REGIONE DEL VENETO

Provincia di Rovigo

Comune di Adria

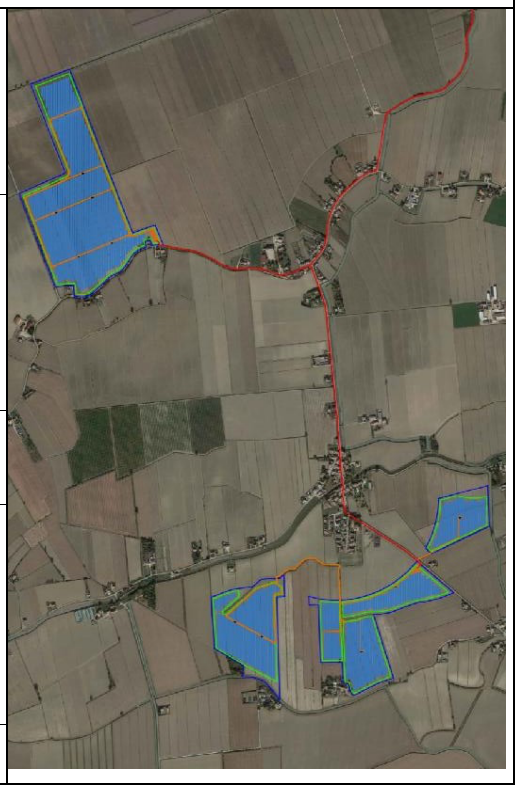
Proponente:

SUNCO SUN RED S.r.l.

Via Melchiorre Gioia, 8 - 20124 Milano - Italy
pec: suncosunredsrl@legalmail.it

SUNCO. CAPITAL

Progetto Definitivo



Denominazione progetto:

REALIZZAZIONE IMPIANTO AGRIVOLTAICO "ADRIA BELLOMBRA"

Potenza nominale complessiva = 39.195 kWp

Sito in:

COMUNE DI ADRIA (RO)

Titolo elaborato:

Stima della producibilità dell'impianto

Elaborato n. **T-SDP0**

Scala -

Responsabile Coordinamento progetto : dott.ssa agr. Eliana Santoro

Progettisti :

Collaboratori :

FLYREN
THE CULTURE OF CLEAN ENERGY

TIMBRI E FIRME:

Firmato digitalmente da:
MASSIMILIANO MARCHICA
Data: 16/04/2024 18:10:41

REV.:	REDAZIONE:	CONTROLLO:	APPROVAZIONE :	DATA:
00	Matteo Pradotto	ing. Massimiliano Marchica	ing. Massimiliano Marchica	05/02/2024
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03				
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FIRMA/TIMBRO COMMITTENTE:

SUNCO. CAPITAL

FLYREN
THE CULTURE OF CLEAN ENERGY

Flyren Development S.r.l.
Lungo Po Antonelli, 21 - 10153 Torino (TO)
tel: 011/ 8123575 - fax: 011/ 8127528
email: info@flyren.eu
web: www.flyren.eu
C.F. / P. IVA n. 12062400010

Version 7.3.1

PVsyst - Simulation report

Grid-Connected System

Project: Adria Bellombra

Variant: Agrivoltaico

Tracking system with backtracking

System power: 39.20 MWp

Corcrevà - Italy

Author

flyRen Development srl (Italy)

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with v7.3.1

Project summary

Geographical Site
Corcrevà
Italy

Situation

Latitude	45.02 °N
Longitude	12.03 °E
Altitude	10 m
Time zone	UTC+1

Project settings
Albedo 0.20

Meteo data
Corcrevà
Meteonorm 8.1 (1991-2012), Sat=100% - Synthetic

System summary

Grid-Connected System
Simulation for year no 1

Tracking system with backtracking

PV Field Orientation

Orientation		Tracking algorithm
Tracking plane, horizontal N-S axis		Astronomic calculation
Axis azimuth	180 °	Backtracking activated

Near Shadings
Linear shadings

System information

PV Array		Inverters	
Nb. of modules	58500 units	Nb. of units	101 units
Pnom total	39.20 MWp	Pnom total	33.33 MWac
		Pnom ratio	1.176

User's needs
Unlimited load (grid)

Results summary

Produced Energy	56974735 kWh/year	Specific production	1454 kWh/kWp/year	Perf. Ratio PR	85.29 %

Table of contents

General parameters

Grid-Connected System

Tracking system with backtracking

PV Field Orientation

Orientation

Tracking plane, horizontal N-S axis	
Axis azimuth	180 °

Tracking algorithm

Astronomic calculation	
Backtracking activated	

Backtracking array

Nb. of trackers	1950 units

Sizes

Tracker Spacing	12.0 m
Collector width	4.91 m
Ground Cov. Ratio (GCR)	40.9 %
Phi min / max.	-/+ 60.0 °

Backtracking strategy

Phi limits for BT	-/+ 65.8 °
Backtracking pitch	11.9 m
Backtracking width	4.94 m

Models used

Transposition	Perez
Diffuse	Perez, Meteonorm
Circumsolar	separate

Horizon
Free Horizon

Near Shadings
Linear shadings

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	CSI Solar Co., Ltd.
Model	CS7N-670TB-AG 1500V
(Custom parameters definition)	
Unit Nom. Power	670 Wp
Number of PV modules	58500 units
Nominal (STC)	39.20 MWp
Modules	1950 Strings x 30 In series
At operating cond. (50°C)	
Pmpp	36.26 MWp
U mpp	1069 V
I mpp	33902 A

Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-330KTL-H1-ENG
(Custom parameters definition)	
Unit Nom. Power	330 kWac
Number of inverters	101 units
Total power	33330 kWac
Operating voltage	500-1500 V
Max. power (=>30°C)	330 kWac
Pnom ratio (DC:AC)	1.18
Power sharing within this inverter	

Total PV power

Nominal (STC)	39195 kWp
Total	58500 modules
Module area	181722 m²

Total inverter power

Total power	33330 kWac
Number of inverters	101 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

DC wiring losses

Global array res.	0.29 mΩ
Loss Fraction	0.9 % at STC

Serie Diode Loss

Voltage drop	0.7 V
Loss Fraction	0.1 % at STC

LID - Light Induced Degradation

Loss Fraction	1.5 %

Module Quality Loss

Loss Fraction	-0.4 %

Array losses

Module mismatch losses
Loss Fraction 0.9 % at MPP

Strings Mismatch loss
Loss Fraction 0.1 %

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 1.56 % at STC
Inverter: SUN2000-330KTL-H1-ENG
Wire section (101 Inv.) Alu 101 x 3 x 240 mm²
Average wires length 200 m

MV line up to HV Transfo
MV Voltage 20 kV
Average each inverter
Wires Alu 3 x 240 mm²
Length 800 m
Loss Fraction 0.09 % at STC

HV line up to Injection
HV line voltage 36 kV
Wires Copper 3 x 400 mm²
Length 12900 m
Loss Fraction 1.80 % at STC

AC losses in transformers

MV transfo
Medium voltage 20 kV
One transfo parameters
Nominal power at STC 3.50 MVA
Iron Loss (24/24 Connexion) 8.75 kVA
Iron loss fraction 0.25 % at STC
Copper loss 43.73 kVA
Copper loss fraction 1.25 % at STC
Coils equivalent resistance 3 x 2.29 mΩ

Operating losses at STC (full system)
Nb. identical MV transfos 11
Nominal power at STC 38.49 MVA
Iron loss (24/24 Connexion) 96.22 kVA
Copper loss 481.08 kVA

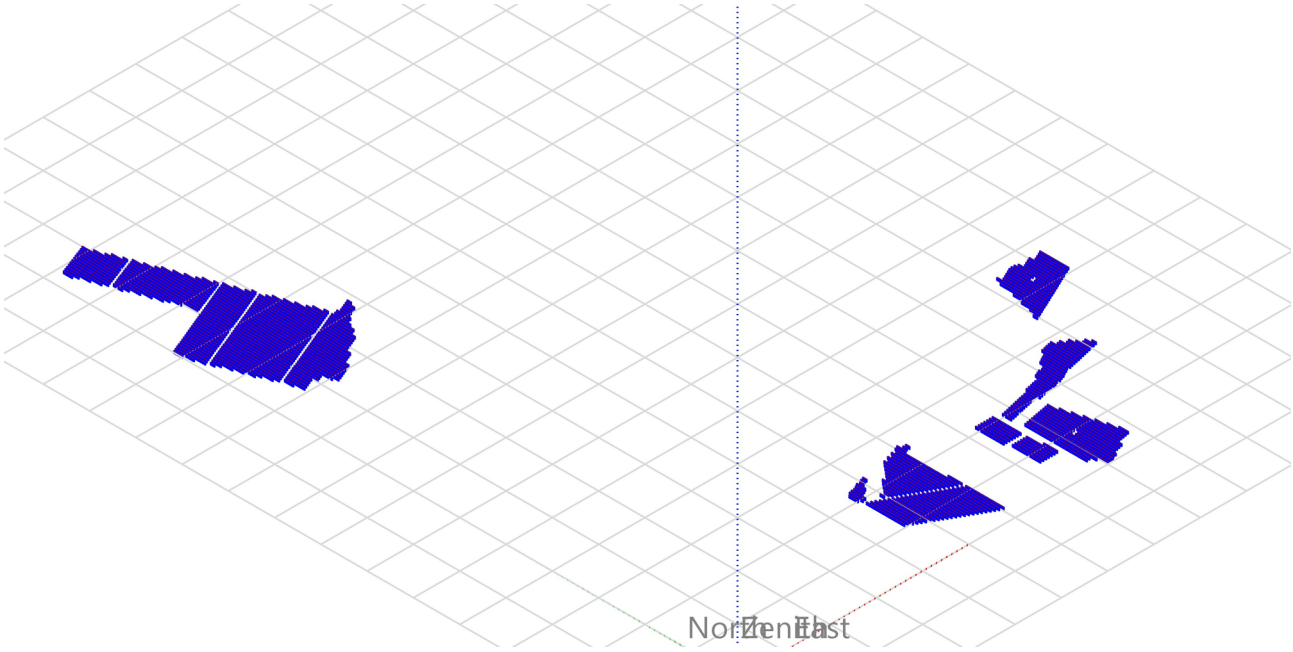
AC losses in transformers

HV transfo

Grid voltage	36 kV
Transformer from Datasheets	
Nominal power	40000 kVA
Iron Loss (24/24 Connexion)	40.00 kVA
Iron loss fraction	0.10 % of PNom
Copper loss	400.00 kVA
Copper loss fraction	1.00 % at PNom
Coils equivalent resistance	3 x 100.00 mΩ

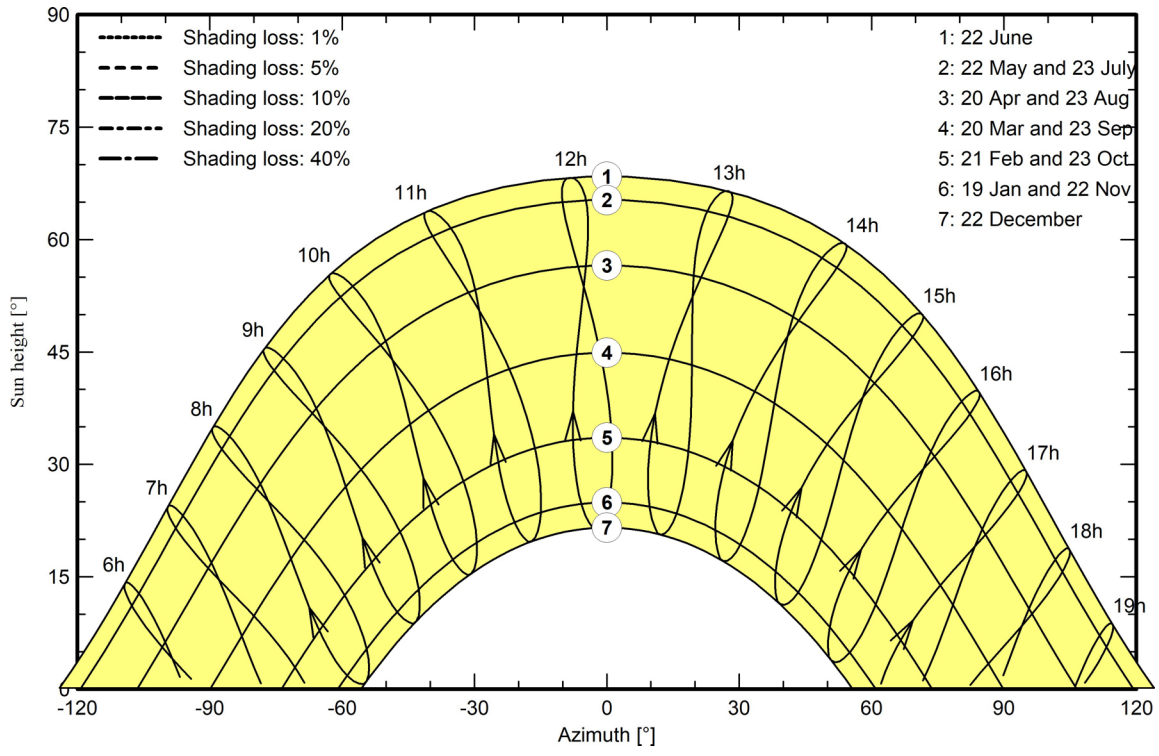
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

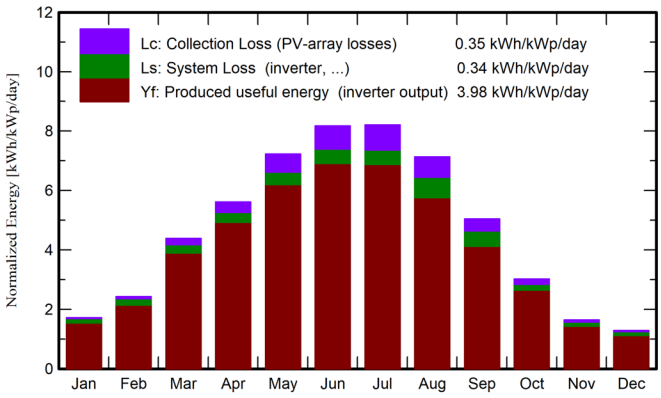


Main results

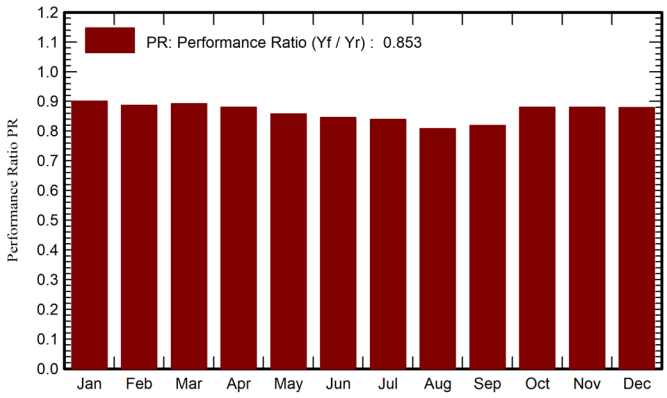
System Production

Produced Energy	56974735 kWh/year	Specific production	1454 kWh/kWp/year
		Performance Ratio PR	85.29 %

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 kWh	E_Grid kWh	PR ratio
January	40.2	20.34	2.49	53.3	52.4	2054275	1882882	0.901
February	55.1	34.09	4.69	67.9	66.9	2599030	2357567	0.886
March	105.0	49.00	9.73	135.8	133.9	5081958	4747905	0.892
April	133.9	74.36	14.38	168.4	166.1	6201724	5806094	0.880
May	178.2	88.33	19.32	224.1	221.0	8056152	7534536	0.858
June	192.7	84.08	23.46	245.4	242.2	8702866	8129836	0.845
July	198.2	86.62	25.55	254.6	251.3	8954307	8368453	0.839
August	169.7	74.08	24.91	221.2	218.4	7844660	7002326	0.808
September	116.0	53.11	19.64	151.3	149.2	5462545	4854958	0.819
October	74.6	42.43	15.05	93.5	92.1	3460457	3224430	0.880
November	39.5	25.18	9.40	49.1	48.3	1855234	1695159	0.880
December	30.3	16.71	3.84	39.8	38.9	1520375	1370589	0.879
Year	1333.2	648.31	14.43	1704.4	1680.6	61793583	56974735	0.853

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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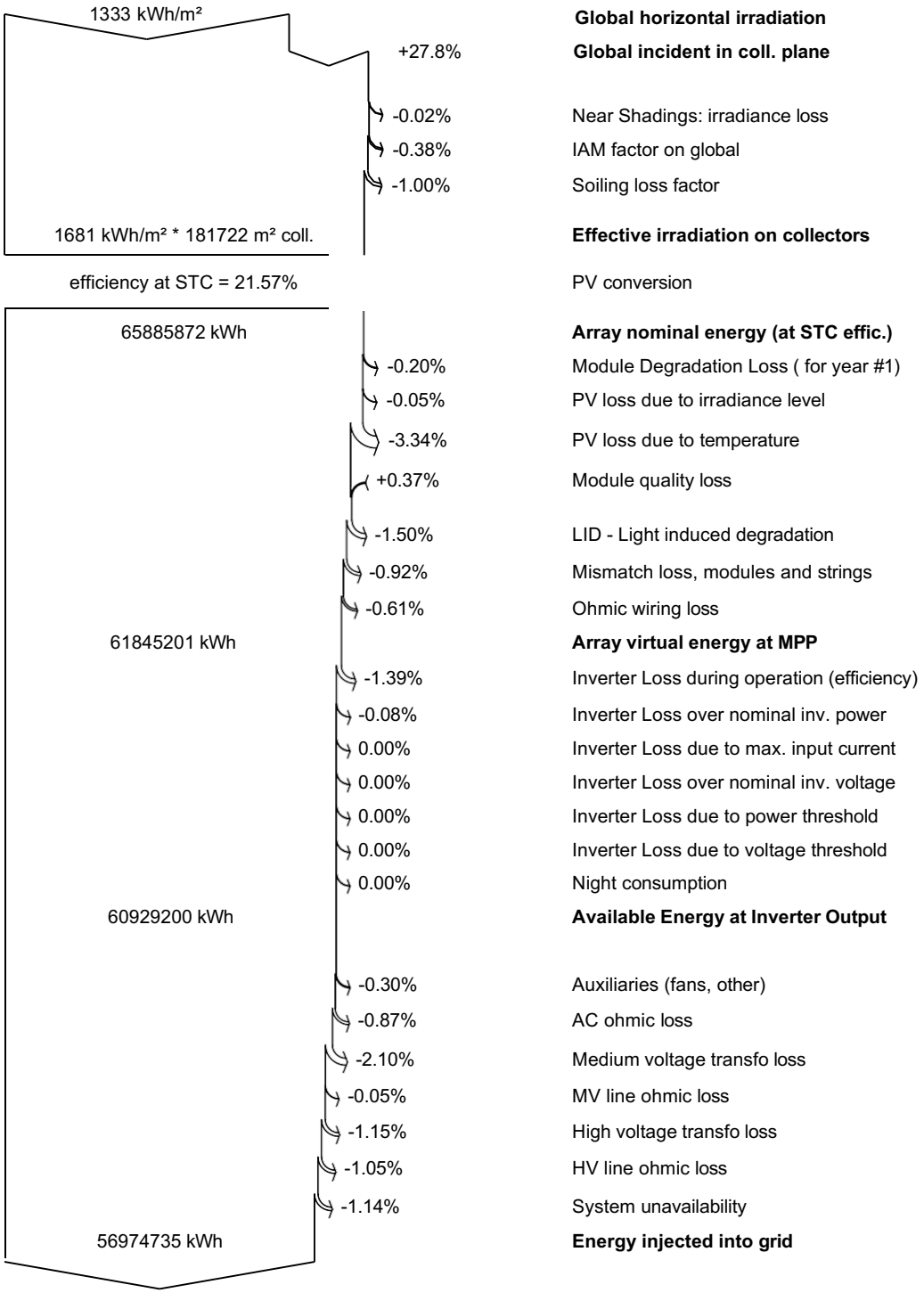
Loss diagram



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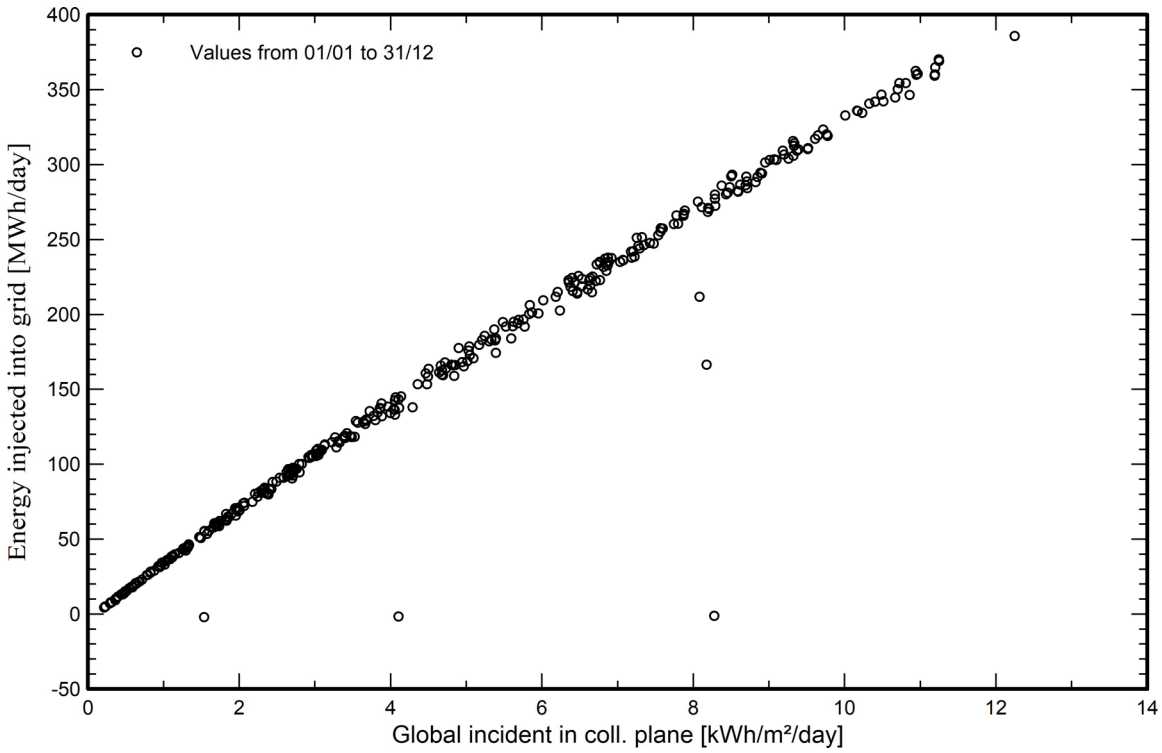
Predef. graphs

Daily Input/Output diagram



System Output Power Distribution