

**IMPIANTO FOTOVOLTAICO A TERRA COLLEGATO ALLA RTN  
POTENZA NOMINALE 25,7 MWp  
Località "Podere Fredella" – Comune di Foggia (FG)**

**PROPONENTE:**

**TEP RENEWABLES (FOGGIA 6 PV) S.R.L.**  
Corso Vercelli, 27 – 20144 Milano  
P. IVA e C.F. 11621270963 – REA MI - 2615131

**PROGETTISTA:**

**ING. GIULIA GIOMBINI**  
Iscritto all'Ordine degli Ingegneri della Provincia di Viterbo  
al n. A 1009

**PROGETTO DEFINITIVO IMPIANTO FOTOVOLTAICO**  
(art. 23 del D. Lgs 152/2006 e ss. mm. ii)

***Calcolo di Producibilità***

<b>Cod. Documento</b>	<b>Data</b>	<b>Tipo revisione</b>	<b>Redatto</b>	<b>Verificato</b>	<b>Approvato</b>
B23B35_FG_PD_R10_Rev0_Calcolo di Producibilità	05/2021	Prima emissione	B.Akyüz	G.Giombini	G.Giombini

# PVsyst - Simulation report

## Grid-Connected System

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TEP RENEWABLES

B35.IT.20.PG

FOGGIA 6

System power: 25.71 MWp

Foggia - Italy



**Baris Akyuz**

TEP Renewables Ltd (United kingdom)



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**Project summary**

<b>Geographical Site</b>		<b>Situation</b>		<b>Project settings</b>	
Foggia		Latitude	41.46 °N	Albedo	0.20
Italy		Longitude	15.54 °E		
		Altitude	73 m		
		Time zone	UTC+1		
<b>Meteo data</b>					
Foggia					
Meteonorm 7.3 (1986-2005), Sat=19% - Synthetic					

**System summary**

<b>Grid-Connected System</b>		<b>FOGGIA 6</b>		<b>User's needs</b>	
<b>PV Field Orientation</b>		<b>Near Shadings</b>		Unlimited load (grid)	
Tracking plane, horizontal N-S axis		According to strings			
Axis azimuth	0 °	Electrical effect	100 %		
<b>System information</b>					
<b>PV Array</b>					
Nb. of modules	48048 units	<b>Inverters</b>		11 units	
Pnom total	25.71 MWp	Nb. of units		21.95 MWac	
		Pnom total		1.171	
		Pnom ratio			

**Results summary**

Produced Energy	42953 MWh/year	Specific production	1671 kWh/kWp/year	Perf. Ratio PR	82.43 %
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**General parameters**

<b>Grid-Connected System</b>		<b>FOGGIA 6</b>	
<b>PV Field Orientation</b>		<b>Backtracking strategy</b>	
<b>Orientation</b>		<b>Nb. of trackers</b>	885 units
Tracking plane, horizontal N-S axis		<b>Sizes</b>	
Axis azimuth	0 °	Tracker Spacing	9.50 m
		Collector width	4.48 m
		Ground Cov. Ratio (GCR)	47.2 %
		Phi min / max	-/+ 60.0 °
		<b>Backtracking limit angle</b>	
		Phi limits	+/- 61.7 °
<b>Horizon</b>		<b>Near Shadings</b>	
Free Horizon		According to strings	
		Electrical effect	100 %
<b>Bifacial system</b>		<b>User's needs</b>	
Model	2D Calculation	Unlimited load (grid)	
	unlimited trackers		
<b>Bifacial model geometry</b>		<b>Bifacial model definitions</b>	
Tracker Spacing	9.50 m	Ground albedo	0.20
Tracker width	4.52 m	Bifaciality factor	80 %
Tracking limit angle	14 °	Rear shading factor	5.0 %
GCR	47.6 %	Rear mismatch loss	10.0 %
Axis height above ground	10.00 m	Module transparency	0.0 %

**PV Array Characteristics**

<b>PV module</b>		<b>Inverter</b>	
Manufacturer	Risen Solar	Manufacturer	Santerno
Model	RSM-144-9-535-BMDG	Model	Sunway TG 1800 1500V TE - 640 EV
(Custom parameters definition)		(Original PVsyst database)	
Unit Nom. Power	535 Wp	Unit Nom. Power	1995 kWac
Number of PV modules	48048 units	Number of inverters	22 * MPPT 50% 11 units
Nominal (STC)	25.71 MWp	Total power	21945 kWac
Modules	1716 Strings x 28 In series	Operating voltage	910-1300 V
<b>At operating cond. (50°C)</b>		Pnom ratio (DC:AC)	1.17
Pmpp	23.36 MWp		
U mpp	1050 V		
I mpp	22251 A		
<b>Total PV power</b>		<b>Total inverter power</b>	
Nominal (STC)	25706 kWp	Total power	21945 kWac
Total	48048 modules	Nb. of inverters	11 units
Module area	124501 m <sup>2</sup>	Pnom ratio	1.17
Cell area	101708 m <sup>2</sup>		



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**Array losses**

**Array Soiling Losses**

Loss Fraction 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. 0.79 mΩ

Loss Fraction 1.5 % at STC

**Serie Diode Loss**

Voltage drop 0.7 V

Loss Fraction 0.1 % at STC

**LID - Light Induced Degradation**

Loss Fraction 2.0 %

**Module Quality Loss**

Loss Fraction -0.8 %

**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) 19.80 kW

1980.0 kW from Power thresh.

**AC wiring losses**

**Inv. output line up to injection point**

Inverter voltage 640 Vac tri

Loss Fraction 7.75 % at STC

**Inverter: Sunway TG 1800 1500V TE - 640 EV**

Wire section (11 Inv.) Copper 11 x 3 x 1500 mm²

Average wires length 1100 m



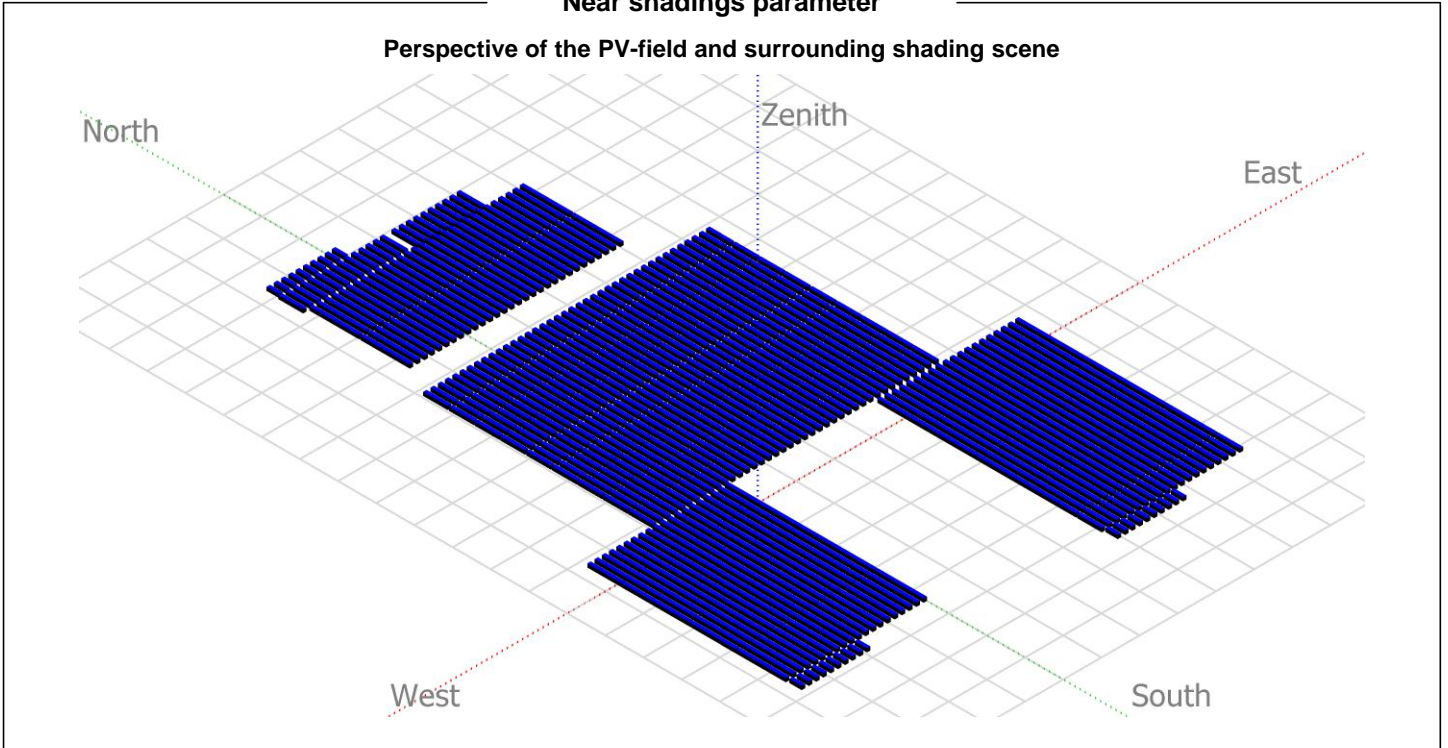


PVsyst V7.2.2

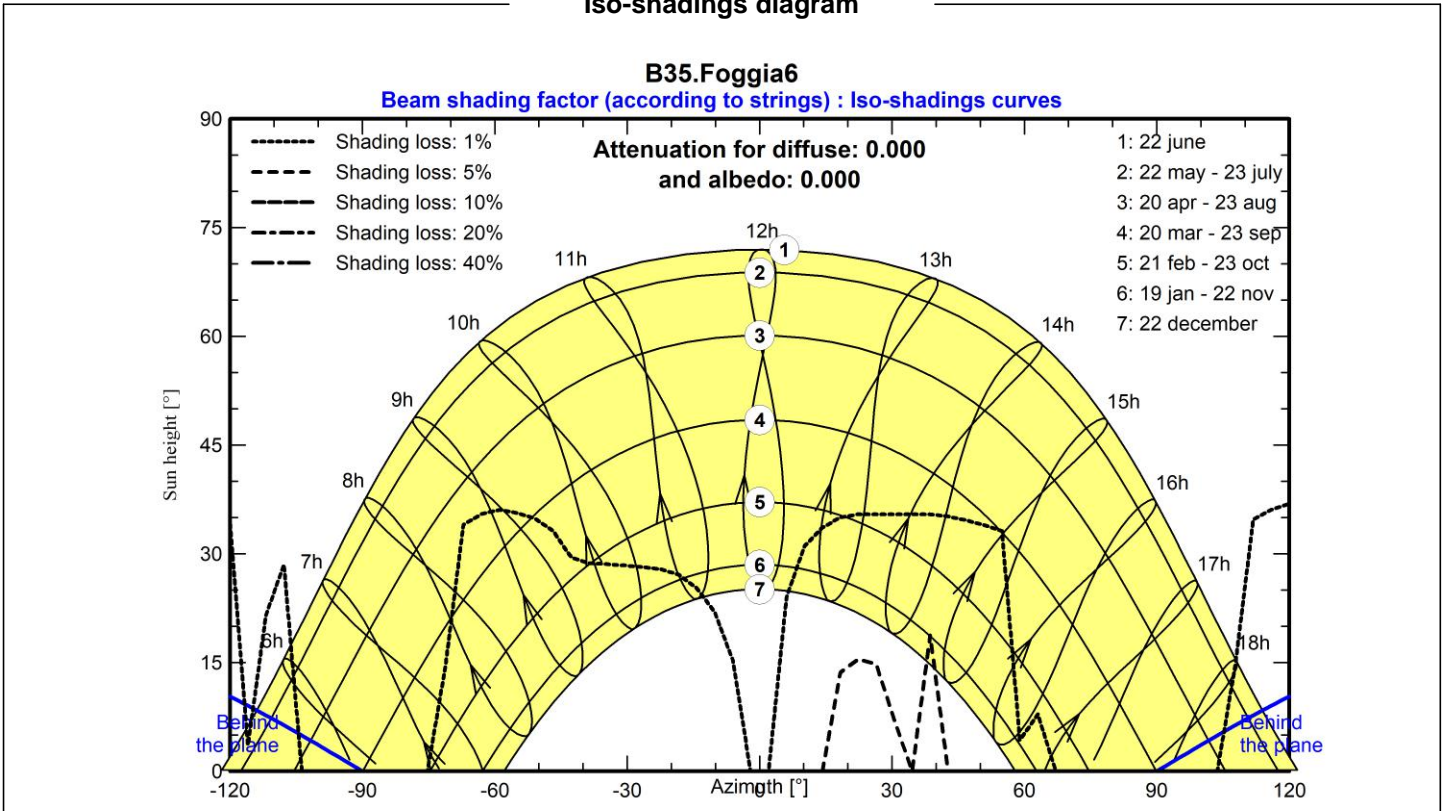
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### Near shadings parameter



### Iso-shadings diagram





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**Main results**

**System Production**

Produced Energy 42953 MWh/year

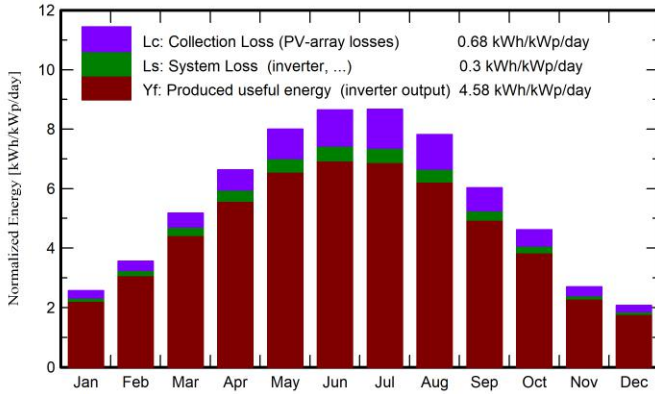
Specific production

1671 kWh/kWp/year

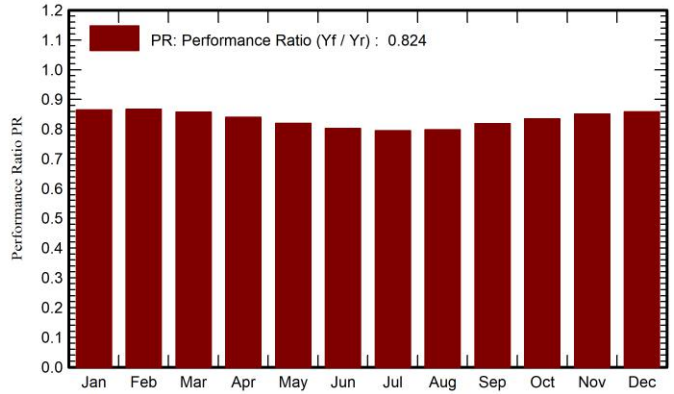
Performance Ratio PR

82.43 %

**Normalized productions (per installed kWp)**



**Performance Ratio PR**



**Balances and main results**

	<b>GlobHor</b> kWh/m <sup>2</sup>	<b>DiffHor</b> kWh/m <sup>2</sup>	<b>T_Amb</b> °C	<b>GlobInc</b> kWh/m <sup>2</sup>	<b>GlobEff</b> kWh/m <sup>2</sup>	<b>EArray</b> MWh	<b>E_Grid</b> MWh	<b>PR</b> ratio
<b>January</b>	60.0	27.46	7.28	79.7	72.8	1859	1772	0.865
<b>February</b>	76.4	33.09	7.61	99.7	92.6	2345	2222	0.867
<b>March</b>	124.9	54.39	11.08	160.3	149.9	3753	3532	0.857
<b>April</b>	156.9	63.57	14.02	199.2	187.5	4600	4302	0.840
<b>May</b>	196.5	87.20	20.03	248.2	233.6	5598	5234	0.820
<b>June</b>	206.6	83.10	24.03	259.5	245.0	5738	5355	0.803
<b>July</b>	211.2	87.21	27.22	269.0	253.5	5875	5495	0.795
<b>August</b>	188.1	72.72	26.70	242.4	229.0	5315	4972	0.798
<b>September</b>	140.1	55.64	21.17	181.0	169.9	4057	3812	0.819
<b>October</b>	108.0	41.00	17.83	142.9	133.3	3243	3067	0.835
<b>November</b>	61.6	28.62	12.38	80.8	74.3	1858	1769	0.851
<b>December</b>	49.7	24.91	8.76	64.4	58.3	1484	1420	0.859
<b>Year</b>	1580.0	658.89	16.57	2027.1	1899.8	45724	42953	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

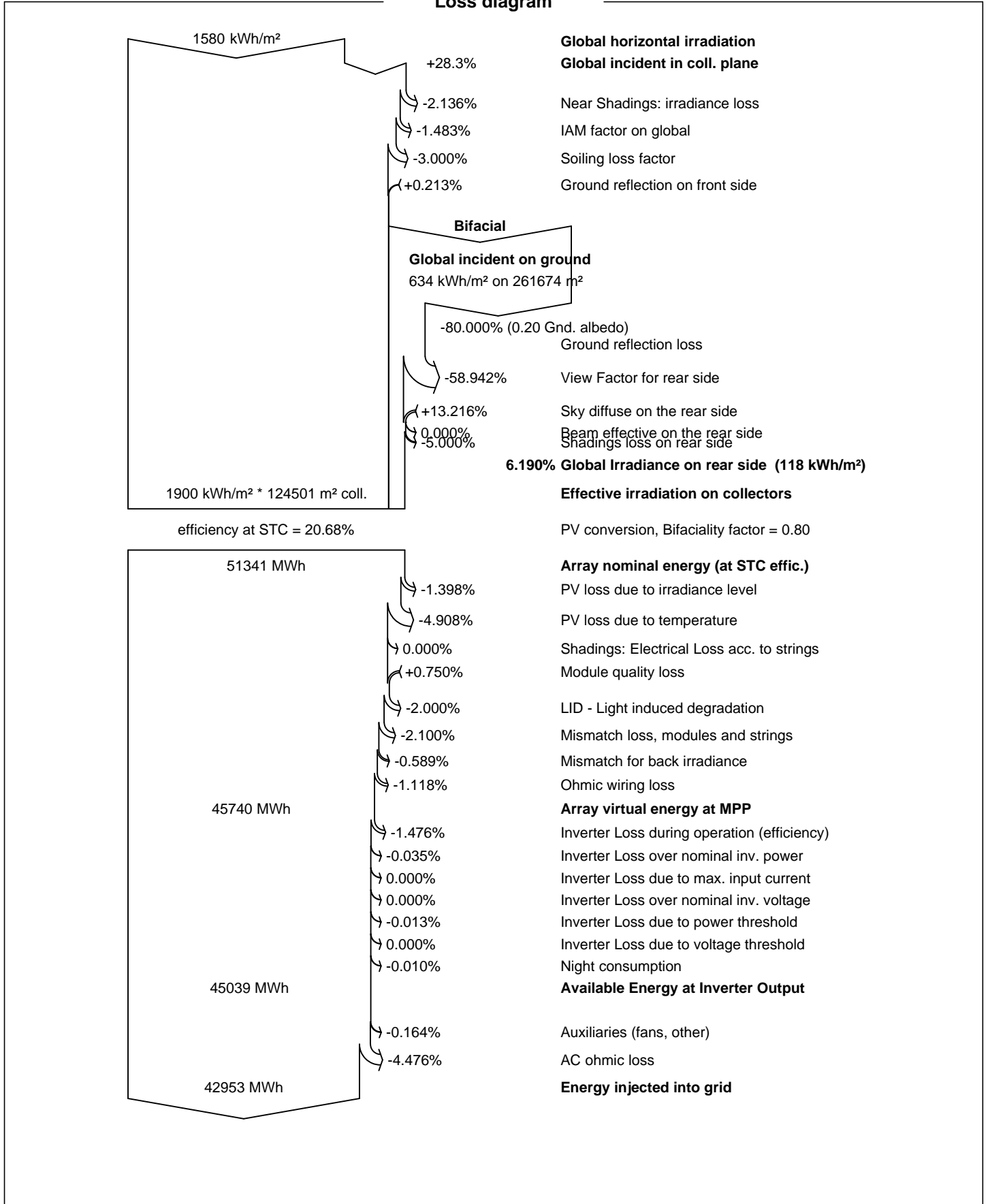


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Loss diagram







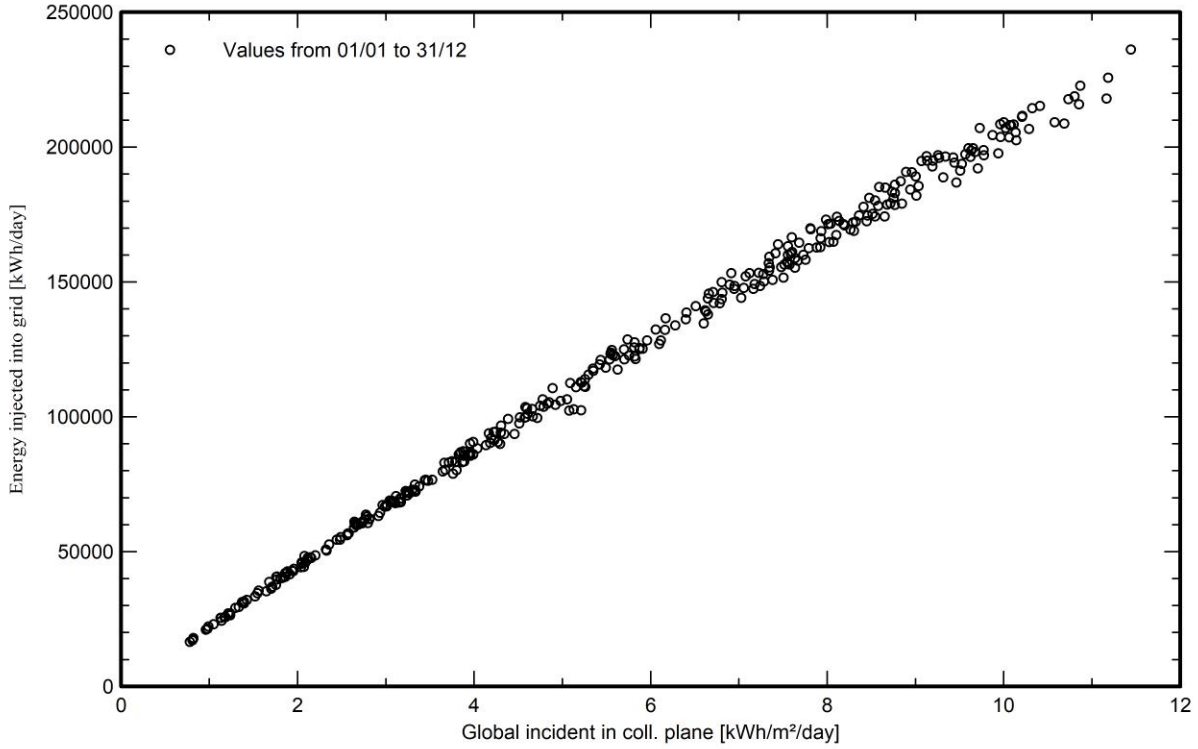
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**Special graphs**

**Daily Input/Output diagram**



**System Output Power Distribution**

