

# PVsyst - Simulation report

## Grid-Connected System

Project: Large Capacity-Large Megawatt with Bi-facial\_1MW

Variant: New simulation variant

Unlimited sheds

System power: 998 kWp

Girokomio - Greece



# Project: Large Capacity-Large Megawatt with Bi-facial\_1MW

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## PVsyst V7.2.8

VC0, Simulation date:  
05/07/22 11:50  
with v7.2.8

### Project summary

#### Geographical Site

##### Girokomio

Greece

#### Situation

Latitude 40.29 °N

Longitude 21.78 °E

Altitude 697 m

Time zone UTC+2

#### Project settings

Albedo 0.20

#### Meteo data

Girokomio

Meteonorm 8.0 (1994-2006), Sat=100% - Synthetic

### System summary

#### Grid-Connected System

Simulation for year no 10

#### Unlimited sheds

#### PV Field Orientation

Sheds

tilt 34 °

azimuth 0 °

#### Near Shadings

Mutual shadings of sheds

Electrical effect

#### User's needs

Unlimited load (grid)

#### System information

##### PV Array

Nb. of modules 2464 units

Pnom total 998 kWp

##### Inverters

Nb. of units 5 units

Pnom total 875 kWac

Pnom ratio 1.140

### Results summary

Produced Energy 1472 MWh/year Specific production 1475 kWh/kWp/year Perf. Ratio PR 82.44 %

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**General parameters****Grid-Connected System****PV Field Orientation****Orientation**

Sheds  
tilt 34 °  
azimuth 0 °

**Unlimited sheds****Sheds configuration**

Nb. of sheds 44 units  
Unlimited sheds

**Sizes**

Sheds spacing 7.00 m  
Collector width 3.00 m  
Ground Cov. Ratio (GCR) 42.9 %  
Top inactive band 0.02 m  
Bottom inactive band 0.02 m

**Shading limit angle**

Limit profile angle 20.6 °

**Shadings electrical effect**

Cell size 15.6 cm  
Strings in width 3 units

**Models used**

Transposition Perez  
Diffuse Perez, Meteonorm  
Circumsolar separate

**Horizon**

Free Horizon

**Near Shadings**

Mutual shadings of sheds  
Electrical effect

**User's needs**

Unlimited load (grid)

**Bifacial system**

Model 2D Calculation  
unlimited sheds

**Bifacial model geometry**

Sheds spacing 7.00 m  
Sheds width 3.04 m  
Limit profile angle 20.8 °  
GCR 43.4 %  
Height above ground 1.50 m

**Bifacial model definitions**

Ground albedo 0.25  
Bifaciality factor 85 %  
Rear shading factor 5.0 %  
Rear mismatch loss 10.0 %  
Shed transparent fraction 0.0 %

**PV Array Characteristics****PV module**

Manufacturer Talesun Solar (suzhou)  
Model TD6D72M-405(H)  
(Original PVsyst database)

Unit Nom. Power 405 Wp  
Number of PV modules 2464 units  
Nominal (STC) 998 kWp  
Modules 88 Strings x 28 In series

**At operating cond. (50°C)**

Pmpp 904 kWp  
U mpp 965 V  
I mpp 937 A

**Total PV power**

Nominal (STC) 998 kWp  
Total 2464 modules  
Module area 4825 m²  
Cell area 4334 m²

**Inverter**

Manufacturer Huawei Technologies  
Model SUN2000-185KTL-H1  
(Original PVsyst database)

Unit Nom. Power 175 kWac  
Number of inverters 5 units  
Total power 875 kWac  
Operating voltage 550-1500 V  
Max. power (=>30°C) 185 kWac  
Pnom ratio (DC:AC) 1.14

**Total inverter power**

Total power 875 kWac  
Nb. of inverters 5 units  
Pnom ratio 1.14



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## Array losses

## Array Soiling Losses

Average loss Fraction 3.0 %

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%

## 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. 3.4 mΩ  
Loss Fraction 0.3 % at STC

## LID - Light Induced Degradation

Loss Fraction 2.5 %

## Module Quality Loss

Loss Fraction -0.5 %

## Module mismatch losses

Loss Fraction 2.0 % at MPP

## Strings Mismatch loss

Loss Fraction 0.1 %

## Module average degradation

Year no 10  
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): 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

## Unavailability of the system

Time fraction 0.5 %  
1.8 days,  
3 periods

## Auxiliaries loss

constant (fans) 2.00 kW  
0.0 kW from Power thresh.

## AC wiring losses

## Inv. output line up to MV transfo

Inverter voltage 800 Vac tri  
Loss Fraction 0.30 % at STC

## Inverter: SUN2000-185KTL-H1

Wire section (5 Inv.) Copper 5 x 3 x 500 mm²  
Average wires length 260 m

## AC losses in transformers

## MV transfo

Grid voltage 20 kV

## Operating losses at STC

Nominal power at STC 982 kVA  
Iron loss (24/24 Connexion) 0.98 kW  
Loss Fraction 0.10 % at STC  
Coils equivalent resistance 3 x 6.52 mΩ  
Loss Fraction 1.00 % at STC



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### Main results

#### System Production

Produced Energy

1472 MWh/year

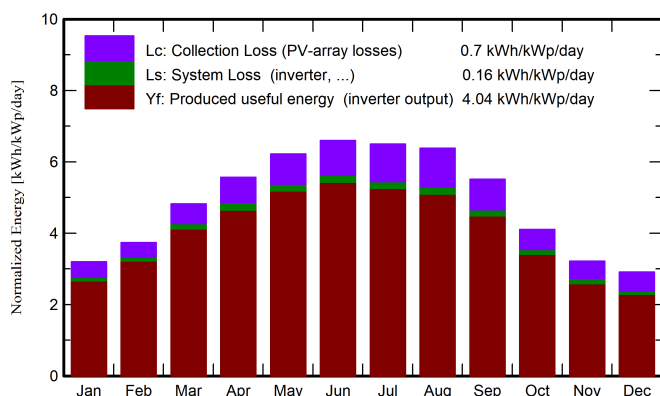
Specific production

1475 kWh/kWp/year

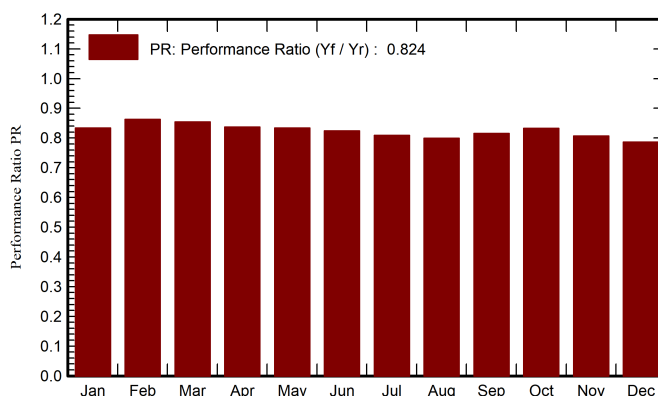
Performance Ratio PR

82.44 %

#### Normalized productions (per installed kWp)



#### Performance Ratio PR



### Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	MWh	MWh	ratio
January	59.5	27.50	3.07	99.2	91.4	85.7	82.5	0.834
February	74.5	37.69	4.86	104.6	97.4	93.4	90.1	0.863
March	120.4	52.17	8.89	149.6	139.3	132.1	127.5	0.854
April	154.1	67.64	12.85	166.9	154.9	145.6	139.4	0.837
May	198.5	75.53	17.76	193.0	178.5	166.4	160.7	0.834
June	212.8	75.17	21.96	197.9	182.8	168.5	162.7	0.824
July	212.6	73.34	25.37	201.3	186.4	168.6	162.7	0.810
August	190.4	64.13	25.05	197.8	183.9	164.3	157.9	0.800
September	137.3	50.63	19.50	165.3	153.9	139.4	134.5	0.815
October	94.7	45.95	14.34	127.2	118.4	109.7	105.7	0.833
November	59.6	25.91	8.94	96.4	89.0	82.1	77.6	0.807
December	51.3	24.17	4.35	90.2	80.9	73.8	70.8	0.787
Year	1565.8	619.82	13.96	1789.5	1656.9	1529.6	1472.1	0.824

#### 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

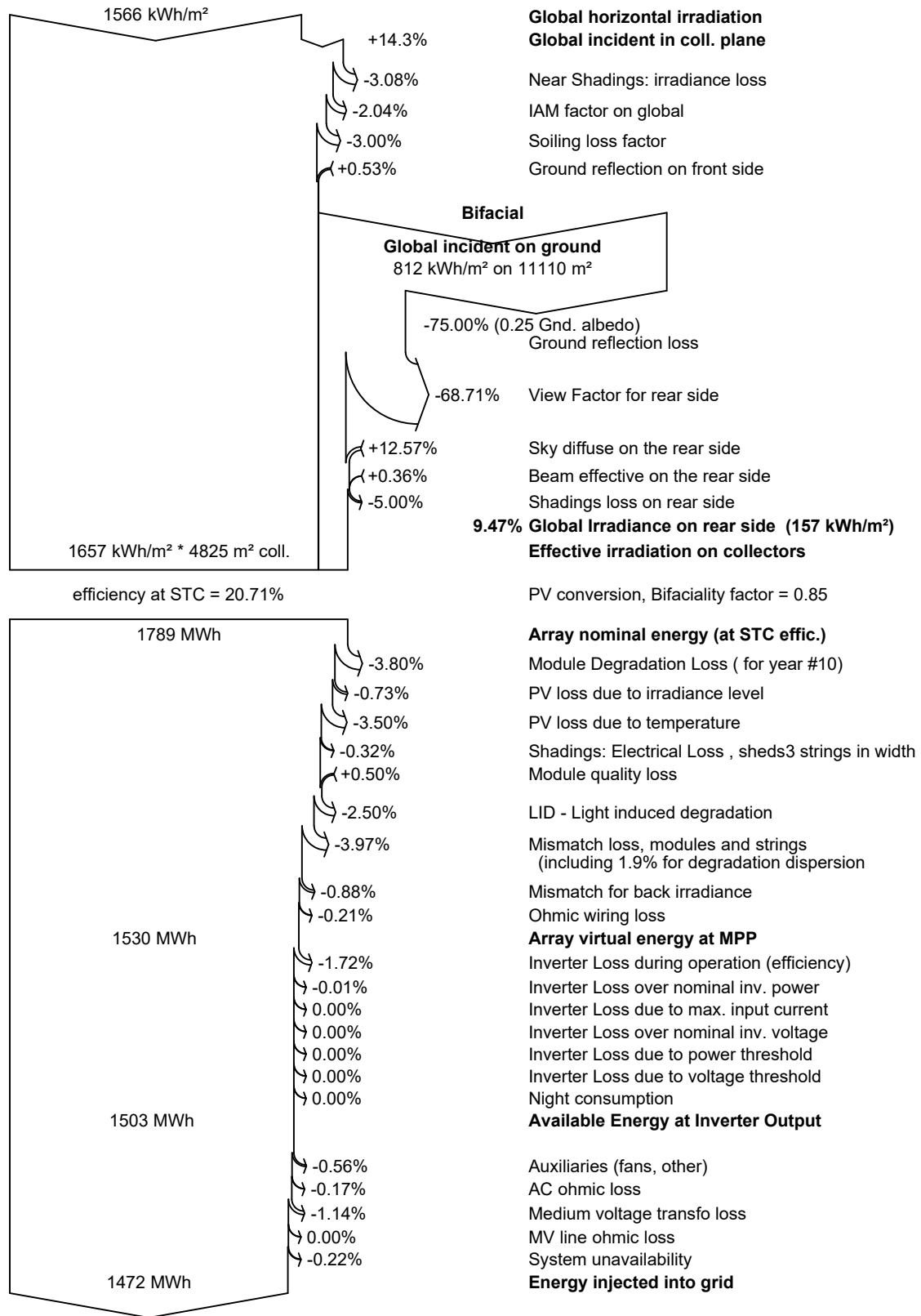
PR Performance Ratio



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**Loss diagram**



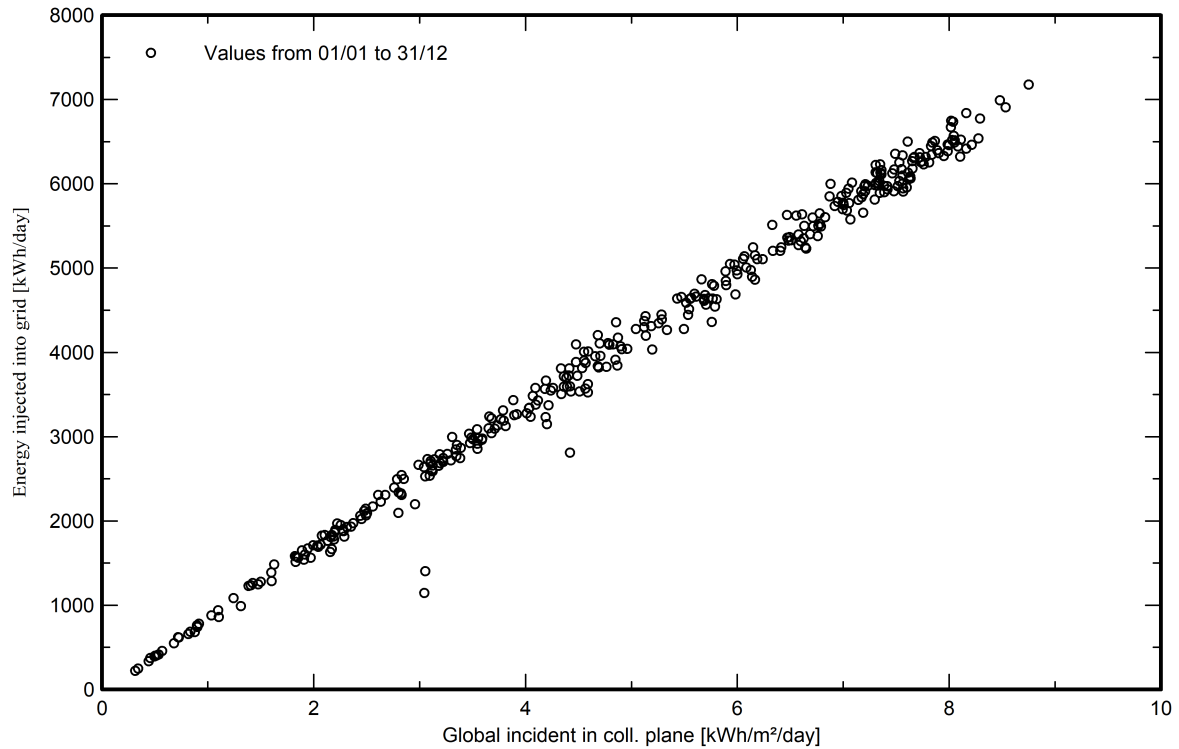


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**Special graphs**

**Daily Input/Output diagram**



**System Output Power Distribution**

