MINISTERO DELLA TRANSIZIONE ECOLOGICA

REGIONE: SICILIA	PROVINCIA: PALERMO
COMUNI: CIMINNA, MEZZOJUSO, VILLAFRATI	LOCALITA': C/da Buffa, C/da Serre, C/da Feotto

TIPO PROGETTO: PD	OGGETTO: Progetto per la realizzazione di un impianto agrovoltaico denominato 'Agrovoltaico Ciminna' per la produzione di energia elettrica con una potenza installata di 57 MW, potenza di immissione di 54 MW e potenza del sistema di accumulo di 10 MW, per la produzione agricola di beni e servizi oltre alle opere connesse e alle infrastrutture indispensabili nelle aree identificate nei comuni di Villafrati (PA), Mezzojuso (PA) e Ciminna (PA)

TAVOLA N.: 129	IMPIANTO: AGROVOLTAICO CIMINNA	RT	SCALA
	ELABORATO: Report PVSyst	COD. DOC.: SP01ELRT129	REV.

PROPONENTE: FRI-ELSUN	RESPONSABILE: Timbro e Firma	APPROVATO DA: Timbro e Firma
PROGETTISTA: SUPER CORP	DIRETTORE TECNICO: ARCH: FRANCESCO LAUDICINA Timbro e Firma	REDATTO DA: Timbro e Firma

REV.	DATA	REDATTO	DESCRIZIONE
0			
1			
2			
3			

ORDINE DEGLI ARCHITETTI P.P.C. PALERMO — Dott. Arch. Francesco Laudicina N. 4313

Firmato digitalmente da

FRANCESCO LAUDICINA

SerialNumber = TINIT-LDCFNC70P02G273L
C = IT

Version 7.4.0

PVsyst - Simulation report

Grid-Connected System

Progetto: Impianto PV_CIMINNA

Località:Ciminna (PA)

Inseguitore Monoassiale N-S con Backtraking

System power: 57.45 MWp

Villafrati - Italia

Progettisti

Project: SuperCorp Project_PV

Variant: Nuova variante di simulazione - CIMINNA

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Project summary

Geographical Site
Villafrati
Italia

Situation

Latitude	37.91 °N
Longitude	13.48 °E
Altitude	458 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Villafrati
PVGIS api TMY

System summary

Grid-Connected System — ***Inseguitore Monoassiale N-S con Backtraking***

PV Field Orientation

Orientation

Tracking plane, tilted axis	
Avg axis tilt	2.2 °
Avg axis azim.	0 °

Tracking algorithm
Irradiance optimization
Backtracking activated

Near Shadings
Linear shadings

Diffuse shading	Automatic

System information

PV Array

Nb. of modules	89760 units
Pnom total	57.45 MWp

Inverters

Nb. of units	252 units
Pnom total	54.18 MWac
Pnom ratio	1.060

User's needs
Unlimited load (grid)

Results summary

Produced Energy	100639.04 MWh/year	Specific production	1752 kWh/kWp/year	Perf. Ratio PR	81.23 %

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General parameters

Grid-Connected System — **Inseguitore Monoassiale N-S con Backtraking**

PV Field Orientation

Orientation

Tracking plane, tilted axis	
Avg axis tilt	2.2 °
Avg axis azim.	0 °

Tracking algorithm

Irradiance optimization	
Backtracking activated	

Backtracking array

Nb. of trackers	3740 units

Sizes

Tracker Spacing	7.80 m
Collector width	4.82 m
Ground Cov. Ratio (GCR)	61.8 %
Phi min / max.	-/+ 60.0 °

Backtracking strategy

Phi limits for BT	-/+ 51.7 °
Backtracking pitch	7.80 m
Backtracking width	4.82 m

Models used

Transposition	Perez
Diffuse	Imported
Circumsolar	separate

Horizon

Average Height	6.6 °

Near Shadings

Linear shadings	
Diffuse shading	Automatic

User's needs
Unlimited load (grid)

PV Array Characteristics

PV module

Manufacturer	Jinkosolar
Model	JKM640M-7RL4
(Custom parameters definition)	
Unit Nom. Power	640 Wp
Number of PV modules	89760 units
Nominal (STC)	57.45 MWp
Modules	3740 Strings x 24 In series
At operating cond. (50°C)	
Pmpp	50.72 MWp
U mpp	978 V
I mpp	51882 A

Inverter

Manufacturer	Huawei Technologies
Model	SUN2000-215KTL-H1
(Custom parameters definition)	
Unit Nom. Power	215 kWac
Number of inverters	252 units
Total power	54180 kWac
Operating voltage	550-1500 V
Pnom ratio (DC:AC)	1.06
Power sharing within this inverter	

Total PV power

Nominal (STC)	57446 kWp
Total	89760 modules
Module area	245410 m²
Cell area	344463 m²

Total inverter power

Total power	54180 kWac
Number of inverters	252 units
Pnom ratio	1.06

Array losses

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.	0.32 mΩ
Loss Fraction	1.5 % at STC

Serie Diode Loss

Voltage drop	0.7 V
Loss Fraction	0.1 % at STC

Module Quality Loss

Loss Fraction	-0.8 %

Module mismatch losses

Loss Fraction	2.0 % at MPP

Strings Mismatch loss

Loss Fraction	0.1 %

Array losses

IAM loss factor

Incidence effect (IAM): Fresnel smooth glass, n = 1.526

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.998	0.981	0.948	0.862	0.776	0.636	0.403	0.000

Spectral correction

FirstSolar model

Precipitable water estimated from relative humidity

Coefficient Set	*C0*	*C1*	*C2*	*C3*	*C4*	*C5*
Monocrystalline Si	0,85914	-0,02088	-0,0058853	0,12029	0,026814	-0,001781

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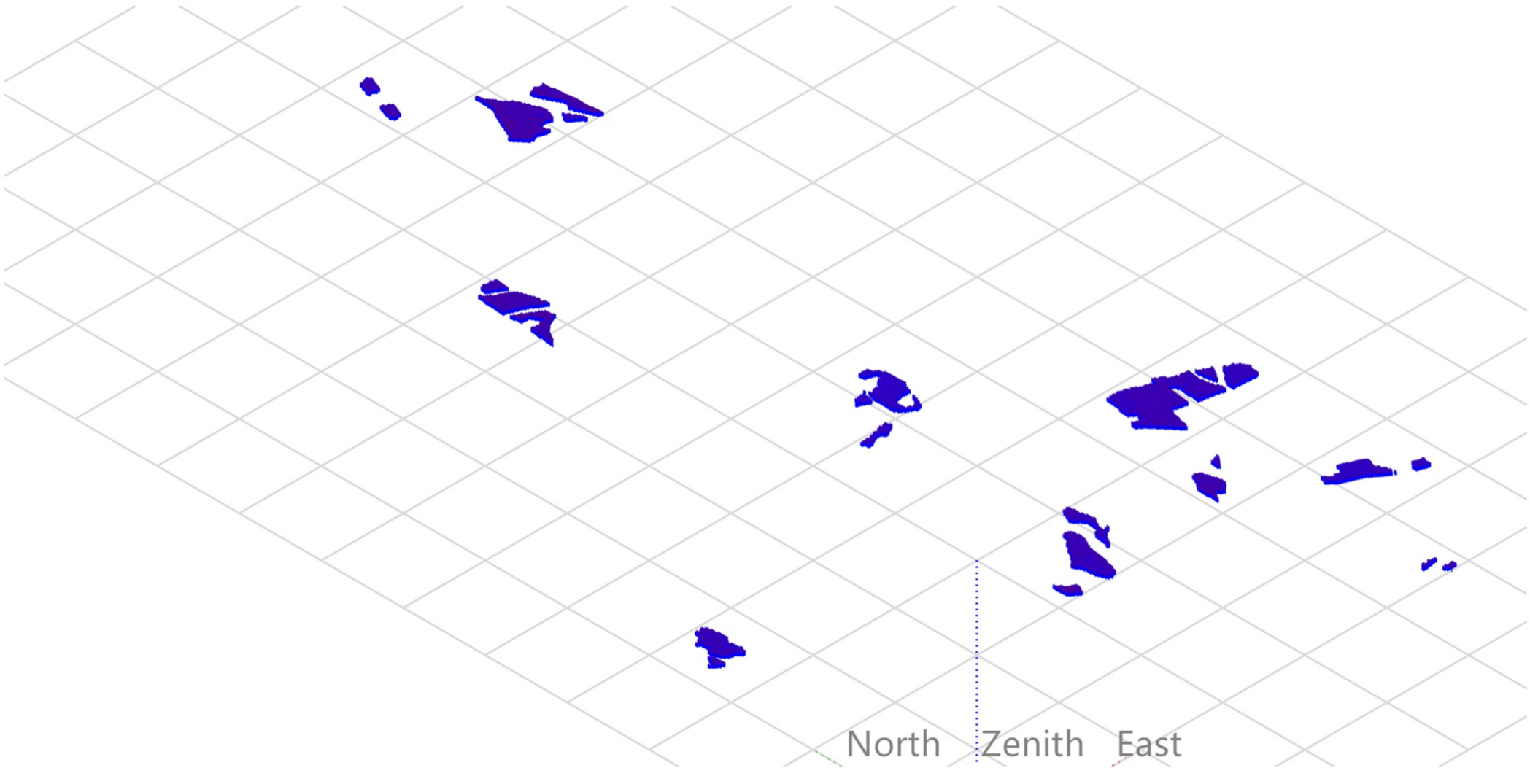
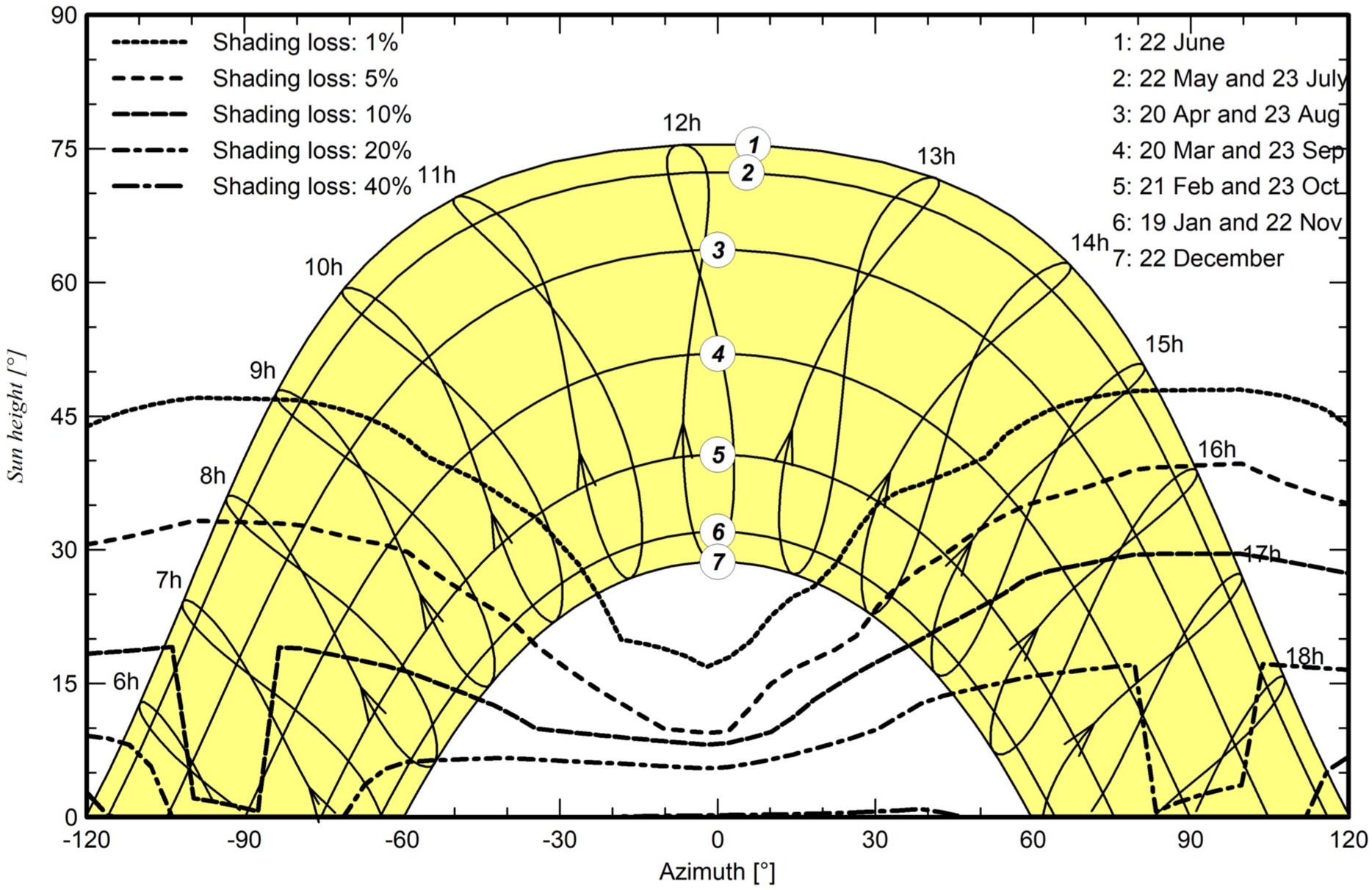
Near shadings parameter

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Orientation #1

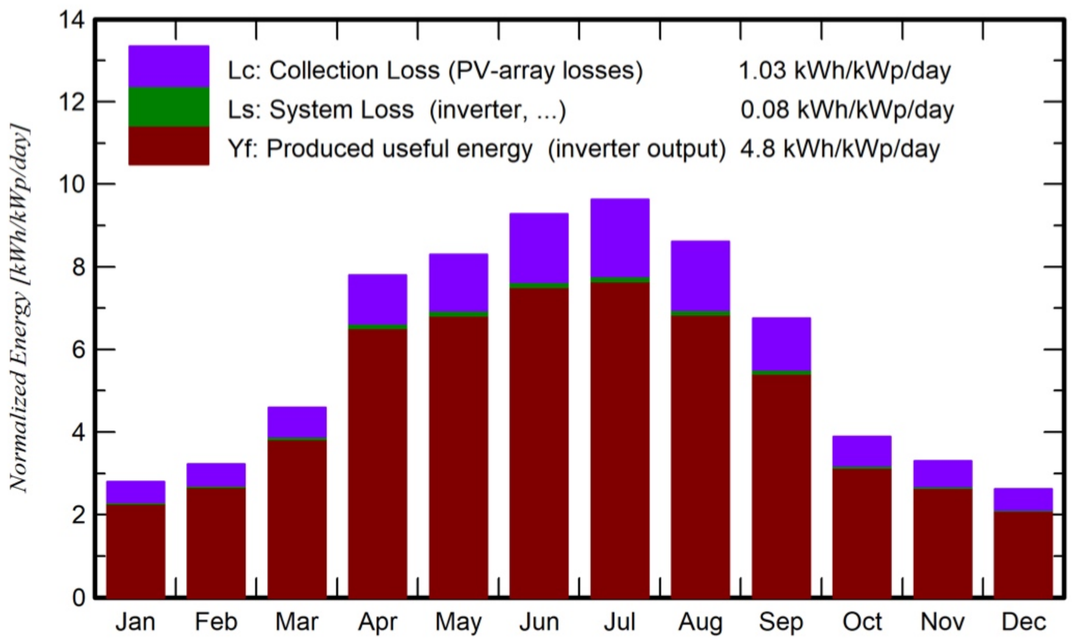


Main results

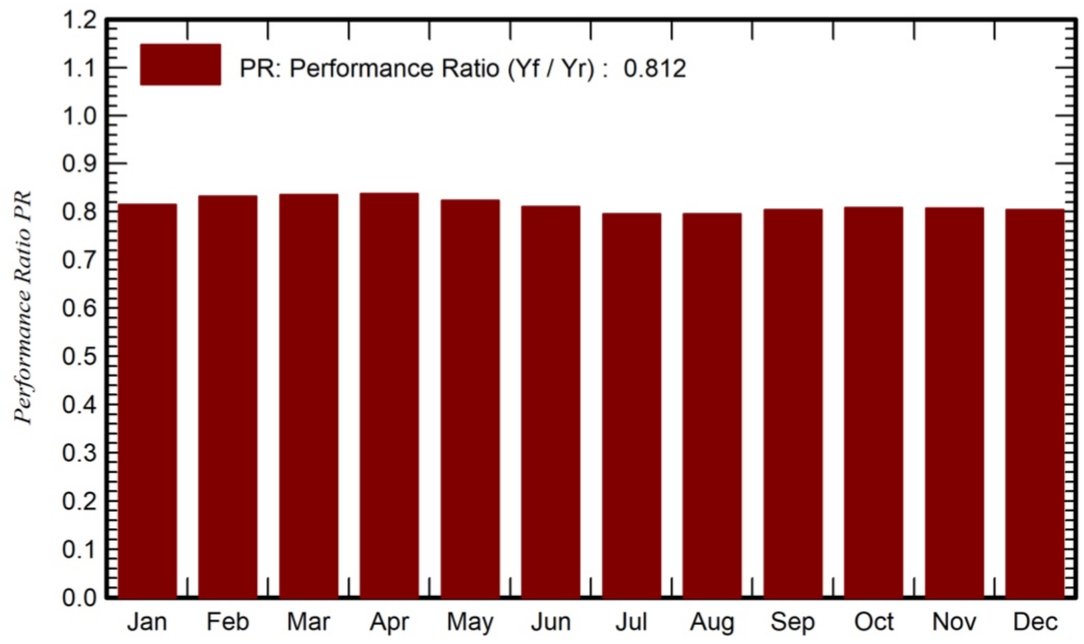
System Production

Produced Energy	100639.04 MWh/year	Specific production	1752 kWh/kWp/year
		Perf. Ratio PR	81.23 %

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* MWh	*EArrMPP* MWh	*EffSysR* %	*EArray* MWh	*EffSysR* %
January	68.3	30.08	11.80	86.8	77.3	4127	4127	19.07	4127	19.07
February	74.4	41.14	9.23	90.2	82.0	4379	4379	19.47	4379	19.47
March	116.5	55.59	11.28	142.4	131.8	6943	6943	19.54	6943	19.54
April	191.1	66.95	12.93	234.0	220.1	11433	11433	19.59	11433	19.59
May	211.9	70.26	16.76	257.4	243.4	12376	12376	19.27	12376	19.27
June	228.4	72.24	20.29	278.2	262.9	13175	13175	18.97	13175	18.97
July	241.2	63.14	24.89	298.3	282.3	13866	13866	18.61	13866	18.61
August	214.0	61.78	24.67	266.9	251.8	12411	12411	18.62	12411	18.62
September	162.4	56.12	22.34	202.5	189.4	9511	9511	18.82	9511	18.82
October	99.6	49.47	19.16	120.5	111.3	5691	5691	18.92	5691	18.92
November	77.0	32.21	16.30	98.8	88.9	4653	4653	18.88	4653	18.88
December	64.4	32.69	12.85	81.0	71.5	3802	3802	18.80	3802	18.80
Year	1749.2	631.68	16.93	2156.8	2012.7	102366	102366	19.01	102366	19.01

Legends

GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	EArrMPP	Array virtual energy at MPP
T_Amb	Ambient Temperature	EffSysR	Effic. Eout system / rough area
GlobInc	Global incident in coll. plane	EArray	Effective energy at the output of the array
GlobEff	Effective Global, corr. for IAM and shadings	EffSysR	Effic. Eout system / rough area

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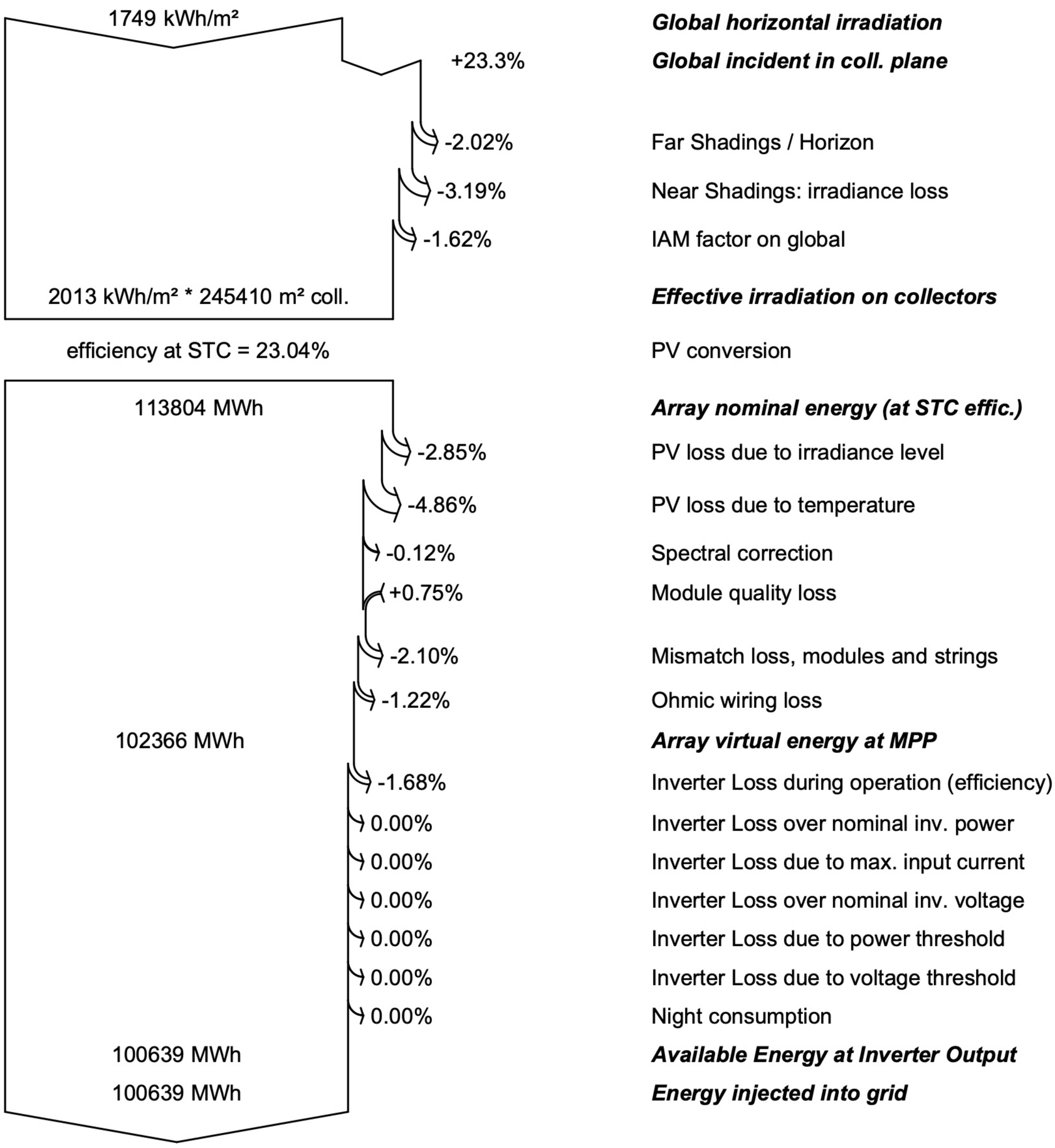
Loss diagram



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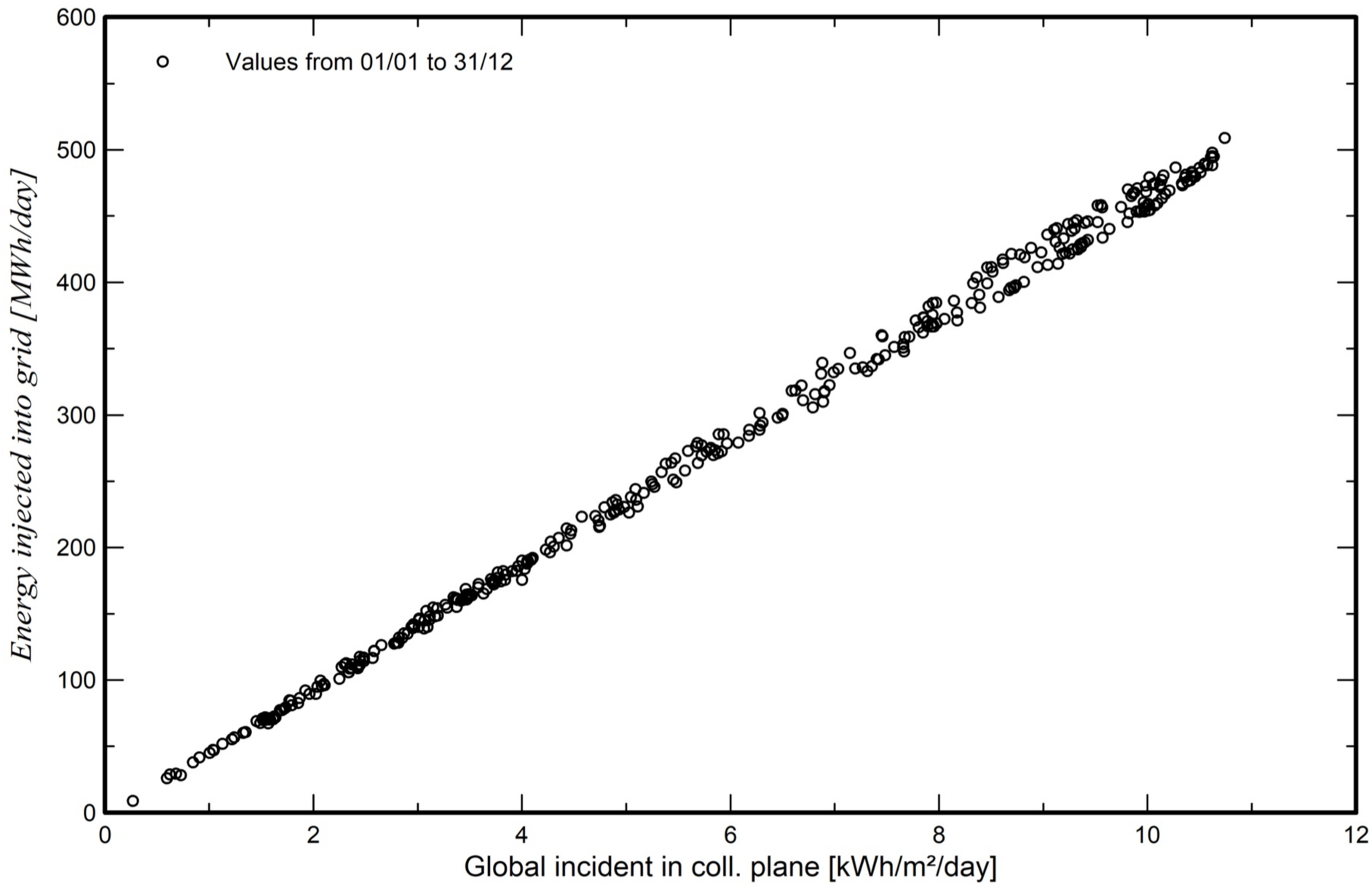
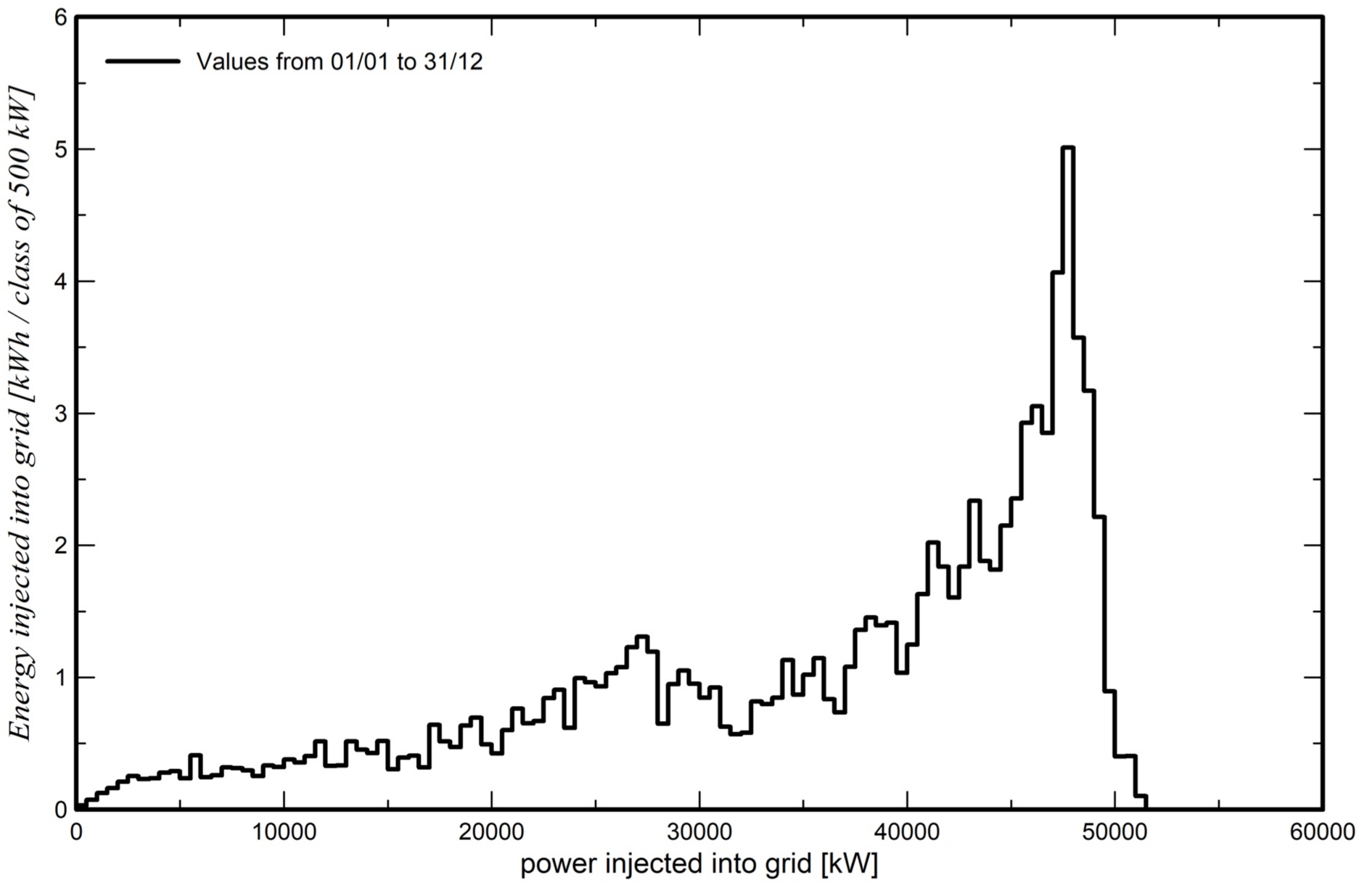
Predef. graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema



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P50 - P90 evaluation

Meteo data

Source	PVGIS api TMY
Kind	Own measured
Year	TMY
Year-to-year variability(Variance)	-1.0 %

Specified Deviation

Year deviation from average	0.0 %

Simulation and parameters uncertainties

PV module modelling/parameters	1.0 %
Inverter efficiency uncertainty	0.5 %
Soiling and mismatch uncertainties	1.0 %
Degradation uncertainty	1.0 %

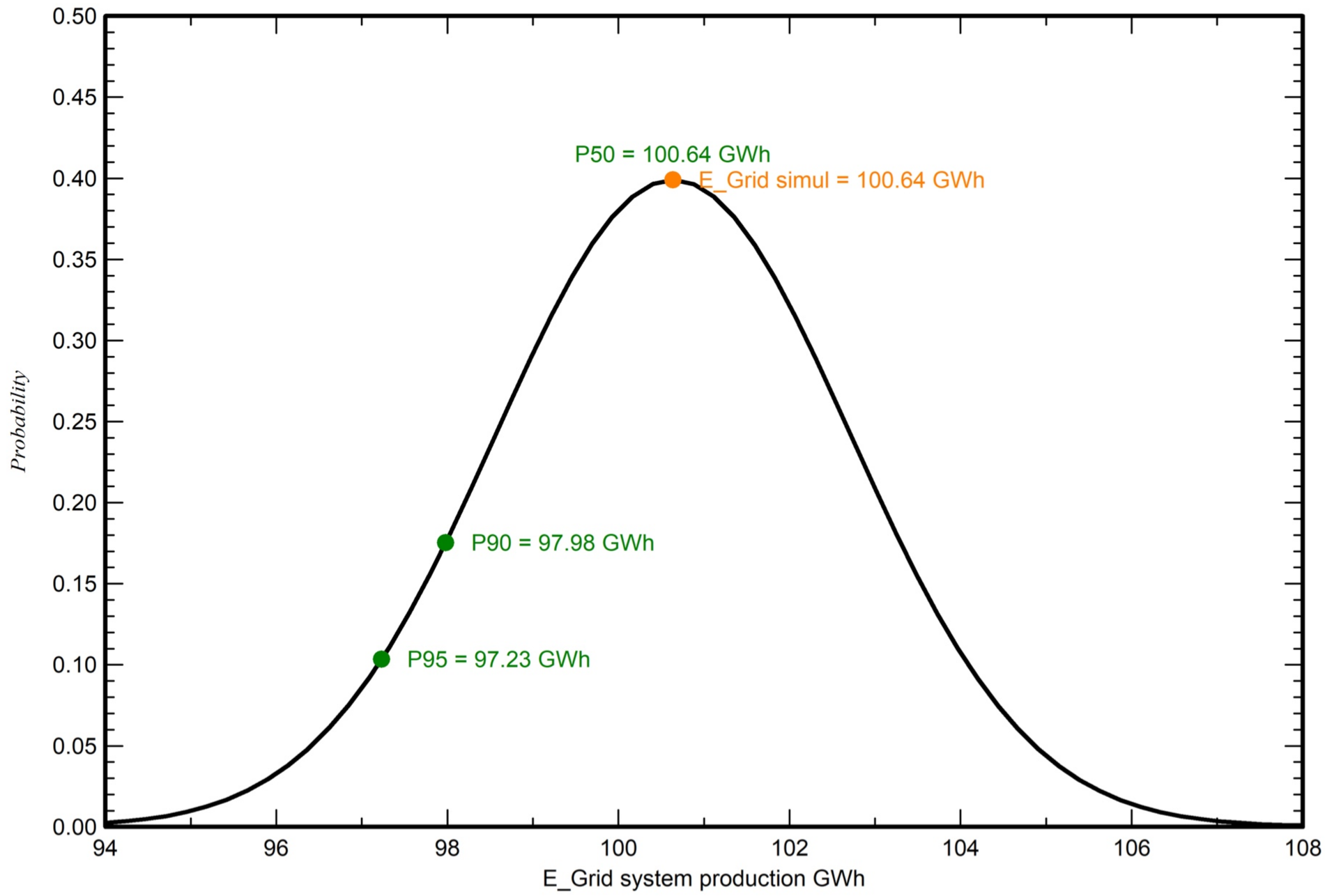
Global variability (meteo + system)

Variability (Quadratic sum)	2.1 %

Annual production probability

Variability	2.07 GWh
P50	100.64 GWh
P90	97.98 GWh
P95	97.23 GWh

Probability distribution



Single-line diagram

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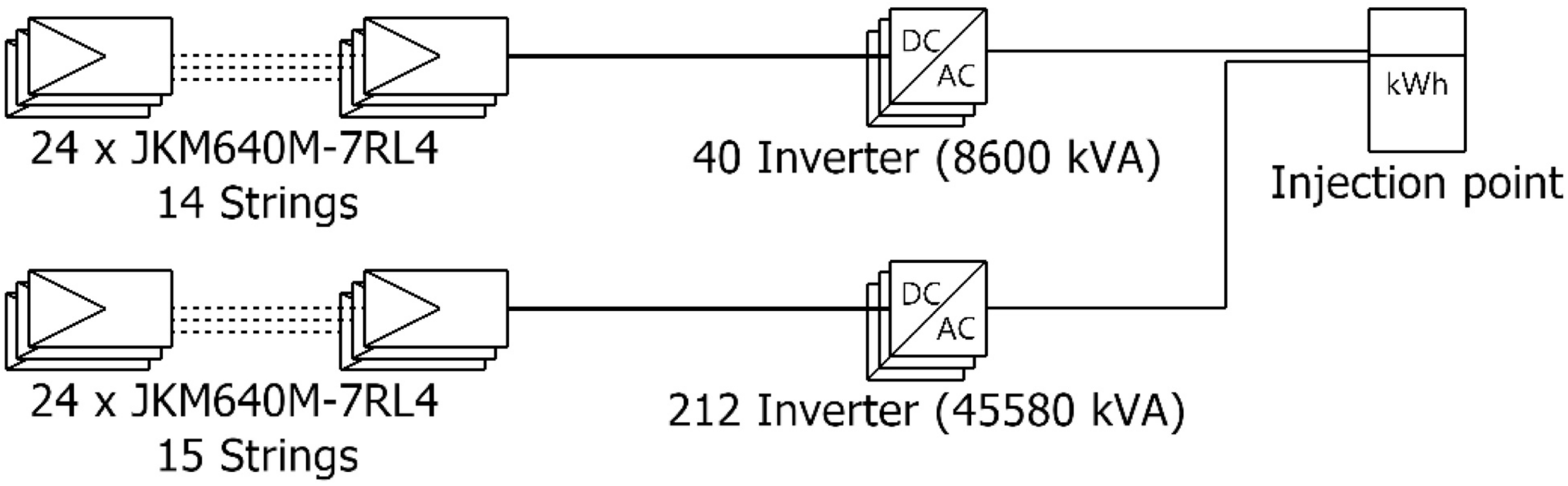

PV module	JKM640M-7RL4
Inverter	SUN2000-215KTL-H1
String	24 x JKM640M-7RL4

SuperCorp Project_PV

VIQ : Nuova variante di simulazione - CIMINNA

26/03/24