



LIO ENERGY
Rosso

Regione Emilia-Romagna
Comune di Fiscaglia (FE)

**IMPIANTO AGRIVOLTAICO "FISCAGLIA"
ED OPERE CONNESSE**
Potenza Impianto 178,12 MWp

Proponente

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LIO ENERGY
Rosso

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Specialistica

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Dati documento

STIMA PRODUCIBILITA'

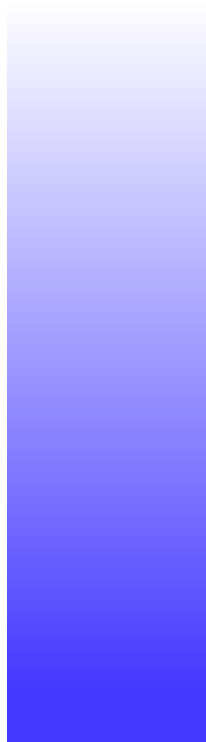
| LIVELLO PROGETTO | NOME ELABORATO | FILE NATIVO | DATA |
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Revisioni

| REV | DATA | DESCRIZIONE | ESEGUITO | VERIFICATO | APPROVATO |
|-----|------------|-------------|----------|------------|-----------|
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STIMA PRODUCIBILITA'



PVsyst - Simulation report

Grid-Connected System

Project: Fiscaglia 2

Variant: Nuova variante di simulazione

Tracking system with backtracking

System power: 178.1 MWp

Codigoro - Italy

Author

AREA TECNICA (Italy)



Project: Fiscaglia 2

Variant: Nuova variante di simulazione

PVsyst V8.0.10

VC0, Simulation date:
24/04/25 14:54
with V8.0.10

AREA TECNICA (Italy)

Project summary

Geographical Site

Codigoro

Italia

Situation

Latitude 44.83 °(N)
Longitude 12.11 °(E)
Altitude 8 m
Time zone UTC+1

Project settings

Albedo 0.20

Weather data

Codigoro

Meteonorm 8.2 (1991-2012), Sat=100% - Sintetico

System summary

Grid-Connected System

Orientation #1

Tracking plane, horizontal N-S axis

Axis azimuth 0 °
Phi min / max. -/+ 55 °
Diffuse shading all trackers

Tracking algorithm

Irradiance optimization
Backtracking activated

System information

PV Array

Nb. of modules 234364 units
Pnom total 178.1 MWp

Tracking system with backtracking

Near Shadings

Linear shadings : Fast (table)

User's needs

Unlimited load (grid)

Inverters

Nb. of units 42 units
Total power 144354 kWac
Pnom ratio 1.23

Results summary

Produced Energy 300.61 GWh/year Specific production 1688 kWh/kWp/year Perf. Ratio PR 93.45 %

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General parameters

Grid-Connected System

Orientation #1

Tracking plane, horizontal N-S axis

Axis azimuth 0 °
Phi min / max. +/- 55 °
Diffuse shading all trackers

Tracking algorithm

Irradiance optimization
Backtracking activated

Tracking system with backtracking

Field properties

Nb. of trackers 9069 units
Tracking plane, horizontal N-S axis

Sizes

Tracker Spacing 8.00m
Collector width 2.38m
Average GCR 29.8%

Backtracking limit angle

Phi limits +/- 72.7 °

Backtracking parameters

Backtracking pitch 8.00m
Backtracking width 2.38m
Left inactive band 0.00 m
Right inactive band 0.00 m
Backtracking GCR 29.8 %
Parameters choice:Automatic

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Horizon

Free Horizon

Near Shadings

Linear shadings : Fast (table)

User's needs

Unlimited load (grid)

Bifacial system definition

Orientation #1

Bifacial system

Model Unlimited Trackers 2D model

Bifacial model geometry

Tracker Spacing 8.00 m
Tracker width 2.38 m
GCR 29.8 %
Axis height above ground 2.10 m
Nb. of sheds 620 units

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 SUNGi
Model SUNGi SNG-760W
(Custom parameters definition)
Unit Nom. Power 760 Wp
Number of PV modules 234364 units
Nominal (STC) 178.1 MWp
Modules 9014 string x 26 In series
At operating cond. (50°C)
Pmpp 165.3 MWp
U mpp 1005 V
I mpp 164462 A

Inverter

Manufacturer Sungrow
Model SG3400-HV-20
(Original PVsyst database)
Unit Nom. Power 3437 kWac
Number of inverters 42 units
Total power 144354 kWac
Operating voltage 875-1300 V
Max. power (=>25°C) 3593 kWac
Pnom ratio (DC:AC) 1.23



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PV Array Characteristics

Total PV power

| | |
|---------------|-----------------------|
| Nominal (STC) | 178117 kWp |
| Total | 234364 modules |
| Module area | 728017 m ² |

Total inverter power

| | |
|---------------------|-------------|
| Total power | 144354 kWac |
| Max. power | 150906 kWac |
| Number of inverters | 42 units |
| Pnom ratio | 1.23 |

Array losses

Thermal Loss factor

| | |
|--|----------------------------|
| Module temperature according to irradiance | |
| Uc (const) | 29.0 W/m ² K |
| Uv (wind) | 0.0 W/m ² K/m/s |

DC wiring losses

| | |
|-------------------|--------------|
| Global array res. | 0.100 mΩ |
| Loss Fraction | 1.5 % at STC |

Module Quality Loss

| | |
|---------------|--------|
| Loss Fraction | -1.3 % |
|---------------|--------|

Module mismatch losses

| | |
|---------------|--------------|
| Loss Fraction | 2.0 % at MPP |
|---------------|--------------|

Strings Mismatch loss

| | |
|---------------|-------|
| Loss Fraction | 0.2 % |
|---------------|-------|

IAM loss factor

Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

| 0° | 30° | 50° | 60° | 70° | 75° | 80° | 85° | 90° |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1.000 | 0.999 | 0.987 | 0.963 | 0.892 | 0.814 | 0.679 | 0.438 | 0.000 |

AC wiring losses

Inv. output line up to MV transfo

| | |
|------------------|---------------|
| Inverter voltage | 600 Vac tri |
| Loss Fraction | 0.00 % at STC |

Inverter: SG3400-HV-20

| | |
|------------------------|--------------------------------------|
| Wire section (42 Inv.) | Copper 42 x 3 x 3000 mm ² |
| Average wires length | 0 m |

MV line up to Injection

| | |
|-----------------------|-------------------------------|
| MV Voltage | 30 kV |
| Average each inverter | |
| Wires | Copper 3 x 95 mm ² |
| Length | 300 m |
| Loss Fraction | 0.03 % at STC |

AC losses in transformers

MV transfo

| | |
|----------------|-------|
| Medium voltage | 30 kV |
|----------------|-------|

One transfo parameters

| | |
|-----------------------------|---------------|
| Nominal power at STC | 4.20 MVA |
| Iron Loss (24/24 Connexion) | 3.44 kVA |
| Iron loss fraction | 0.08 % at STC |
| Copper loss | 51.29 kVA |
| Copper loss fraction | 1.22 % at STC |
| Coils equivalent resistance | 3 x 1.05 mΩ |

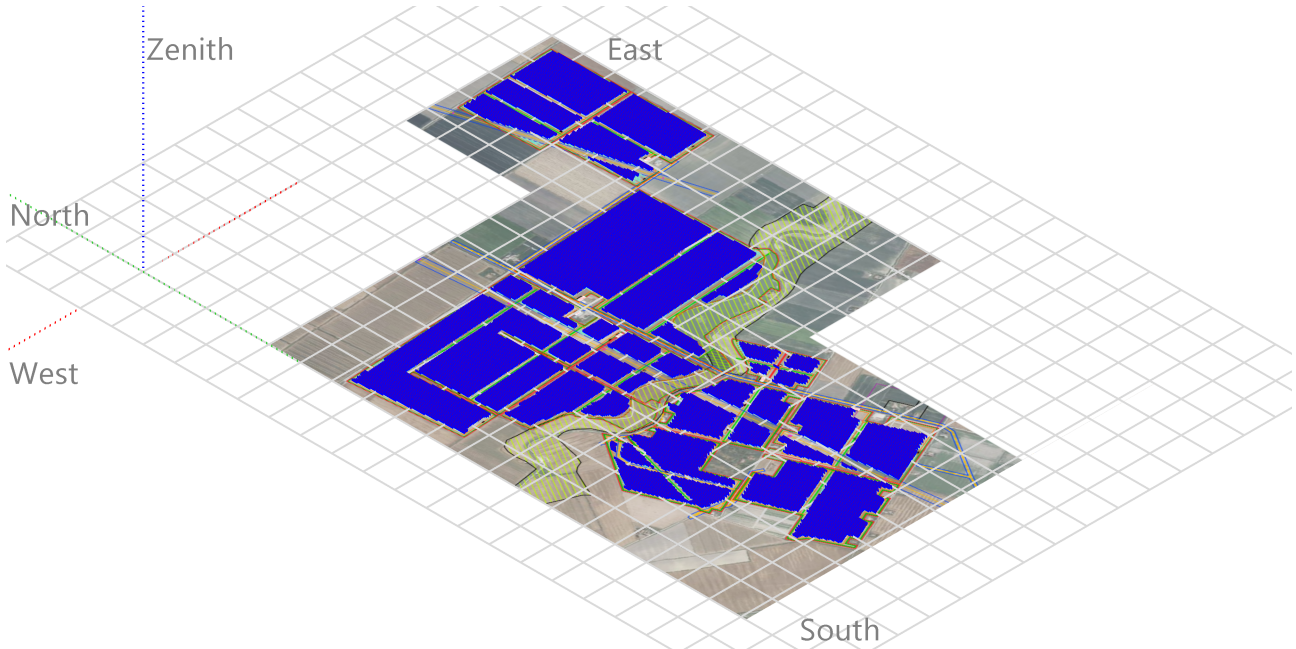
Operating losses at STC (full system)

| | |
|-----------------------------|-------------|
| Nb. identical MV transfos | 42 |
| Nominal power at STC | 176.3 MVA |
| Iron loss (24/24 Connexion) | 144.35 kVA |
| Copper loss | 2154.02 kVA |



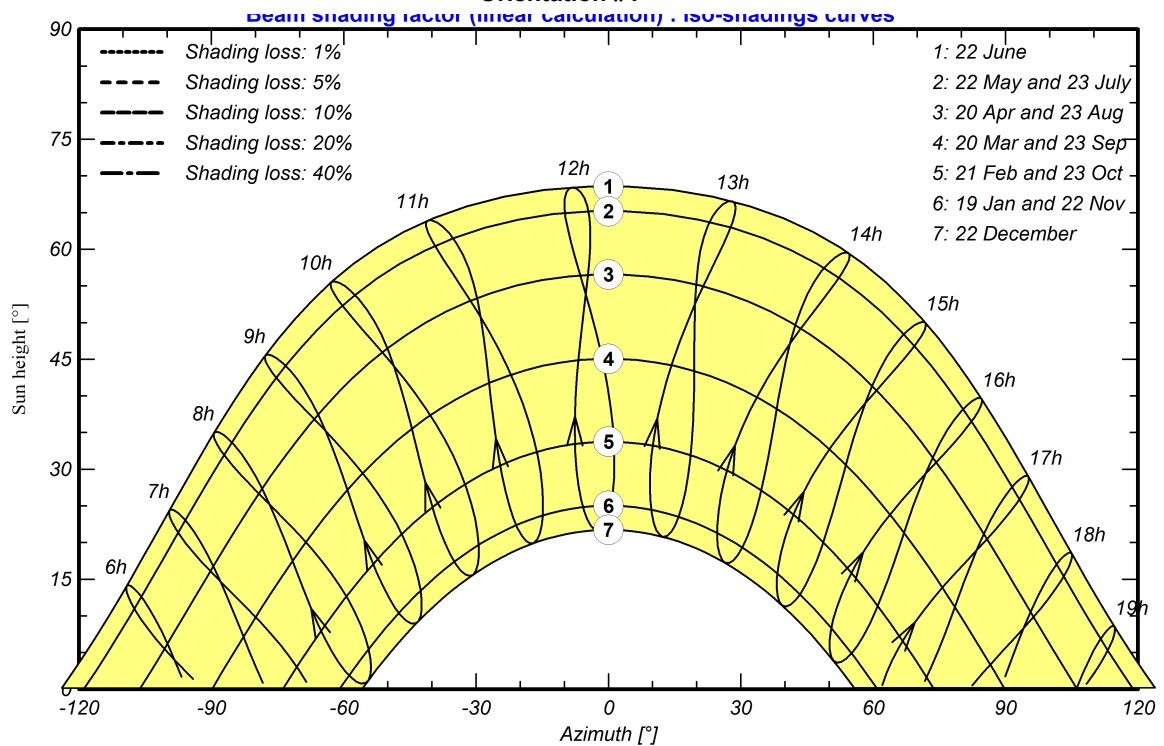
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1 -





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Main results

System Production

Produced Energy

300.61 GWh/year

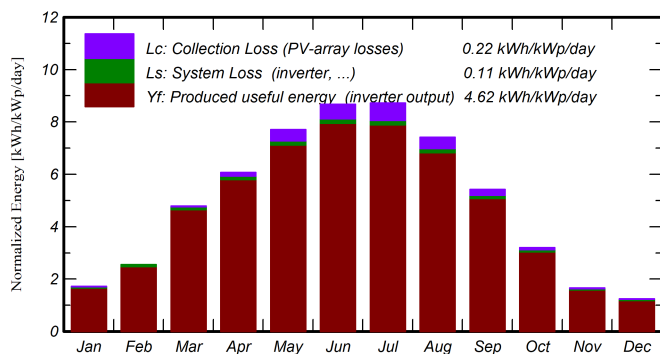
Specific production

1688 kWh/kWp/year

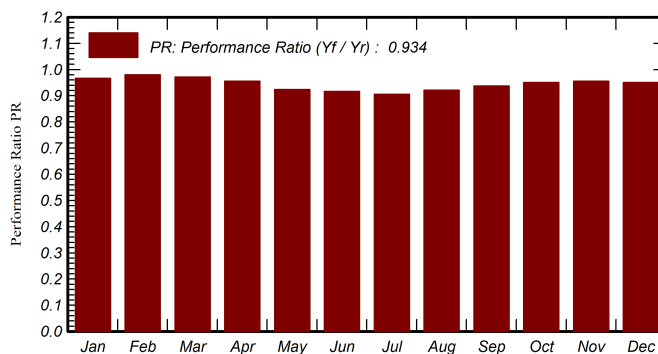
Perf. Ratio PR

93.45 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

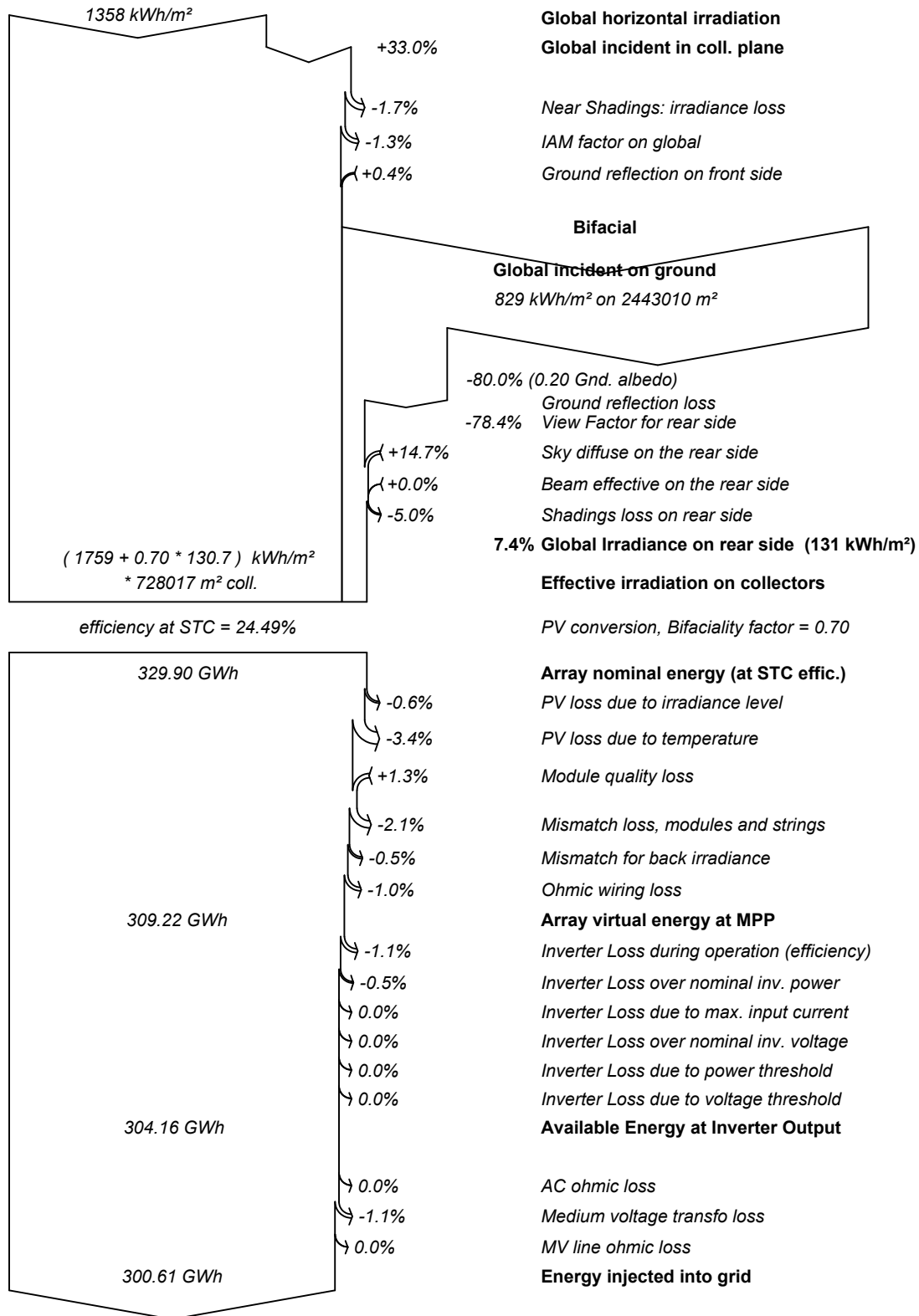
| | GlobHor kWh/m ² | DiffHor kWh/m ² | T_Amb °C | GlobInc kWh/m ² | GlobEff kWh/m ² | EArray GWh | E_Grid GWh | PR ratio |
|-----------|-------------------------------|-------------------------------|-------------|-------------------------------|-------------------------------|---------------|---------------|-------------|
| January | 39.4 | 21.83 | 3.23 | 53.5 | 50.7 | 9.48 | 9.20 | 0.966 |
| February | 53.7 | 30.35 | 5.25 | 71.0 | 68.3 | 12.72 | 12.39 | 0.980 |
| March | 110.2 | 52.20 | 10.15 | 148.7 | 144.5 | 26.32 | 25.74 | 0.972 |
| April | 139.6 | 68.60 | 14.50 | 182.4 | 177.9 | 31.75 | 31.05 | 0.956 |
| May | 181.4 | 77.59 | 19.70 | 238.9 | 233.7 | 40.21 | 39.33 | 0.924 |
| June | 197.0 | 83.14 | 24.30 | 260.4 | 255.0 | 43.43 | 42.50 | 0.916 |
| July | 201.3 | 78.78 | 26.49 | 270.5 | 265.0 | 44.56 | 43.59 | 0.905 |
| August | 172.5 | 76.25 | 25.82 | 229.9 | 224.8 | 38.56 | 37.73 | 0.922 |
| September | 118.9 | 55.31 | 20.22 | 162.9 | 158.7 | 27.81 | 27.19 | 0.937 |
| October | 75.4 | 42.72 | 15.67 | 99.4 | 96.1 | 17.25 | 16.83 | 0.951 |
| November | 39.6 | 26.41 | 9.93 | 49.9 | 47.5 | 8.76 | 8.49 | 0.956 |
| December | 29.3 | 18.18 | 4.52 | 38.8 | 36.5 | 6.81 | 6.56 | 0.950 |
| Year | 1358.3 | 631.37 | 15.04 | 1806.1 | 1758.9 | 307.65 | 300.61 | 0.934 |

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 | | |



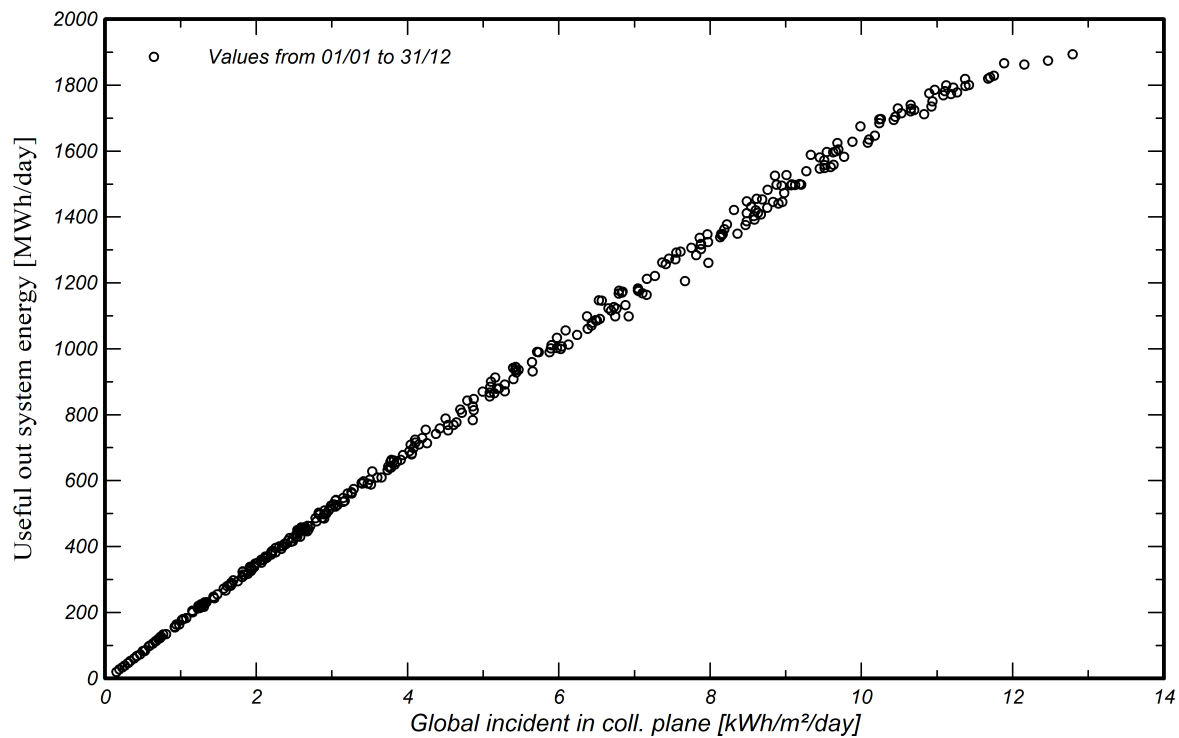
Loss diagram



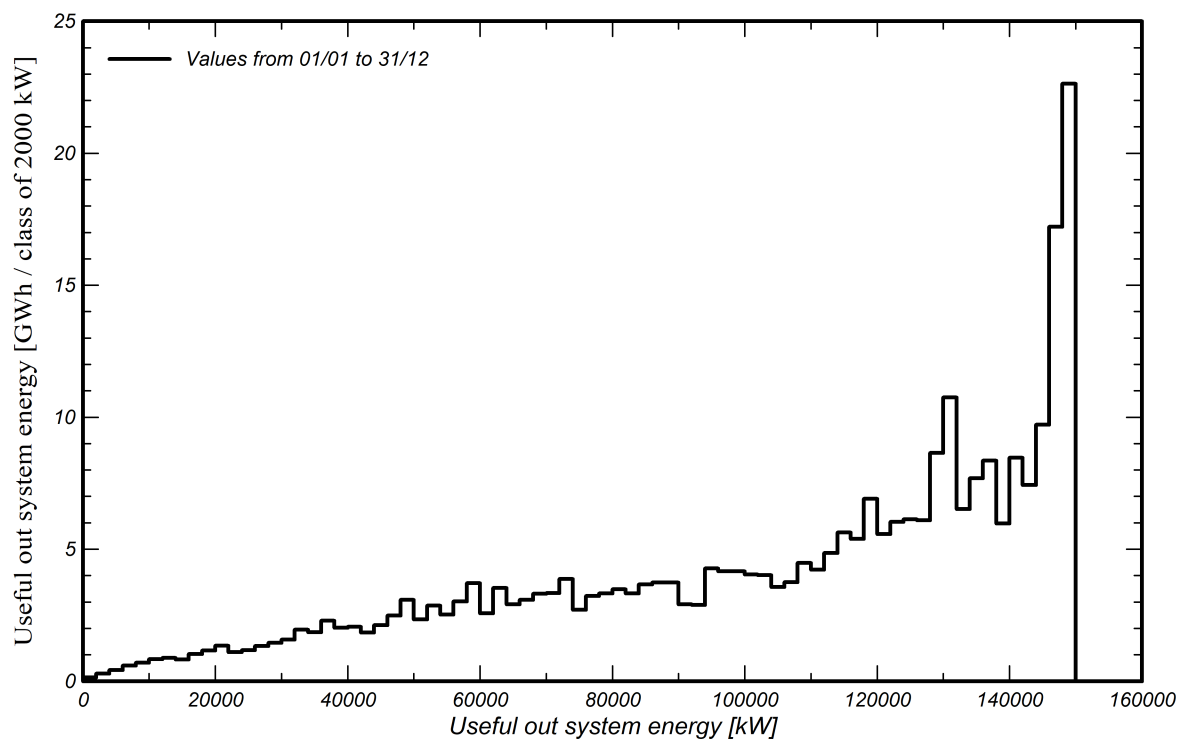


Predef. graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema

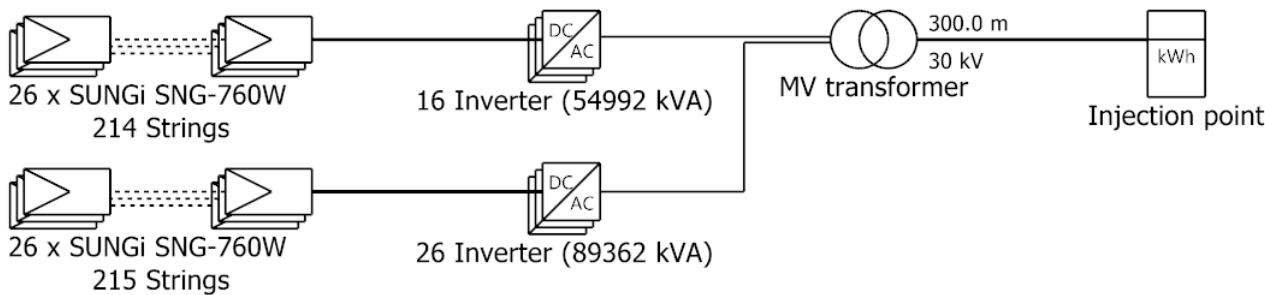




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Single-line diagram



| | |
|-----------|---------------------|
| PV module | SUNGi SNG-760W |
| Inverter | SG3400-HV-20 |
| String | 26 x SUNGi SNG-760W |

Fiscaglia 2

AREA TECNICA (Italy)

VC0 : Nuova variante di simulazione

24/04/25