

# PVsyst - Simulation report

## Grid-Connected System

Project: 20kW Grid-Connected PV System Design Using Trina 550W & Huawei Inverter (PVsyst)

Variant: New simulation variant

No 3D scene defined, no shadings

System power: 22.00 kWp

Kömürcüler - Turkey

Author



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## PVsyst V7.4.8

VC0, Simulation date:  
07/22/25 17:12  
with V7.4.8

### Project summary

#### Geographical Site

Kömürçüler

Turkey

#### Situation

Latitude 37.07 °N

Longitude 30.62 °E

Altitude 303 m

Time zone UTC+3

#### Project settings

Albedo 0.20

#### Weather data

Kömürçüler

Meteonorm 8.1 (2003-2013), Sat=% 100 - Sentetik

### System summary

#### Grid-Connected System

No 3D scene defined, no shadings

#### PV Field Orientation

Fixed plane

Tilt/Azimuth 7 / 0 °

#### Near Shadings

No Shadings

#### User's needs

Unlimited load (grid)

#### System information

##### PV Array

Nb. of modules

40 units

Pnom total

22.00 kWp

##### Inverters

Nb. of units

1 unit

Pnom total

20.00 kWac

Pnom ratio

1.100

### Results summary

Produced Energy

31826 kWh/year

Specific production

1447 kWh/kWp/year

Perf. Ratio PR

84.97 %

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### General parameters

#### Grid-Connected System

No 3D scene defined, no shadings

#### PV Field Orientation

##### Orientation

Fixed plane

Tilt/Azimuth 7 / 0 °

##### Sheds configuration

No 3D scene defined

##### Models used

Transposition Perez  
Diffuse Perez, Meteor norm  
Circumsolar separate

##### Horizon

Free Horizon

##### Near Shadings

No Shadings

##### User's needs

Unlimited load (grid)

### PV Array Characteristics

#### PV module

Manufacturer

Model

TSM-DE19-550Wp Vertex

Generic

(Original PVsyst database)

Unit Nom. Power

550 Wp

Number of PV modules

40 units

Nominal (STC)

22.00 kWp

Modules

4 string x 10 In series

#### At operating cond. (50°C)

Pmpp

20.13 kWp

U mpp

286 V

I mpp

70 A

#### Total PV power

Nominal (STC)

22 kWp

Total

40 modules

Module area

105 m<sup>2</sup>

#### Inverter

Manufacturer

Model

Generic

SUN2000-20KTL-M2

(Original PVsyst database)

Unit Nom. Power

20.0 kWac

Number of inverters

1 unit

Total power

20.0 kWac

Operating voltage

160-950 V

Max. power (=>45°C)

22.0 kWac

Pnom ratio (DC:AC)

1.10

Power sharing within this inverter

#### Total inverter power

Total power

20 kWac

Max. power

22 kWac

Number of inverters

1 unit

Pnom ratio

1.10

### Array losses

#### Thermal Loss factor

Module temperature according to irradiance

Uc (const) 20.0 W/m<sup>2</sup>K

Uv (wind) 0.0 W/m<sup>2</sup>K/m/s

#### DC wiring losses

Global array res.

67 mΩ

Loss Fraction

1.5 % at STC

#### 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): 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



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## Main results

### System Production

Produced Energy 31826 kWh/year

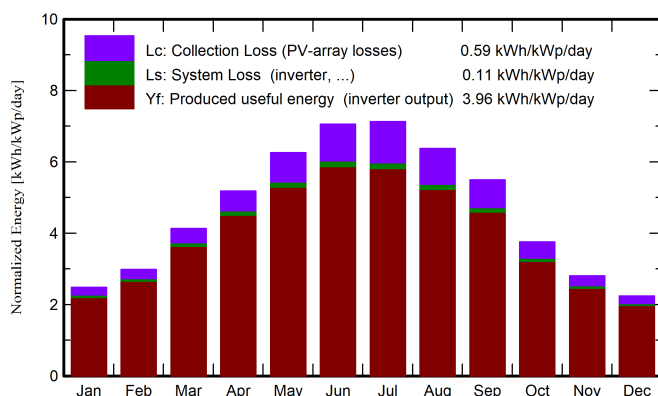
Specific production

1447 kWh/kWp/year

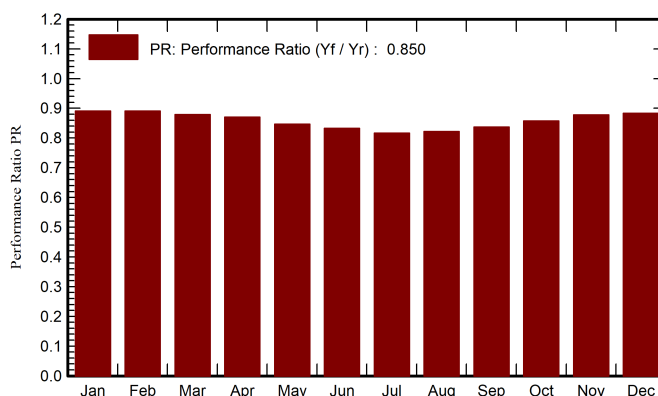
Perf. Ratio PR

84.97 %

### 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>	kWh	kWh	ratio
January	67.0	28.70	8.84	76.8	73.6	1549	1505	0.891
February	76.5	40.42	9.98	83.6	80.6	1685	1638	0.891
March	120.5	55.75	12.57	128.2	124.5	2548	2478	0.879
April	150.5	75.60	15.59	155.4	151.2	3057	2976	0.871
May	191.5	75.52	20.28	193.9	189.3	3711	3610	0.846
June	211.0	83.88	24.80	211.6	206.5	3983	3877	0.833
July	219.3	73.74	28.49	220.9	215.5	4075	3966	0.816
August	191.9	75.55	28.65	197.5	193.1	3670	3572	0.822
September	155.4	56.65	24.44	164.9	160.3	3118	3035	0.837
October	107.1	50.31	19.72	116.3	112.7	2255	2194	0.858
November	74.9	37.67	14.10	84.1	80.7	1671	1625	0.878
December	60.2	29.08	10.24	69.3	66.1	1388	1348	0.884
Year	1625.7	682.86	18.19	1702.6	1653.9	32710	31826	0.850

### 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



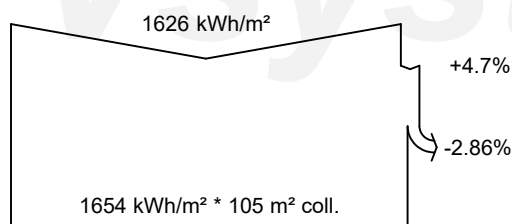
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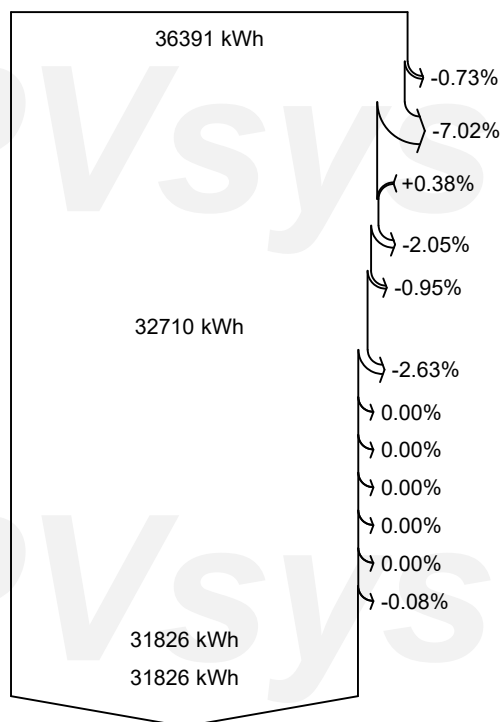
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## Loss diagram



efficiency at STC = 21.05%



**Global horizontal irradiation**

**Global incident in coll. plane**

IAM factor on global

**Effective irradiation on collectors**

PV conversion

**Array nominal energy (at STC effic.)**

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

Mismatch loss, modules and strings

Ohmic wiring loss

**Array virtual energy at MPP**

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

**Available Energy at Inverter Output**

**Energy injected into grid**



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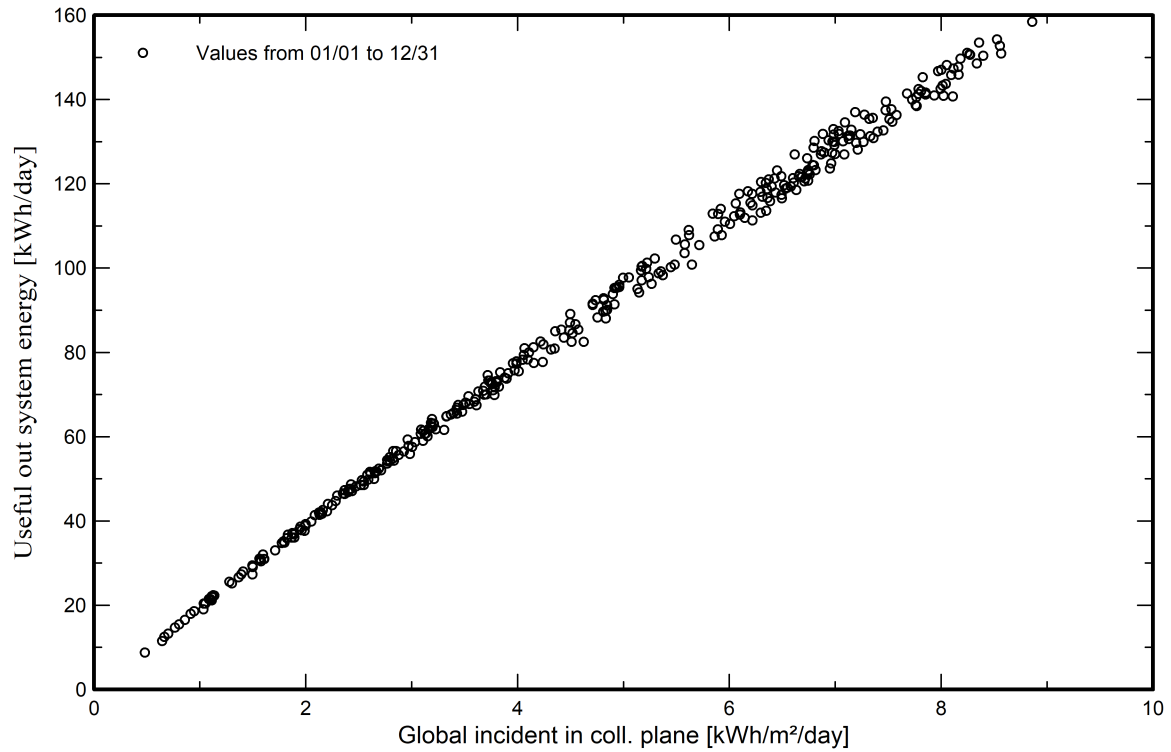
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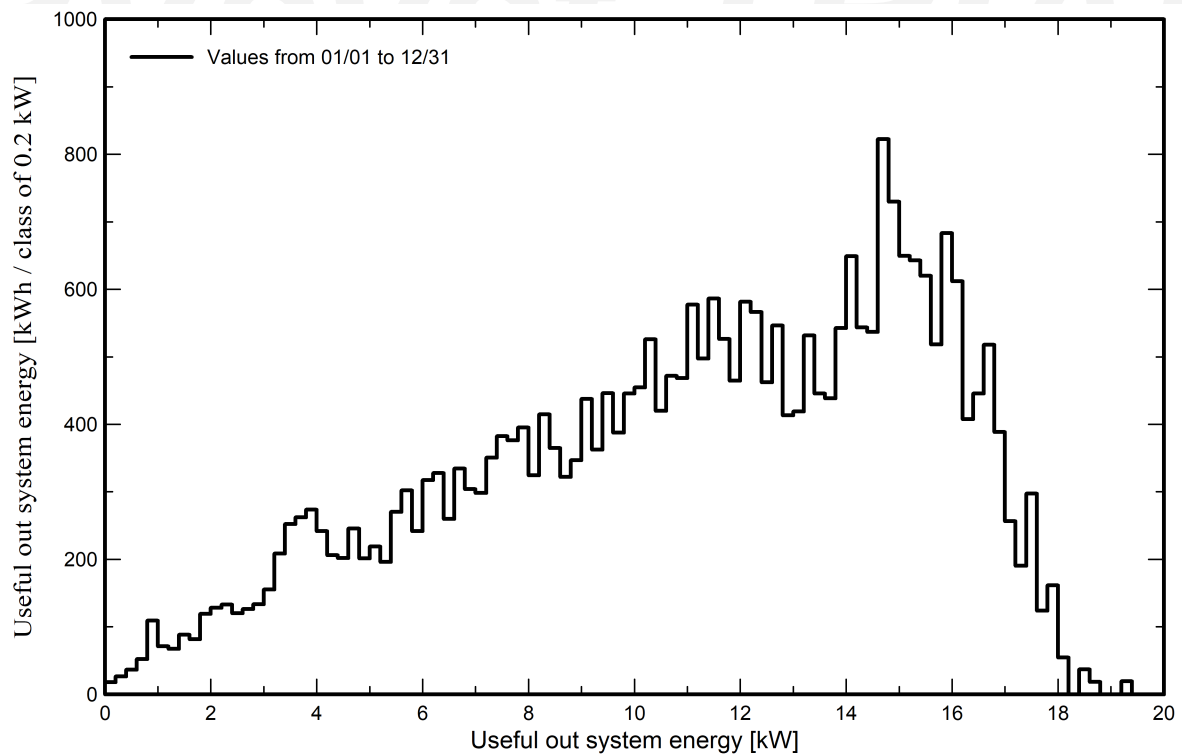
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## Predef. graphs

### Daily Input/Output diagram



### System Output Power Distribution

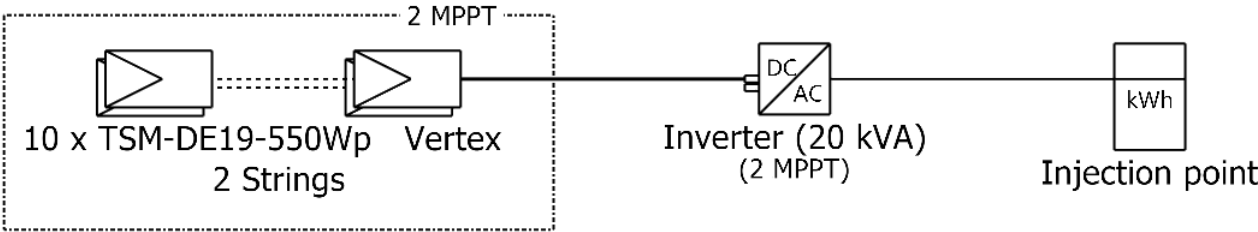




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# Single-line diagram



PV module	TSM-DE19-550Wp	Vertex
Inverter	SUN2000-20KTL-M2	
String	10 x TSM-DE19-550Wp	Vertex

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