

# PVsyst - Simulation report

## Grid-Connected System

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Project: fec\_eee\_building\_20kW

Variant: eee\_building\_20kW

Sheds on ground

System power: 20.40 kWp

Eee\_building - Bangladesh

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## PVsyst V7.4.7

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### Project summary

Geographical Site	Situation	Project settings
Eee_building	Latitude 23.60 °N	Albedo 0.20
Bangladesh	Longitude 89.85 °E	
	Altitude 4 m	
	Time zone UTC+6	
Weather data		
eee_building		
Meteonorm 8.1 (1991-2012), Sat=100% - Synthetic		

### System summary

Grid-Connected System	Sheds on ground	User's needs
Simulation for year no 10		Unlimited load (grid)
PV Field Orientation	Near Shadings	
Fixed plane	Linear shadings : Fast (table)	
Tilt/Azimuth 23 / 0 °		
System information		
PV Array	Inverters	
Nb. of modules 60 units	Nb. of units 1 unit	
Pnom total 20.40 kWp	Pnom total 20.00 kWac	
	Pnom ratio 1.020	

### Results summary

Produced Energy	26597 kWh/year	Specific production	1304 kWh/kWp/year	Perf. Ratio PR	79.20 %
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## General parameters

Grid-Connected System		Sheds on ground	
<b>PV Field Orientation</b>			
<b>Orientation</b>		<b>Sheds configuration</b>	<b>Models used</b>
Fixed plane		Nb. of sheds	Transposition Perez
Tilt/Azimuth	23 / 0 °	7 units	Diffuse Perez, Meteonorm
		<b>Sizes</b>	Circumsolar separate
		Sheds spacing	4.40 m
		Collector width	3.05 m
		Ground Cov. Ratio (GCR)	69.2 %
		Top inactive band	0.02 m
		Bottom inactive band	0.02 m
		<b>Shading limit angle</b>	
		Limit profile angle	37.2 °
<b>Horizon</b>		<b>Near Shadings</b>	
Free Horizon		Linear shadings : Fast (table)	
		<b>User's needs</b>	
		Unlimited load (grid)	

## PV Array Characteristics

<b>PV module</b>		<b>Inverter</b>	
Manufacturer	Suntech	Manufacturer	Sungrow
Model	STP-340-A21-Wnhb	Model	SH-20-T
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	340 Wp	Unit Nom. Power	20.0 kWac
Number of PV modules	60 units	Number of inverters	3 * MPPT 33% 1 unit
Nominal (STC)	20.40 kWp	Total power	20.0 kWac
Modules	3 string x 20 In series	Operating voltage	150-950 V
<b>At operating cond. (50°C)</b>		Pnom ratio (DC:AC)	1.02
Pmpp	18.55 kWp	No power sharing between MPPTs	
U mpp	645 V		
I mpp	29 A		
<b>Total PV power</b>		<b>Total inverter power</b>	
Nominal (STC)	20 kWp	Total power	20 kWac
Total	60 modules	Number of inverters	1 unit
Module area	106 m²	Pnom ratio	1.02
Cell area	91.5 m²		

## Array losses

<b>Array Soiling Losses</b>		<b>Thermal Loss factor</b>		<b>DC wiring losses</b>	
Loss Fraction	2.0 %	Module temperature according to irradiance		Global array res.	375 mΩ
		Uc (const)	29.0 W/m²K	Loss Fraction	1.5 % at STC
		Uv (wind)	0.0 W/m²K/m/s		
<b>Module Quality Loss</b>		<b>Module mismatch losses</b>		<b>Module average degradation</b>	
Loss Fraction	-0.8 %	Loss Fraction	2.0 % at MPP	Year no	10
				Loss factor	0.4 %/year
<b>Mismatch due to degradation</b>					
		Imp RMS dispersion	0.4 %/year		
		Vmp RMS dispersion	0.4 %/year		

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**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

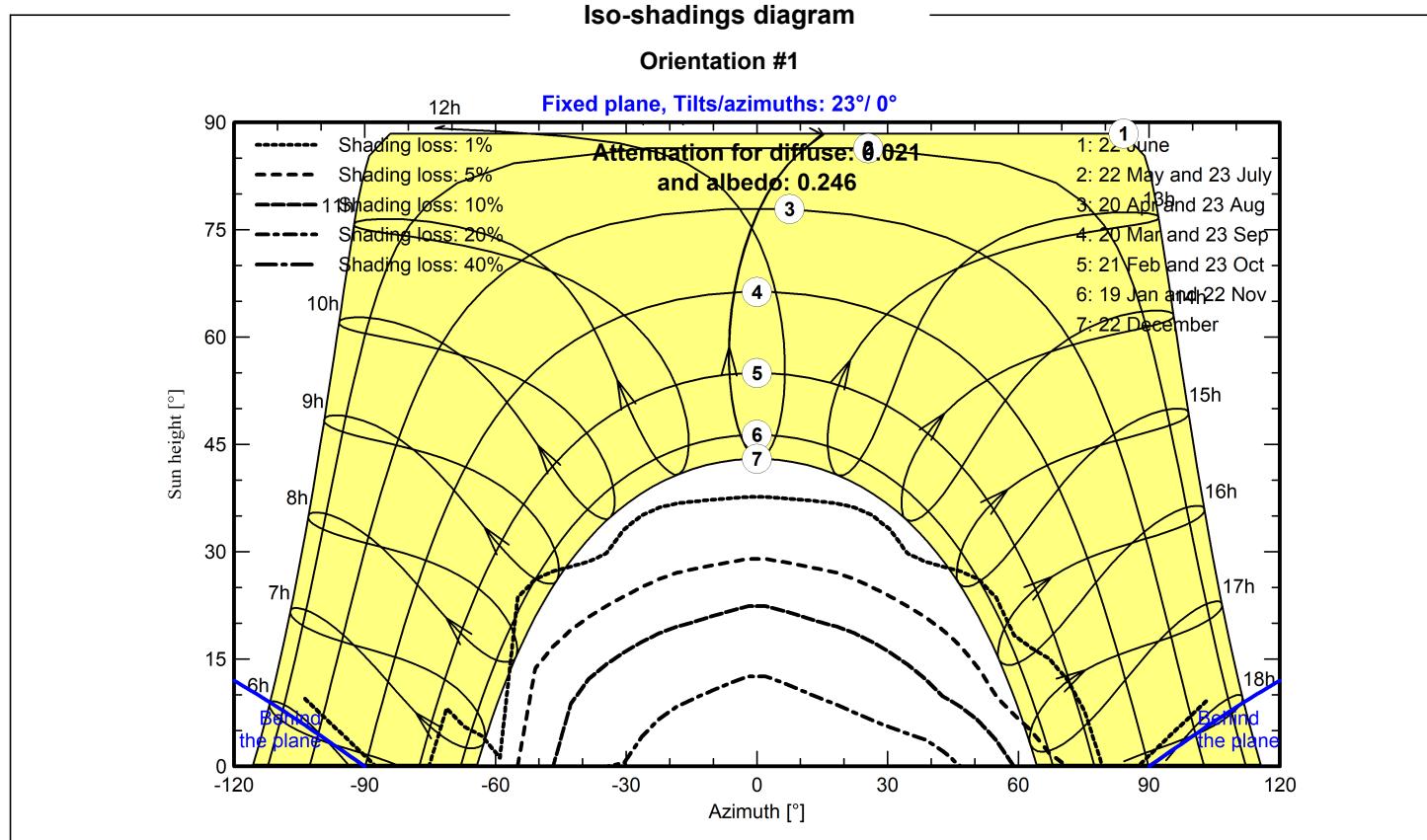
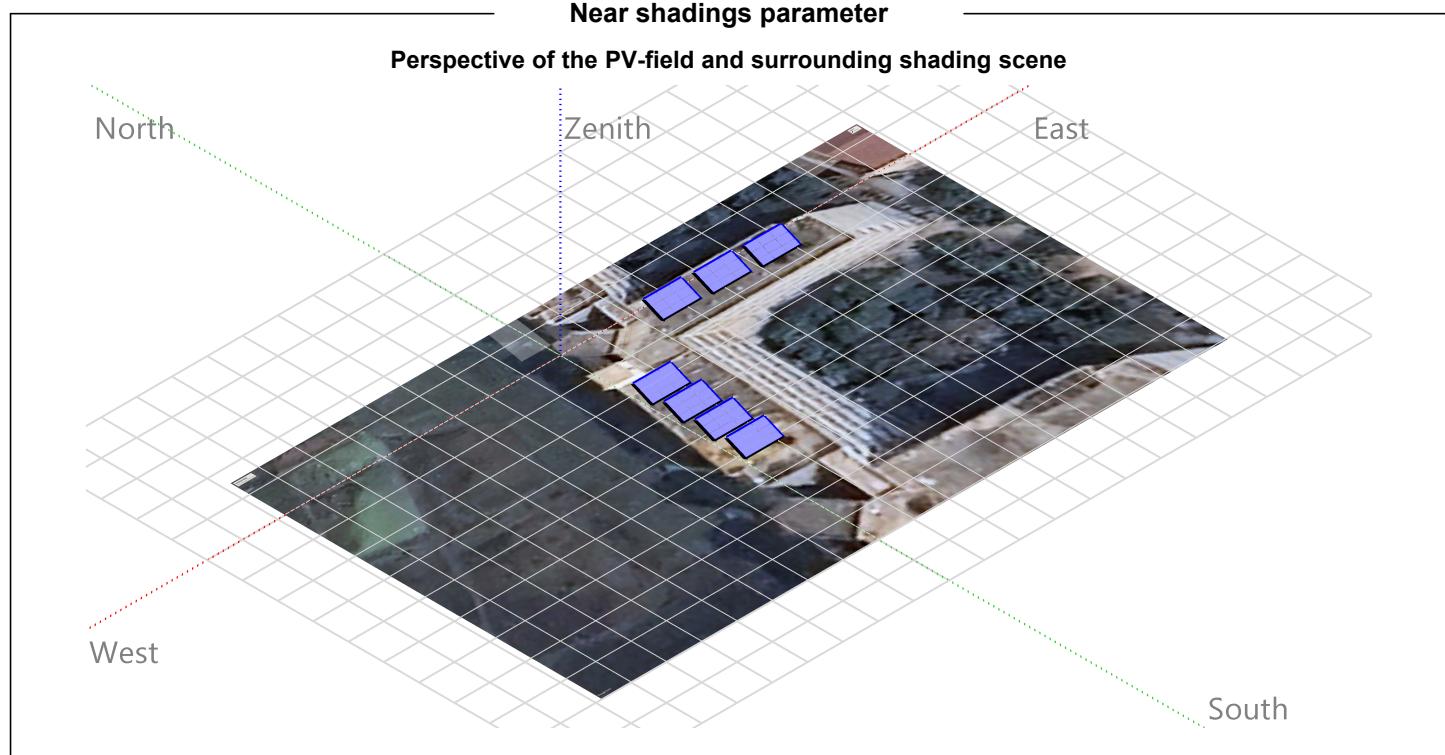
Precipitable water estimated from relative humidity

Coefficient Set	C0	C1	C2	C3	C4	C5
Monocrystalline Si	0.85914	-0.02088	-0.0058853	0.12029	0.026814	-0.001781

**System losses****Auxiliaries loss**



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## Main results

### System Production

Produced Energy 26597 kWh/year

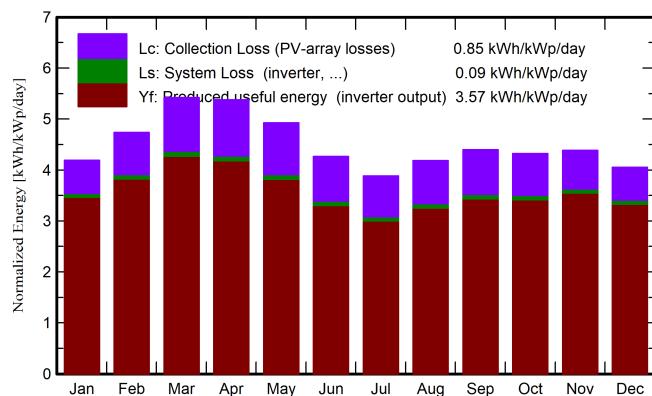
Specific production

1304 kWh/kWp/year

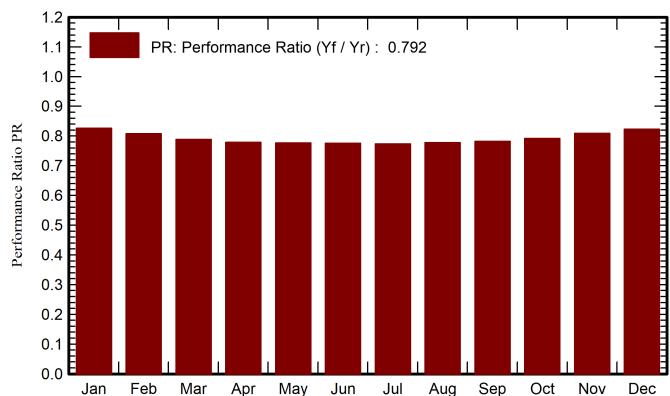
Perf. Ratio PR

79.20 %

### Normalized productions (per installed kWp)



### Performance Ratio PR



## Balances and main results

	GlobHor kWh/m <sup>2</sup>	DiffHor kWh/m <sup>2</sup>	T_Amb °C	GlobInc kWh/m <sup>2</sup>	GlobEff kWh/m <sup>2</sup>	EArray kWh	E_Grid kWh	PR ratio
January	106.2	61.41	17.25	130.0	123.0	2244	2193	0.827
February	115.1	63.95	21.21	132.6	125.8	2235	2185	0.808
March	155.2	82.87	26.14	168.1	159.5	2764	2702	0.788
April	160.9	88.00	28.14	161.4	152.4	2621	2562	0.778
May	161.6	98.41	28.92	152.7	143.7	2477	2418	0.776
June	138.3	94.97	28.65	128.0	119.7	2079	2025	0.776
July	129.3	79.66	28.73	120.5	112.7	1952	1901	0.773
August	134.0	89.92	28.76	129.8	121.8	2113	2061	0.778
September	126.7	71.52	28.08	132.0	124.3	2157	2104	0.782
October	121.1	73.89	27.12	134.0	126.8	2217	2164	0.791
November	109.2	60.69	23.08	131.6	124.8	2223	2172	0.809
December	100.1	56.25	18.93	125.6	118.7	2157	2109	0.823
Year	1557.7	921.55	25.43	1646.3	1553.4	27239	26597	0.792

### Legends

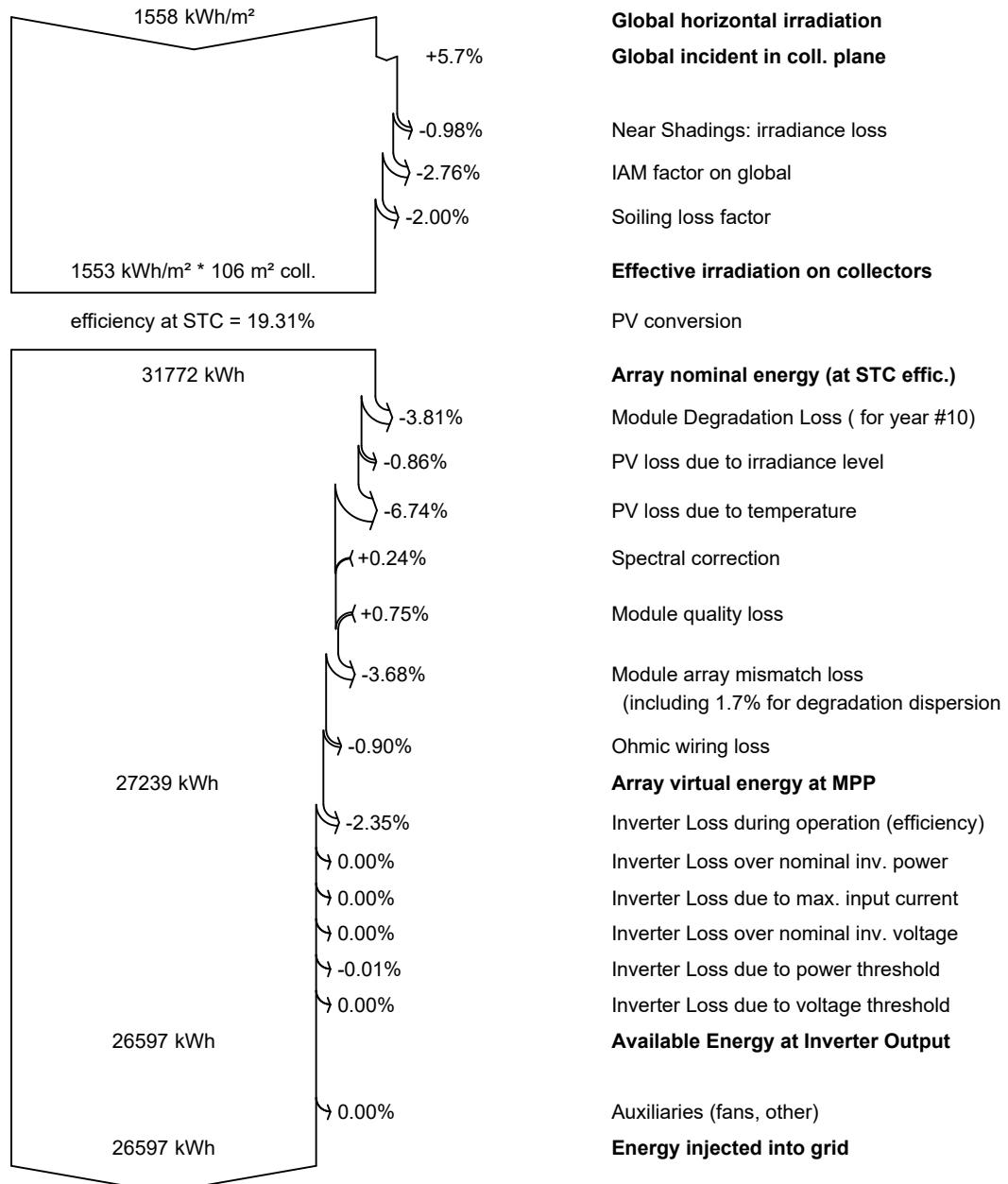
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		



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### Loss diagram



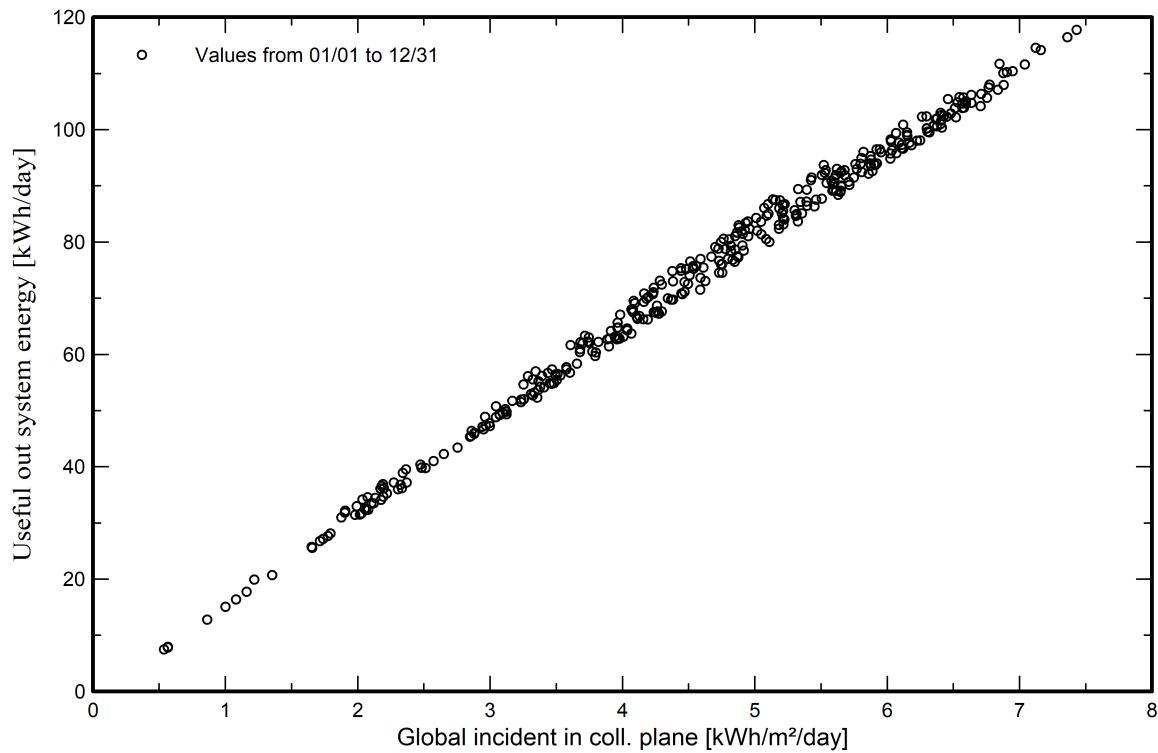


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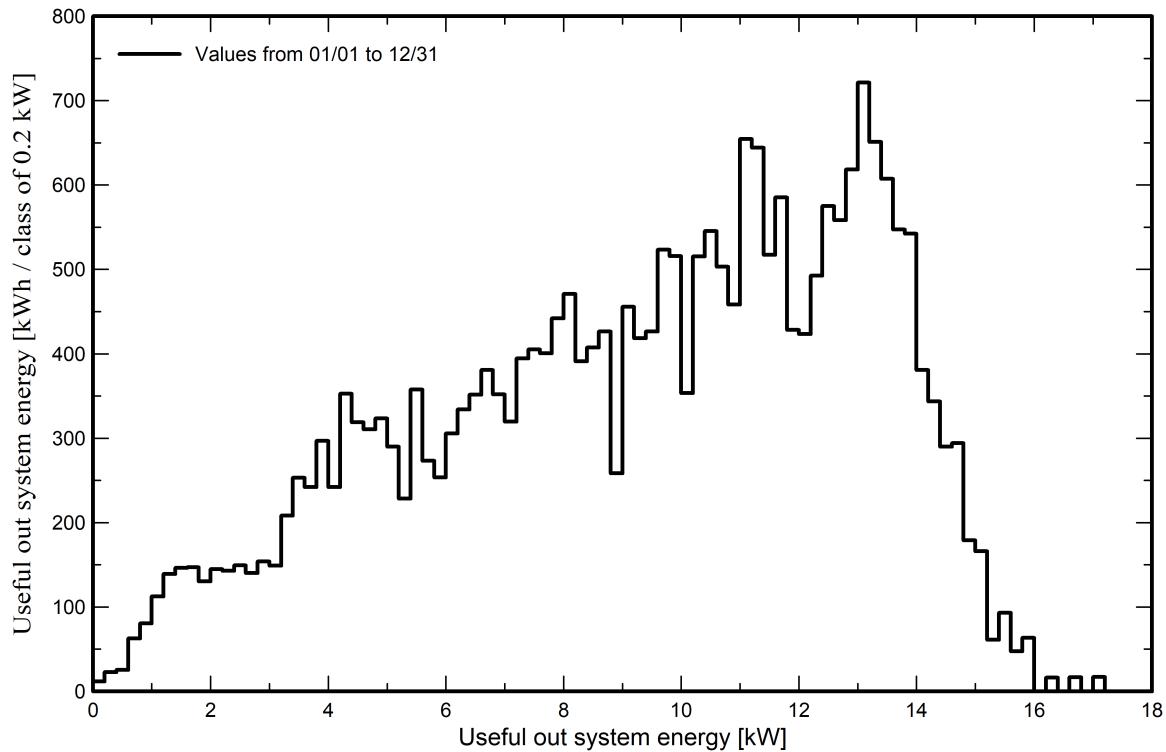
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## Predef. graphs

## Daily Input/Output diagram



## System Output Power Distribution



A

B

C

D

E

F

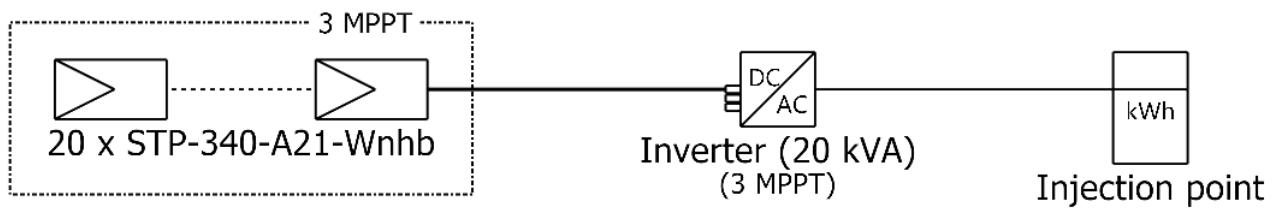
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# Single-line diagram



PV module	STP-340-A21-Wnhb
Inverter	SH-20-T
String	20 x STP-340-A21-Wnhb

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