

Regione
Veneto



Provincia di
Rovigo



Comune di
Guarda Veneta



IMPIANTO AGROVOLTAICO DI 70MW CON STORAGE 30MW/120MWh SITO NEL COMUNE DI GUARDA VENETA (RO) E RELATIVE OPERE CONNESSE

PROGETTISTA INCARICATO:
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Scala

Titolo elaborato:

Formato

A4

SIMULAZIONE PVSYST

TECNICI COINVOLTI

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Dott. Geol. Loris Tietto

CODICE ELABORATO

PROGETTO	CLASSE	TIPO	PROG.
RVFVVE02	VIA 2	R	27

Rev.	Data	Descrizione	Redige	Verifica	Approva
00	04/23	PRIMA EMISSIONE	GR	GR	RC
01					
02					
03					
04					
05					
06					

GESTORE RETE ELETTRICA



SOCIETA' PROPONENTE:

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PVsyst - Simulation report

Grid-Connected System

Project: guarda veneta

Variant: New simulation variant

Tracking system with backtracking

System power: 68.45 MWp

La Barbina - Italy

Author

STE Energy S.r.l. (Italy)



PVsyst V7.2.21

VC0, Simulation date:
03/05/23 15:43
with v7.2.21

STE Energy S.r.l. (Italy)

Project summary

Geographical Site

La Barbina

Italy

Situation

Latitude 44.99 °N

Longitude 11.79 °E

Altitude 12 m

Time zone UTC+1

Project settings

Albedo 0.20

Meteo data

La Barbina

Meteonorm 8.0 (1991-2012), Sat=100% - Sintetico

System summary

Grid-Connected System

PV Field Orientation

Orientation

Tracking plane, horizontal N-S axis

Axis azimuth 3 °

Tracking system with backtracking

Tracking algorithm

Astronomic calculation

Backtracking activated

Near Shadings

Linear shadings

System information

PV Array

Nb. of modules

99932 units

Pnom total

68.45 MWp

Inverters

Nb. of units

14 units

Pnom total

58.24 MWac

Pnom ratio

1.175

User's needs

Unlimited load (grid)

Results summary

Produced Energy	103.3 GWh/year	Specific production	1509 kWh/kWp/year	Perf. Ratio PR	88.85 %
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PVsyst V7.2.21

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STE Energy S.r.l. (Italy)

General parameters

Grid-Connected System

PV Field Orientation

Orientation

Tracking plane, horizontal N-S axis
Axis azimuth 3 °

Models used

Transposition Perez
Diffuse Perez, Meteonorm
Circumsolar separate

Horizon

Free Horizon

Bifacial system

Model 2D Calculation
unlimited trackers

Bifacial model geometry

Tracker Spacing 6.00 m
Tracker width 2.38 m
GCR 39.7 %
Axis height above ground 3.10 m

Tracking system with backtracking

Tracking algorithm

Astronomic calculation
Backtracking activated

Backtracking array

Nb. of trackers 3182 units

Identical arrays

Sizes

Tracker Spacing 6.00 m
Collector width 2.38 m
Ground Cov. Ratio (GCR) 39.7 %
Phi min / max. +/- 60.0 °

Backtracking strategy

Phi limits +/- 66.4 °
Backtracking pitch 6.00 m
Backtracking width 2.38 m

Near Shadings

Linear shadings

User's needs

Unlimited load (grid)

Bifacial model definitions

Ground albedo 0.20
Bifaciality factor 80 %
Rear shading factor 5.0 %
Rear mismatch loss 10.0 %
Shed transparent fraction 0.0 %

PV Array Characteristics

Array #1 - sottocampo ovest

PV module

Manufacturer Risen Energy Co., Ltd
Model RSM132-8-685BNDG

(Custom parameters definition)

Unit Nom. Power 685 Wp
Number of PV modules 65268 units
Nominal (STC) 44.71 MWp
Modules 2331 Strings x 28 In series

At operating cond. (50°C)

Pmpp 41.15 MWp
U mpp 1018 V
I mpp 40425 A

Inverter

Manufacturer Siemens
Model Sinacon PV4000

(Original PVsyst database)

Unit Nom. Power 4000 kWac
Number of inverters 10 units
Total power 40000 kWac
Operating voltage 802-1500 V
Pnom ratio (DC:AC) 1.12



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PV Array Characteristics

Array #2 - sottocampo est

PV module

Manufacturer Risen Energy Co., Ltd
Model RSM132-8-685BNDG

(Custom parameters definition)

Unit Nom. Power 685 Wp
Number of PV modules 34664 units
Nominal (STC) 23.74 MWp
Modules 1238 Strings x 28 In series

At operating cond. (50°C)

Pmpp 21.86 MWp
U mpp 1018 V
I mpp 21470 A

Total PV power

Nominal (STC) 68453 kWp
Total 99932 modules
Module area 310424 m²
Cell area 290862 m²

Inverter

Manufacturer Siemens
Model Sinacon PV4560

(Original PVsyst database)

Unit Nom. Power 4560 kWac
Number of inverters 4 units
Total power 18240 kWac
Operating voltage 919-1500 V
Pnom ratio (DC:AC) 1.30

Total inverter power

Total power 58240 kWac
Number of inverters 14 units
Pnom ratio 1.18

Array losses

Array Soiling Losses

Loss Fraction 1.0 %

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 %

Module Quality Loss

Loss Fraction -0.4 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

IAM loss factor

Incidence effect (IAM): User defined profile

0°	20°	40°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	1.000	0.992	0.978	0.946	0.850	0.000

DC wiring losses

Global wiring resistance 0.54 mΩ
Loss Fraction 3.0 % at STC

Array #1 - sottocampo ovest

Global array res. 0.83 mΩ
Loss Fraction 3.0 % at STC

Array #2 - sottocampo est

Global array res. 1.6 mΩ
Loss Fraction 3.0 % at STC

System losses

Auxiliaries loss

Proportionnal to Power 4.0 W/kW
0.0 kW from Power thresh.



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AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 550 Vac tri
Loss Fraction 2.01 % at STC

Inverters: Sinacon PV4000, Sinacon PV4560

Wire section (14 Inv.) Copper 14 x 3 x 3000 mm²
Average wires length 220 m

MV line up to Injection

MV Voltage 36 kV
Wires Alu 3 x 2000 mm²
Length 7000 m
Loss Fraction 0.57 % at STC

AC losses in transformers

MV transfo

Grid voltage 36 kV

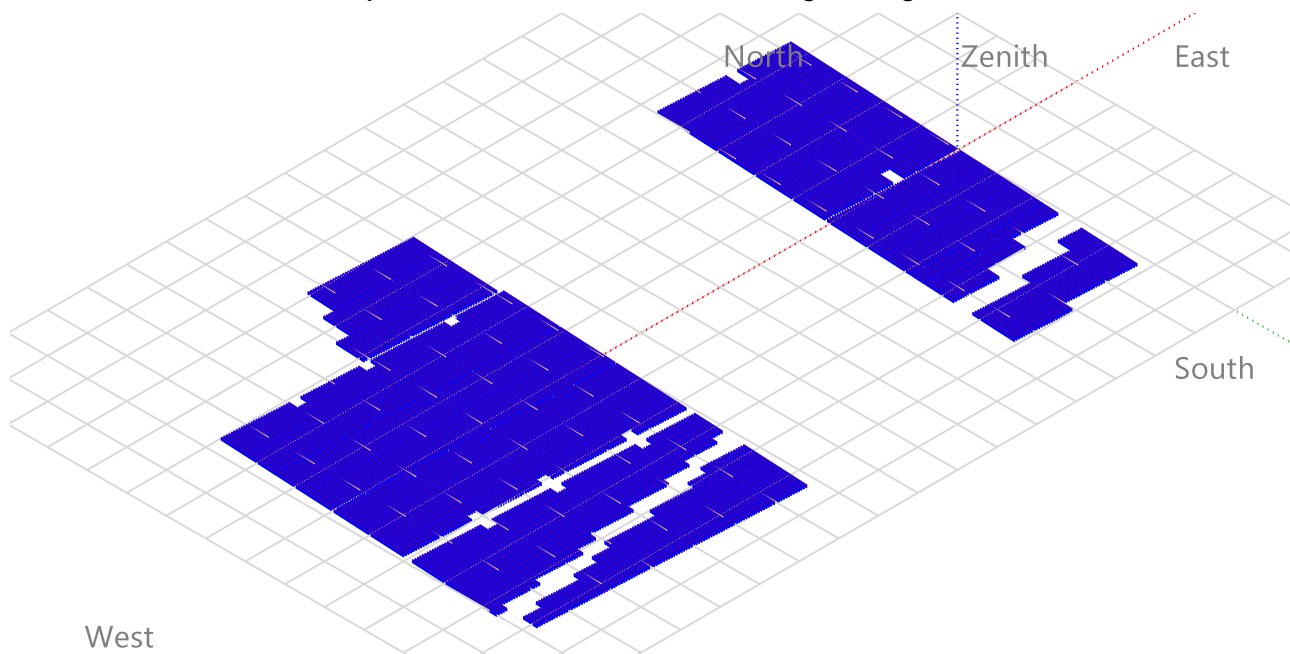
Operating losses at STC

Nominal power at STC 67285 kVA
Iron loss (24/24 Connexion) 67.28 kW
Loss Fraction 0.10 % at STC
Coils equivalent resistance 3 x 0.04 mΩ
Loss Fraction 1.00 % at STC



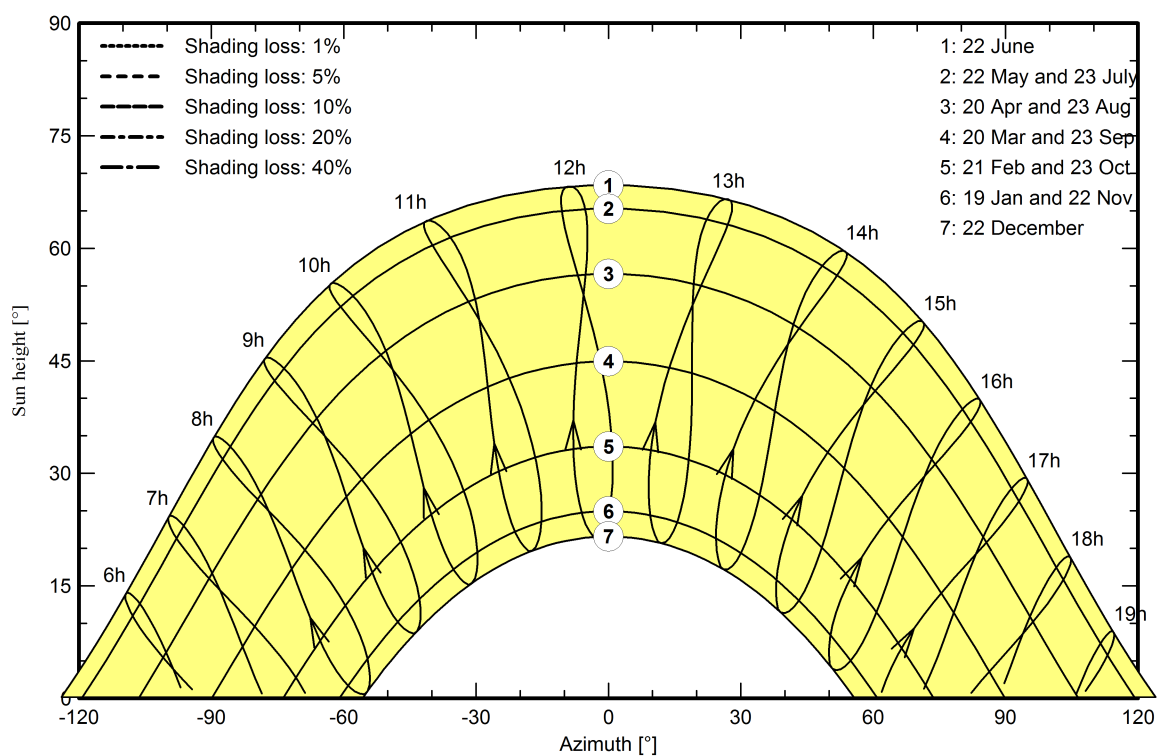
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1





Main results

System Production

Produced Energy

103.3 GWh/year

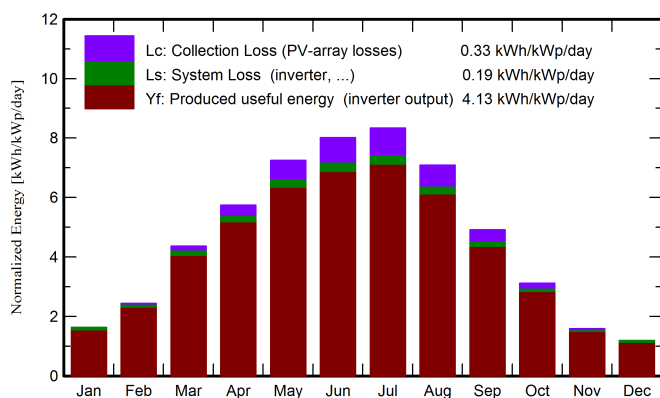
Specific production

1509 kWh/kWp/year

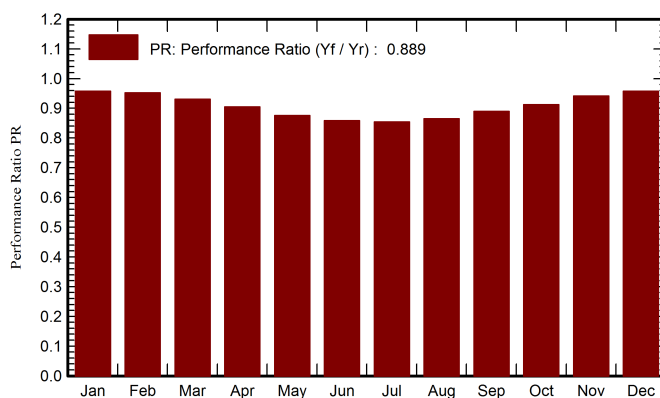
Performance Ratio PR

88.85 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m²	kWh/m²	°C	kWh/m²	kWh/m²	GWh	GWh	ratio
January	39.4	22.20	2.95	50.4	48.6	3.46	3.31	0.958
February	54.4	31.40	4.83	68.3	65.8	4.64	4.45	0.952
March	104.1	49.70	9.68	135.4	131.3	9.00	8.63	0.931
April	133.7	62.50	14.10	172.3	167.1	11.14	10.66	0.904
May	176.9	86.30	19.09	224.9	218.2	14.10	13.48	0.876
June	190.8	87.50	23.41	240.3	233.4	14.79	14.13	0.859
July	195.5	76.60	25.71	258.6	251.7	15.82	15.13	0.855
August	167.2	71.90	25.13	219.6	213.4	13.59	13.01	0.865
September	115.0	57.30	19.65	147.3	142.7	9.37	8.97	0.890
October	73.5	33.80	15.01	96.6	93.5	6.29	6.03	0.912
November	39.6	27.10	9.23	47.7	45.7	3.22	3.08	0.942
December	29.8	19.80	4.04	36.9	35.3	2.53	2.41	0.957
Year	1319.9	626.10	14.46	1698.4	1646.4	107.97	103.30	0.889

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

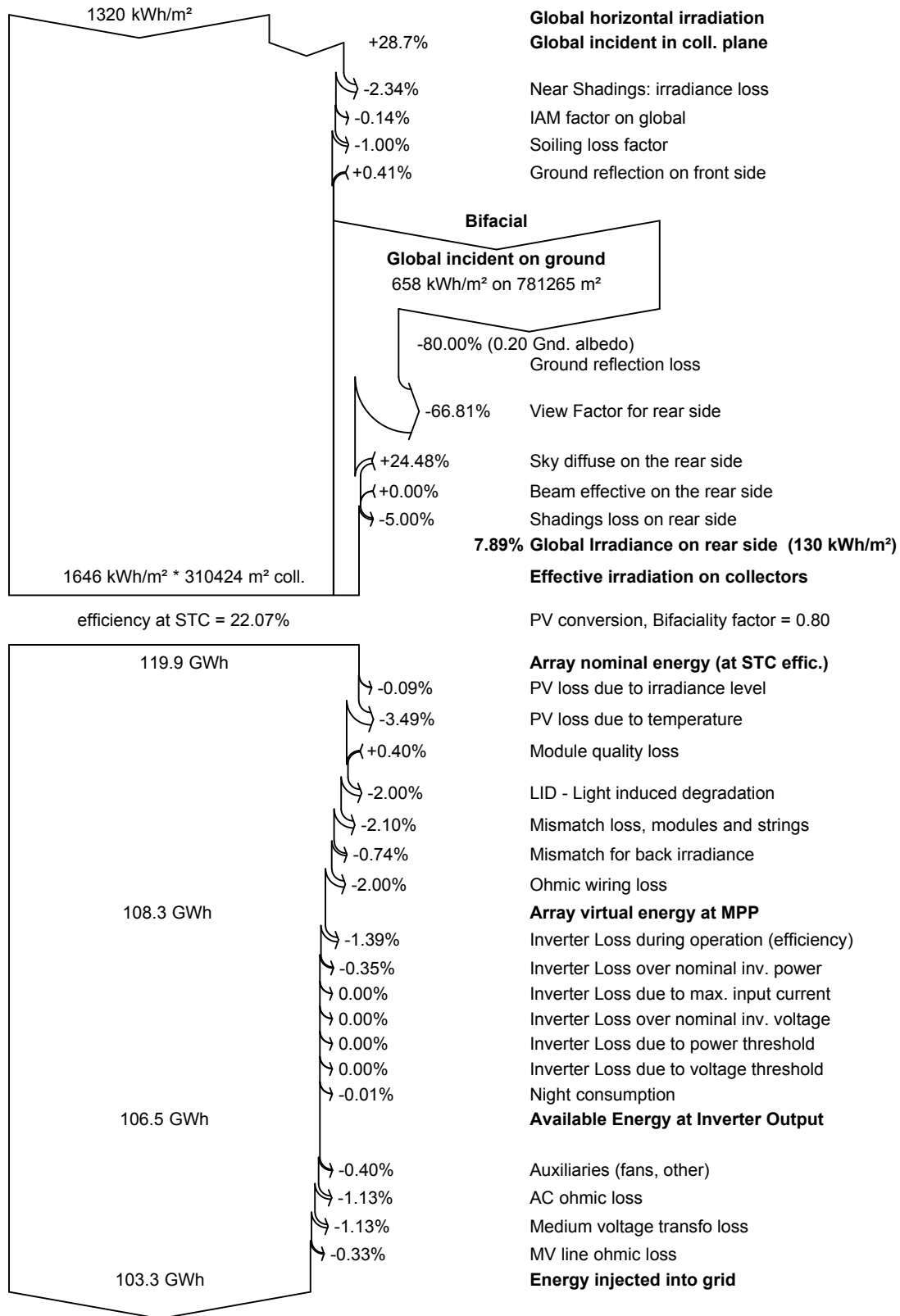
EArray Effective energy at the output of the array

E_Grid Energy injected into grid

PR Performance Ratio



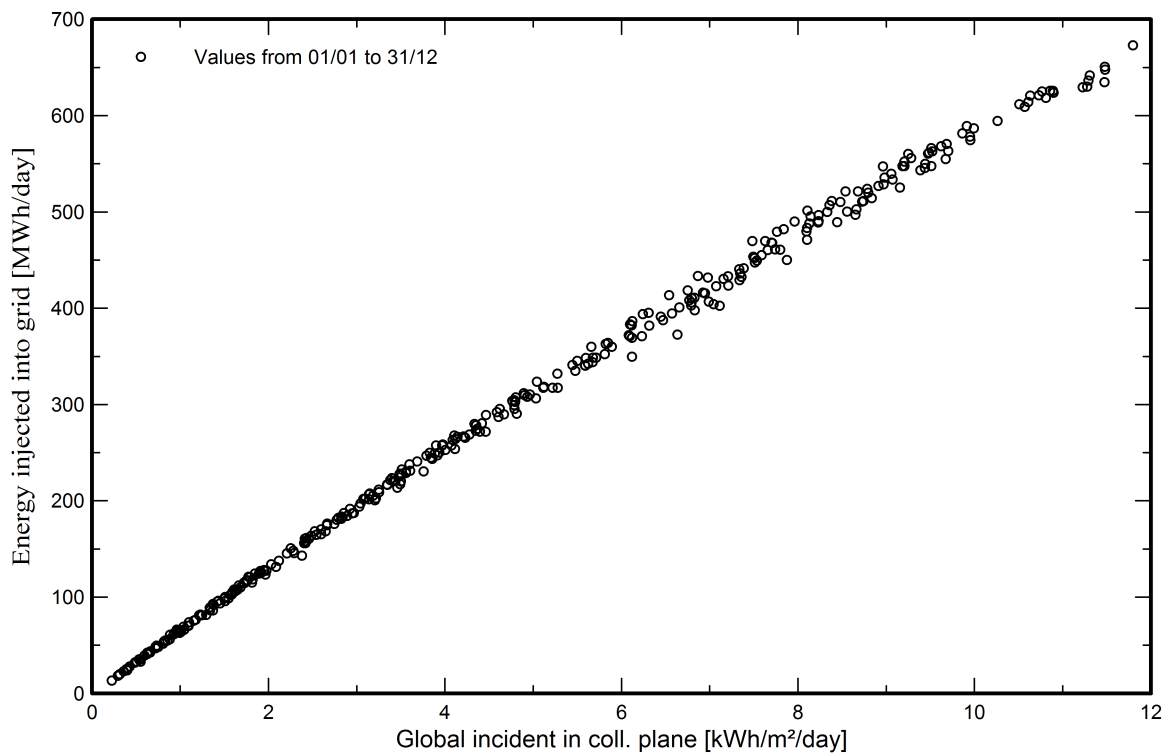
Loss diagram





Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema

