

PVsyst - Simulation report

Grid-Connected System

Project: HY1

Variant: New simulation variant

Unlimited Trackers with backtracking

System power: 2986 kWp

Viconovo - Italy



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Variant: New simulation variant

ARCADIS (italy)

PVsyst V7.4.7

VCO, Simulation date:
20/06/24 12:26
with V7.4.7

Project summary

Geographical Site

Viconovo
Italy

Situation

Latitude 44.84 °N
Longitude 11.77 °E
Altitude 9 m
Time zone UTC+1

Project settings

Albedo 0.20

Weather data

Viconovo
Meteonorm 8.1 (1991-2012), Sat=100% - Synthetic

System summary

Grid-Connected System

Unlimited Trackers with backtracking

PV Field Orientation

Orientation
Tracking horizontal axis

Tracking algorithm

Astronomic calculation
Backtracking activated

Near Shadings

No Shadings

System information

PV Array

Nb. of modules 4524 units
Pnom total 2986 kWp

Inverters

Nb. of units 11 units
Pnom total 2200 kWac
Pnom ratio 1.357

User's needs

Unlimited load (grid)

Results summary

Produced Energy 4118645 kWh/year Specific production 1379 kWh/kWp/year Perf. Ratio PR 81.93 %

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General parameters

Grid-Connected System

Unlimited Trackers with backtracking

PV Field Orientation

Orientation

Tracking horizontal axis

Tracking algorithm

Astronomic calculation

Backtracking activated

Backtracking array

Nb. of trackers 100 units

Unlimited trackers

Sizes

Tracker Spacing 5.30 m

Collector width 2.38 m

Ground Cov. Ratio (GCR) 44.9 %

Left inactive band 0.02 m

Right inactive band 0.02 m

Phi min / max. +/- 60.0 °

Backtracking strategy

Phi limits for BT +/- 62.9 °

Backtracking pitch 5.30 m

Backtracking width 2.38 m

Models used

Transposition Perez

Diffuse Perez, Meteonorm

Circumsolar separate

Horizon

Free Horizon

Near Shadings

No Shadings

User's needs

Unlimited load (grid)

Bifacial system

Model

2D Calculation

unlimited trackers

Bifacial model geometry

Tracker Spacing 5.30 m

Tracker width 2.42 m

GCR 45.7 %

Axis height above ground 1.50 m

Bifacial model definitions

Ground albedo 0.30

Bifaciality factor 72 %

Rear shading factor 5.0 %

Rear mismatch loss 10.0 %

Shed transparent fraction 0.0 %

PV Array Characteristics

PV module

Manufacturer Trina Solar

Model TSM-DEG21C-20-660Wp Vertex

(Original PVsyst database)

Unit Nom. Power 660 Wp

Number of PV modules 4524 units

Nominal (STC) 2986 kWp

Modules 156 string x 29 In series

At operating cond. (50°C)

Pmpp 2736 kWp

U mpp 1003 V

I mpp 2729 A

Total PV power

Nominal (STC) 2986 kWp

Total 4524 modules

Module area 14053 m²

Inverter

Manufacturer Huawei Technologies

Model SUN2000-215KTL-H0

(Original PVsyst database)

Unit Nom. Power 200 kWac

Number of inverters 11 units

Total power 2200 kWac

Operating voltage 550-1500 V

Max. power (=>30°C) 215 kWac

Pnom ratio (DC:AC) 1.36

Power sharing within this inverter

Total inverter power

Total power 2200 kWac

Max. power 2365 kWac

Number of inverters 11 units

Pnom ratio 1.36



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Array losses

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 20.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

DC wiring losses

Global array res. 8.1 mΩ
Loss Fraction 2.0 % at STC

Module Quality Loss

Loss Fraction 1.5 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

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	0.962	0.892	0.816	0.681	0.440	0.000

System losses

Auxiliaries loss

constant (fans) 54.5 kW
0.0 kW from Power thresh.

AC wiring losses

Inv. output line up to MV transfo

Inverter voltage 800 Vac tri
Loss Fraction 0.88 % at STC

Inverter: SUN2000-215KTL-H0

Wire section (11 Inv.) Alu 11 x 3 x 150 mm²
Average wires length 100 m

MV line up to Injection

MV Voltage 15 kV
Wires Alu 3 x 185 mm²
Length 700 m
Loss Fraction 0.16 % at STC

AC losses in transformers

MV transfo

Medium voltage 15 kV

Transformer from Datasheets

Nominal power 2500 kVA
Iron Loss (24/24 Connexion) 2.80 kVA
Iron loss fraction 0.11 % of PNom
Copper loss 19.00 kVA
Copper loss fraction 0.76 % at PNom
Coils equivalent resistance 3 x 1.95 mΩ



Main results

System Production

Produced Energy 4118645 kWh/year

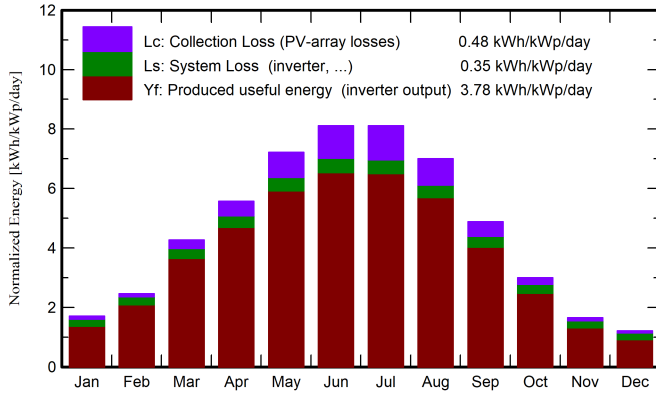
Specific production

1379 kWh/kWp/year

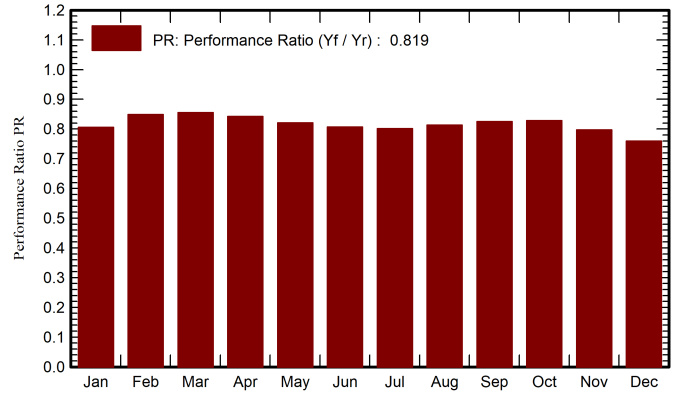
Perf. Ratio PR

81.93 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

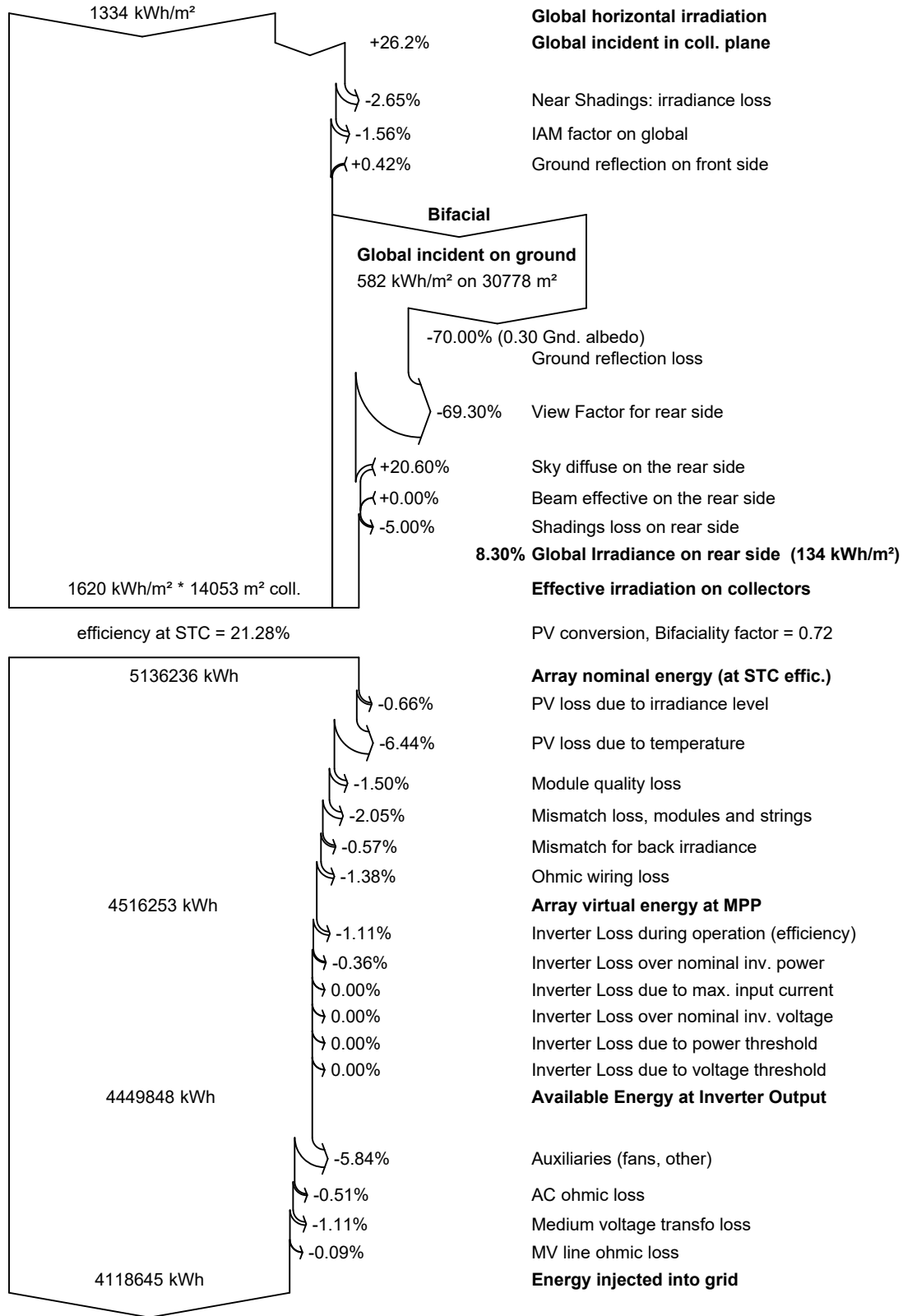
	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	40.9	20.17	2.86	52.7	49.1	149448	126950	0.806
February	55.0	30.22	5.02	69.0	65.4	197521	174934	0.849
March	105.2	52.02	10.07	132.3	126.8	369385	337903	0.855
April	133.5	64.00	14.24	167.1	161.3	456049	420541	0.843
May	177.4	79.46	19.14	223.8	216.7	590241	548213	0.820
June	191.3	77.87	23.54	243.3	236.4	628786	586211	0.807
July	196.4	83.30	25.93	251.5	244.0	645558	602027	0.802
August	169.1	73.40	25.38	217.2	210.5	566919	527399	0.813
September	117.2	57.83	20.11	146.6	140.9	393477	361317	0.825
October	76.1	46.56	15.57	93.1	88.2	257357	230150	0.828
November	40.9	26.61	9.72	49.5	46.2	139004	117766	0.797
December	31.2	19.34	4.21	37.6	34.6	106316	85234	0.759
Year	1334.3	630.80	14.70	1683.7	1620.1	4500063	4118645	0.819

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



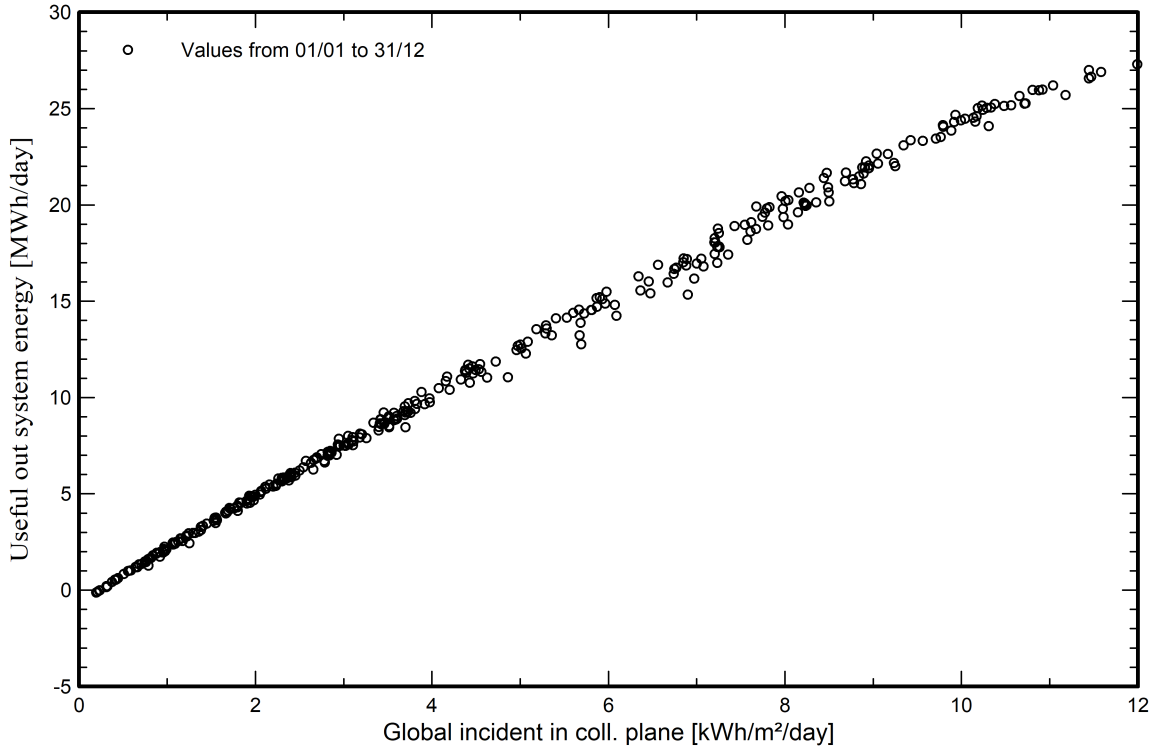
Loss diagram



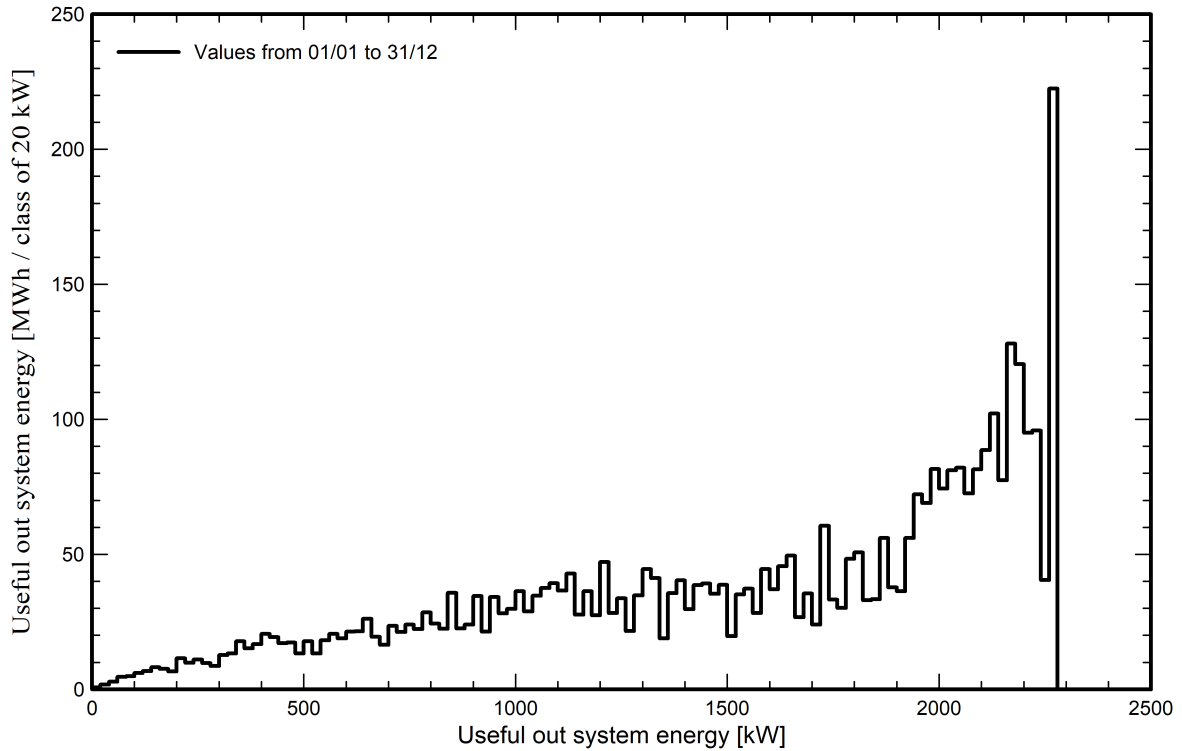


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

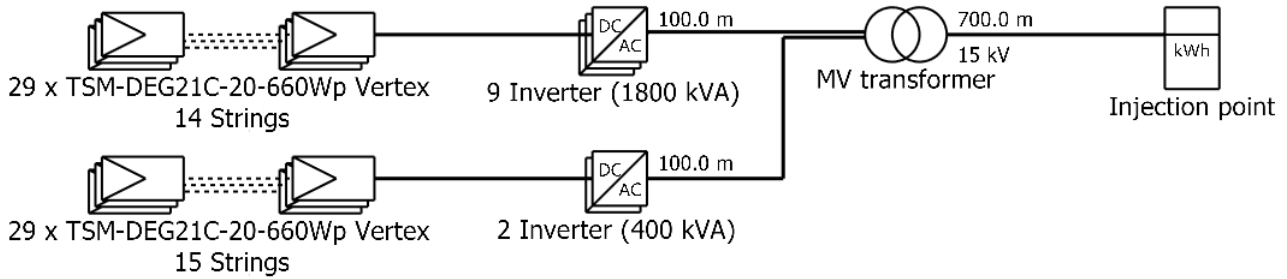




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Single-line diagram



PV module	TSM-DEG21C-20-660Wp Vertex
Inverter	SUN2000-215KTL-H0
String	29 x TSM-DEG21C-20-660Wp Vertex

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