

# PVsyst - Simulation report

## Grid-Connected System

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Project: Test Bifi Sheds

Variant: FT30 Az90 (bifi)

Sheds, single array

System power: 2558 kWp

Sacramento/McClellan Park - United States

**PVsyst V7.3.4**

VC2, Simulation date:  
12/28/23 18:36  
with v7.3.4

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DNV (USA)

**Project summary**

**Geographical Site**  
**Sacramento/McClellan Park**  
United States

**Situation**  
Latitude 38.67 °N  
Longitude -121.40 °W  
Altitude 18 m  
Time zone UTC-8

**Project settings**  
Albedo 0.20

**Meteo data**  
Sacramento/McClellan Park  
MeteoNorm 8.1 station - Synthetic

**System summary****Grid-Connected System****PV Field Orientation**

Fixed plane  
Tilt/Azimuth 30 / 90 °

**Sheds, single array****Near Shadings**

According to strings  
Electrical effect 70 %

**User's needs**

Unlimited load (grid)

**System information****PV Array**

Nb. of modules 4410 units  
Pnom total 2558 kWp

**Inverters**

Nb. of units 1 unit  
Pnom total 2200 kWac  
Pnom ratio 1.163

**Results summary**

Produced Energy 3768754 kWh/year Specific production 1473 kWh/kWp/year Perf. Ratio PR 86.94 %

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### General parameters

#### Grid-Connected System

#### PV Field Orientation

##### Orientation

Fixed plane  
Tilt/Azimuth 30 / 90 °

#### Horizon

Free Horizon

#### Bifacial system

Model 2D Calculation  
unlimited sheds

#### Bifacial model geometry

Sheds spacing 5.00 m  
Sheds width 2.51 m  
Limit profile angle 23.6 °  
GCR 50.1 %  
Height above ground 1.50 m

#### Sheds, single array

##### Sheds configuration

Nb. of sheds 49 units

Single array

##### Sizes

Sheds spacing 5.00 m  
Collector width 2.47 m  
Ground Cov. Ratio (GCR) 49.3 %  
Top inactive band 0.02 m  
Bottom inactive band 0.02 m

##### Shading limit angle

Limit profile angle 23.6 °

#### Near Shadings

According to strings  
Electrical effect 70 %

##### Models used

Transposition Perez  
Diffuse Perez, Meteonorm  
Circumsolar separate

#### User's needs

Unlimited load (grid)

### PV Array Characteristics

#### PV module

Manufacturer HT-SAAE  
Model HT78-18X-580 Bifacial

(Original PVsyst database)

Unit Nom. Power 580 Wp  
Number of PV modules 4410 units  
Nominal (STC) 2558 kWp  
Modules 245 Strings x 18 In series

#### At operating cond. (50°C)

Pmpp 2351 kWp  
U mpp 731 V  
I mpp 3219 A

#### Total PV power

Nominal (STC) 2558 kWp  
Total 4410 modules  
Module area 12327 m²  
Cell area 11351 m²

#### Inverter

Manufacturer SMA  
Model Sunny Central 2200

(Original PVsyst database)

Unit Nom. Power 2200 kWac  
Number of inverters 1 unit  
Total power 2200 kWac  
Operating voltage 570-950 V  
Pnom ratio (DC:AC) 1.16

#### Total inverter power

Total power 2200 kWac  
Number of inverters 1 unit  
Pnom ratio 1.16

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**Array losses****Thermal Loss factor**

Module temperature according to irradiance  
Uc (const) 25.0 W/m²K  
Uv (wind) 1.2 W/m²K/m/s

**Module Quality Loss**

Loss Fraction -0.8 %

**IAM loss factor**

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

**DC wiring losses**

Global array res. 3.7 mΩ  
Loss Fraction 1.5 % at STC

**Module mismatch losses**

Loss Fraction 1.0 % at MPP

**LID - Light Induced Degradation**

Loss Fraction 1.0 %

**Strings Mismatch loss**

Loss Fraction 0.2 %

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



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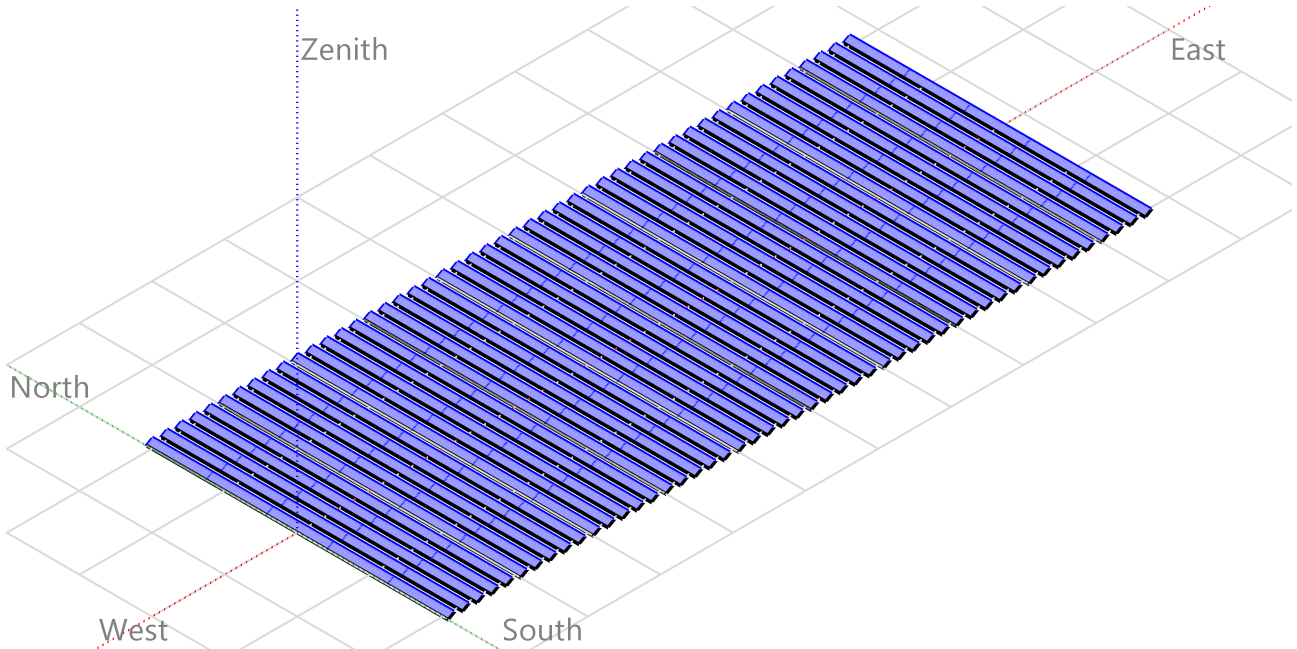
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### Near shadings parameter

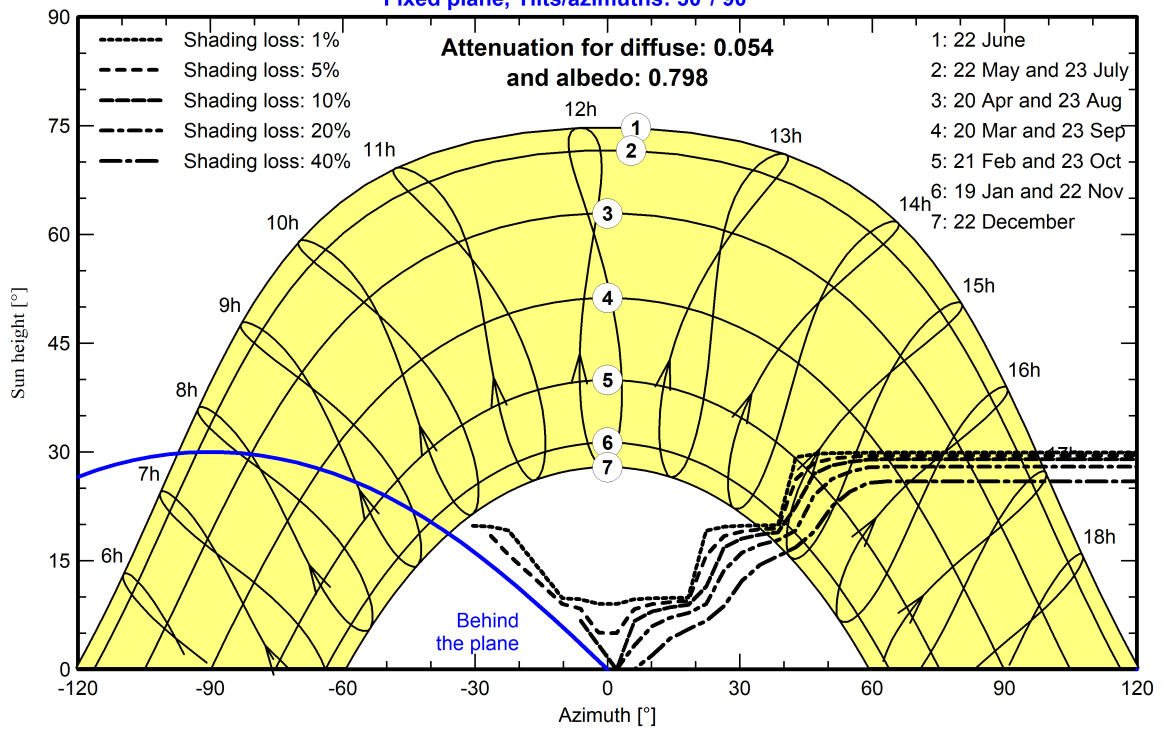
Perspective of the PV-field and surrounding shading scene



### Iso-shadings diagram

#### Orientation #1

Fixed plane, Tilts/azimuths: 30°/ 90°





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## Main results

### System Production

Produced Energy

3768754 kWh/year

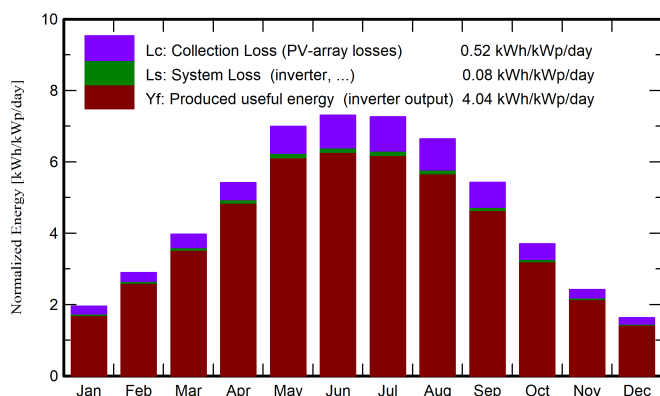
Specific production

1473 kWh/kWp/year

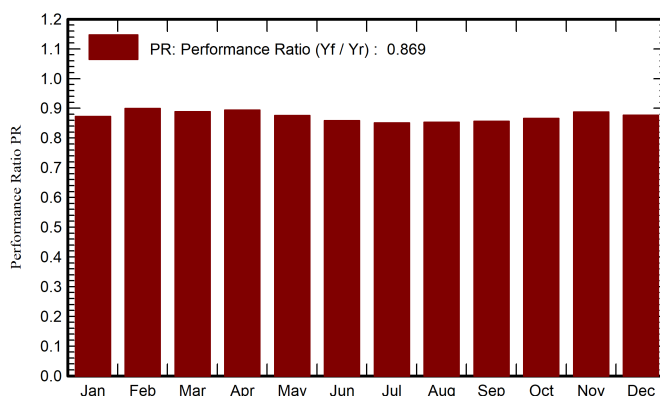
Perf. Ratio PR

86.94 %

### 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	61.4	32.80	7.00	60.5	53.1	138016	134951	0.872
February	83.2	36.20	9.10	81.0	73.2	190368	186418	0.900
March	133.6	60.00	12.60	123.1	112.7	285550	279821	0.889
April	176.1	61.40	15.30	162.5	151.2	379386	371876	0.894
May	231.1	61.70	19.70	216.9	203.6	495571	485719	0.876
June	234.9	64.30	23.20	219.3	206.6	491175	481535	0.859
July	241.8	61.00	24.80	225.2	211.8	500290	490526	0.851
August	217.5	51.60	23.70	206.0	192.7	458589	449686	0.853
September	172.8	39.60	20.90	162.6	150.4	363343	356307	0.857
October	119.1	40.70	16.40	114.6	104.3	259062	253976	0.866
November	76.5	30.60	10.40	72.6	64.9	168371	164823	0.887
December	51.3	27.00	6.70	50.5	44.4	115801	113117	0.876
Year	1799.3	566.90	15.85	1694.8	1568.9	3845522	3768754	0.869

### 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

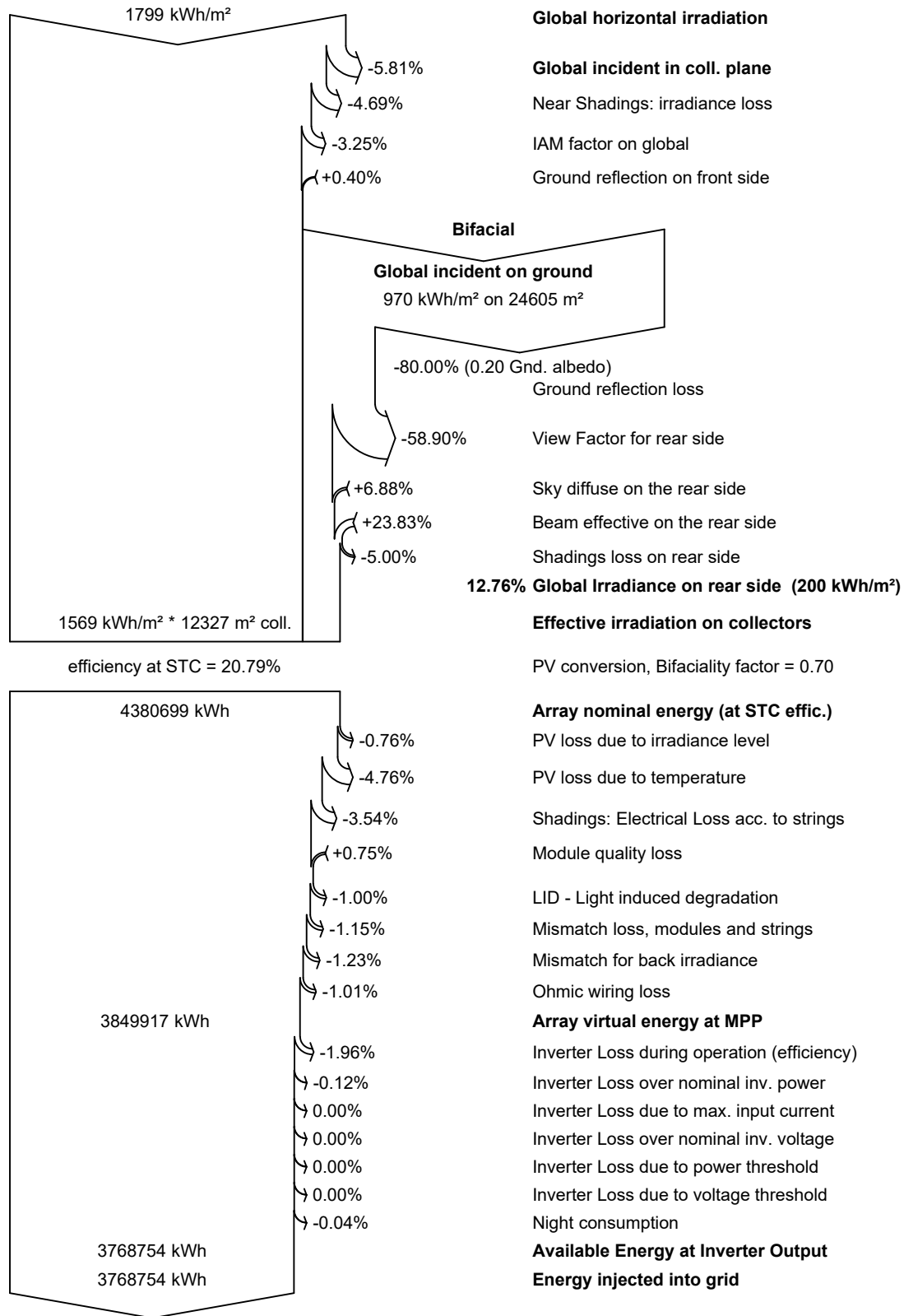
EArray Effective energy at the output of the array

E\_Grid Energy injected into grid

PR Performance Ratio



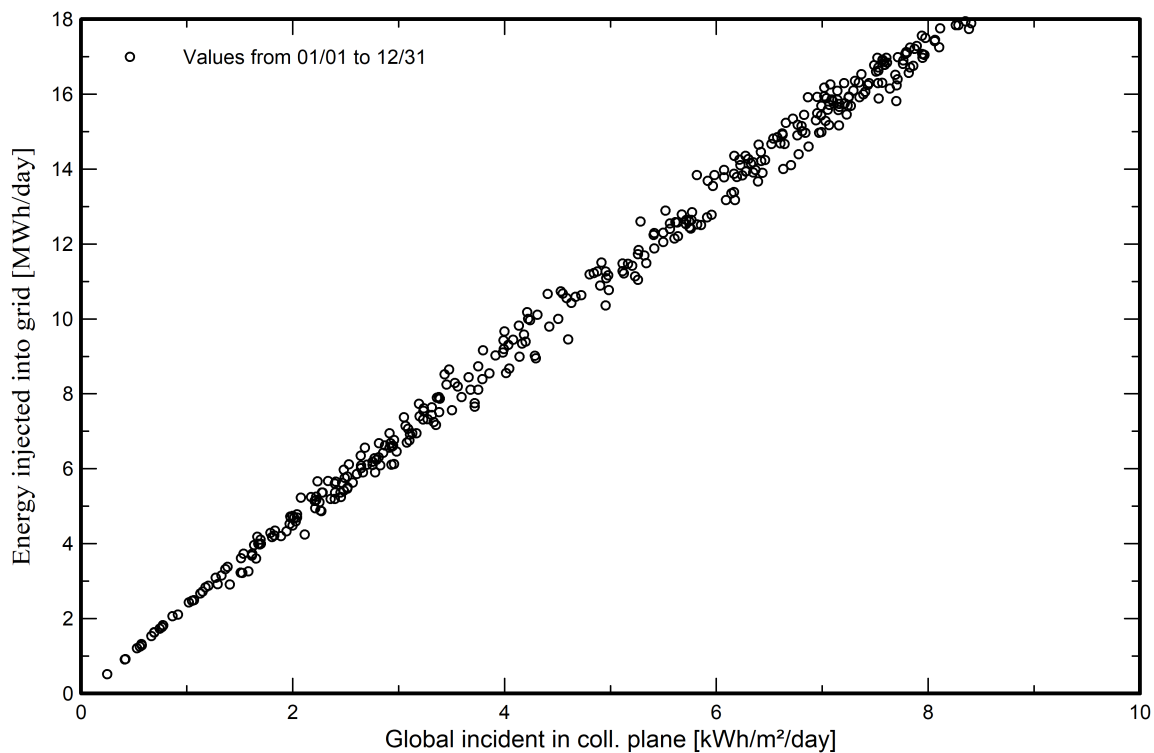
### Loss diagram



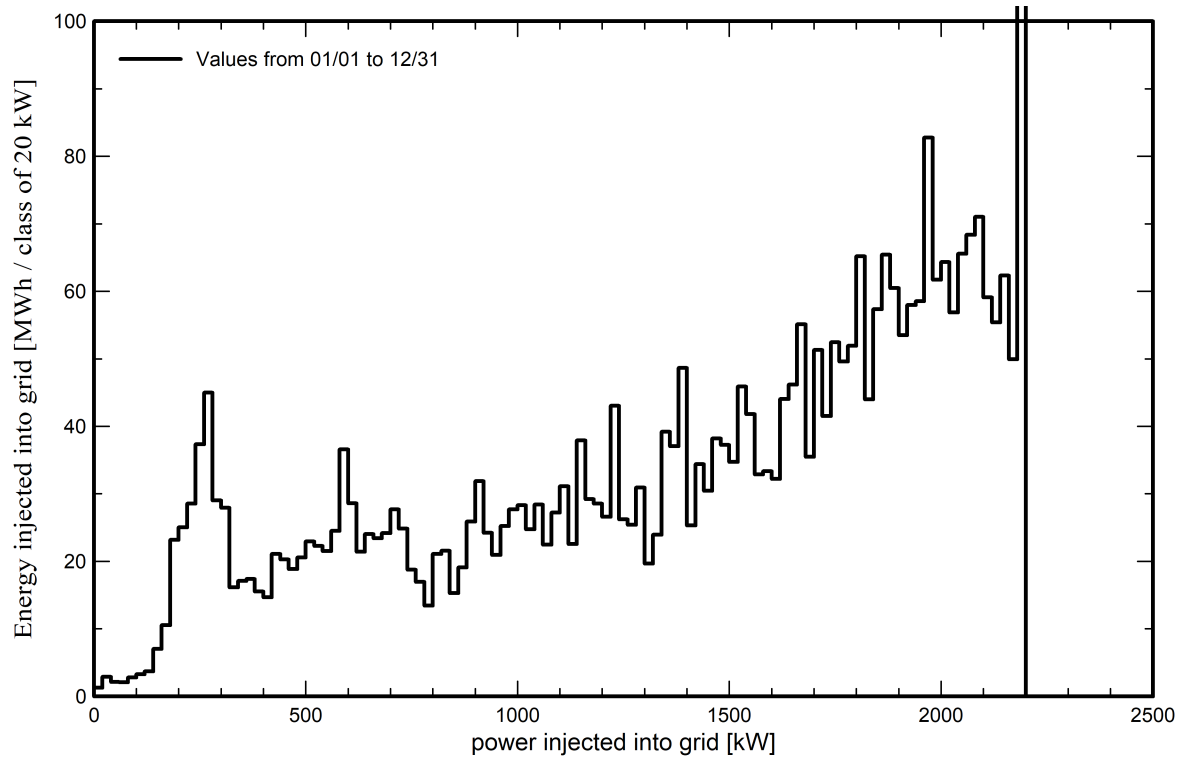


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



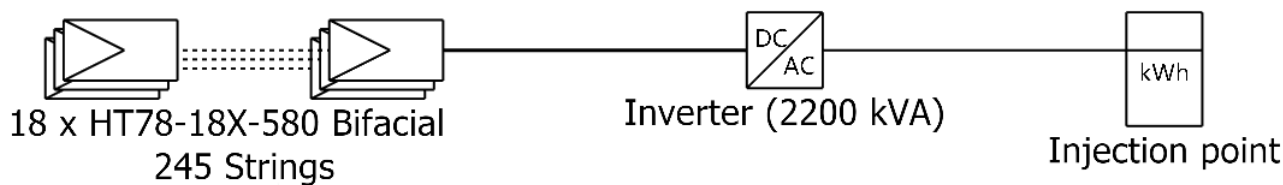




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# Single-line diagram



PV module	HT78-18X-580 Bifacial
Inverter	Sunny Central 2200
String	18 x HT78-18X-580 Bifacial

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