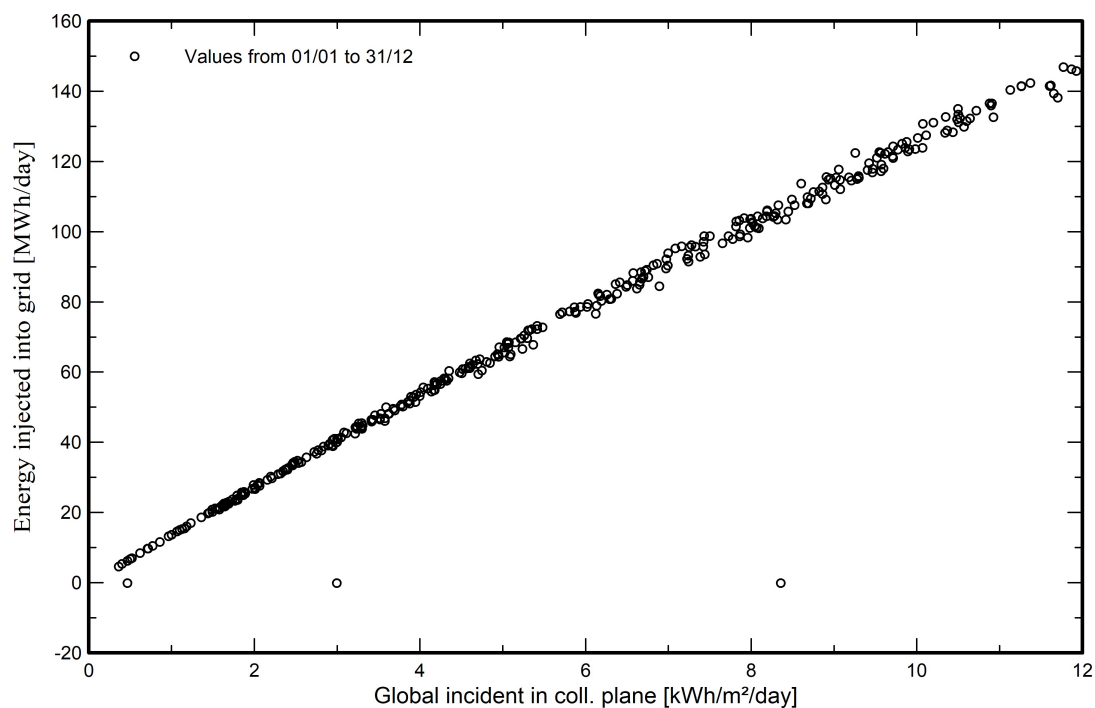


### Predef. graphs

Array Temperature vs. Effective Irradiance



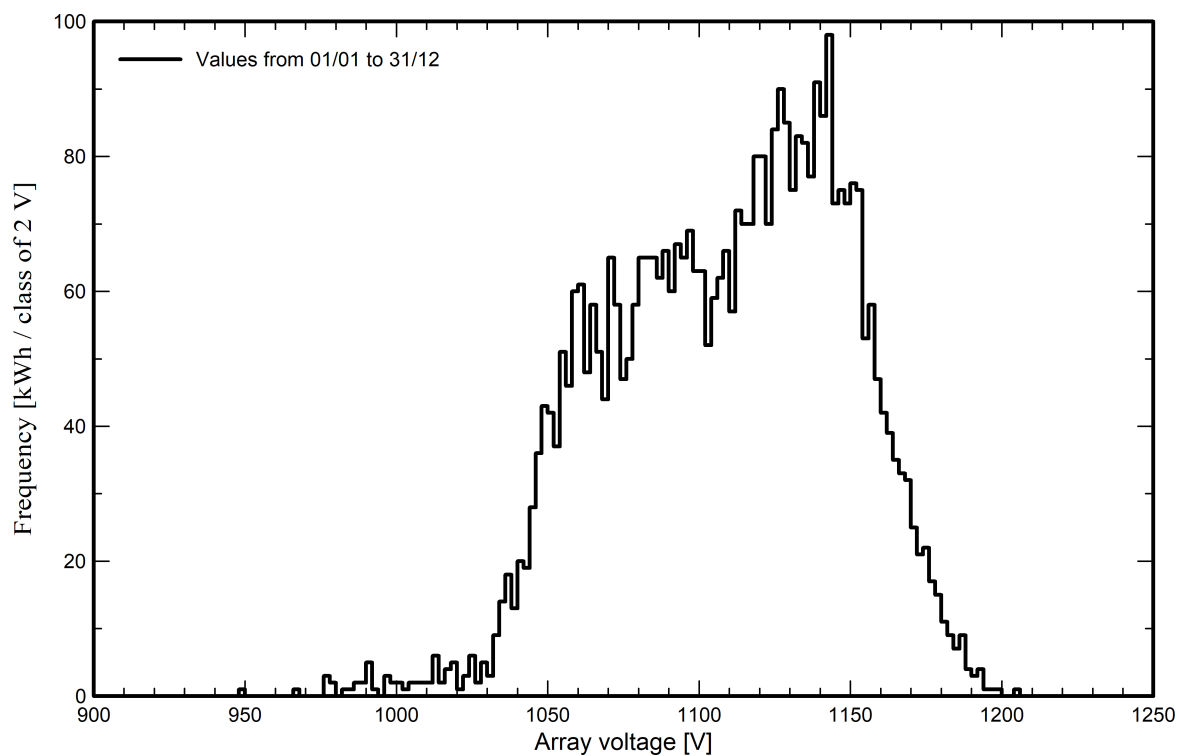
Daily Input/Output diagram



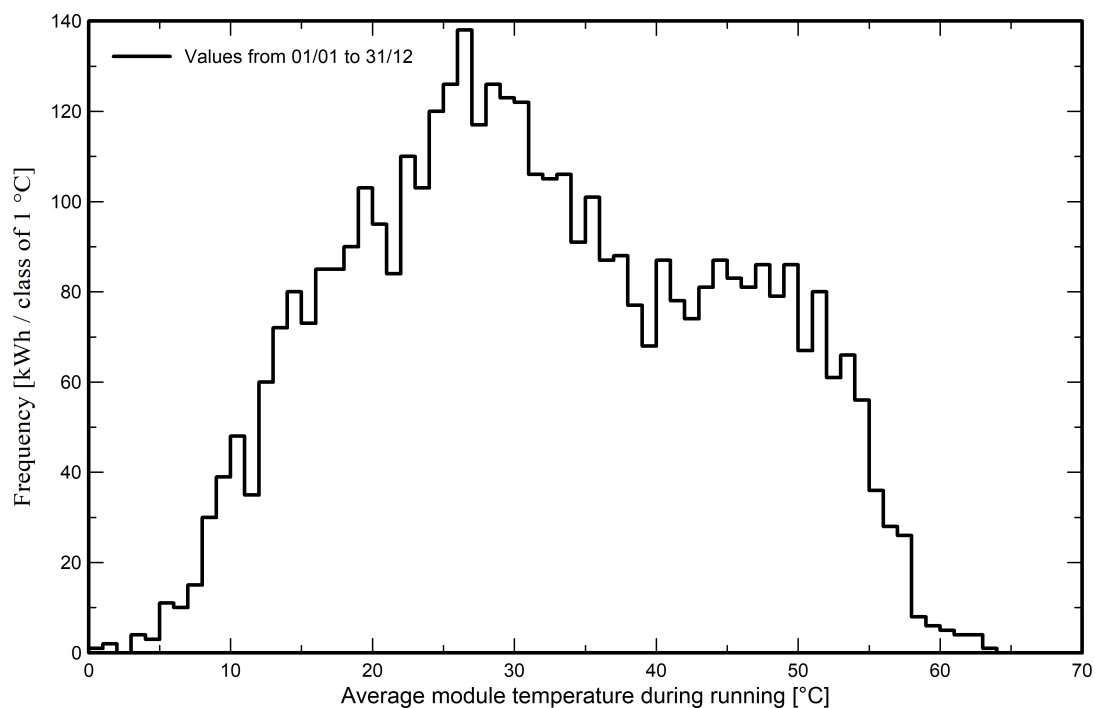


### Predef. graphs

Array Voltage Distribution

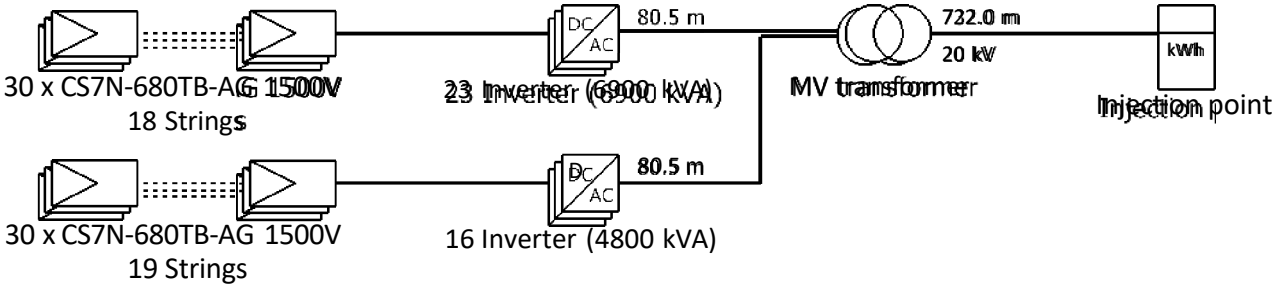


Array Temperature Distribution during running



# Single-line diagram

PVsyst V7.3.1  
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with v7.3.1



PV module	CS7N-680TB-AG 1500V
Inverter	SUN2000-330KTL-H1
String	30 x CS7N-680TB-AG 1500V

San Pancrazio Salentino

flyRen Developmen

VC2 Agrivoltaico REV01

24/11/23