

PVsyst - Simulation report

Grid-Connected System

Project: KBPP ENERGY

Variant: 12m 30 grad

Unlimited sheds

System power: 11.85 MWp

Pechesky - Ukraine



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Project summary

Geographical Site		Situation		Project settings	
Pechesky		Latitude	49.52 °N	Albedo	0.20
Ukraine		Longitude	27.12 °E		
		Altitude	370 m		
		Time zone	UTC+2		
Weather data					
Pechesky					
Meteonorm 8.2 (2001-2020), Sat=100% - Synthetic					

System summary

Grid-Connected System		Unlimited sheds		User's needs	
Orientation #1		Near Shadings		Unlimited load (grid)	
Sheds		Mutual shadings of sheds			
Tilt	25 °				
Azimuth	0 °				
System information					
PV Array					
Nb. of modules	20088 units	Inverters		80 units	
Pnom total	11.85 MWp	Nb. of units		Pnom total	10000 kWac
		Pnom ratio		Pnom ratio	1.185

Results summary

Produced Energy	15423 MWh/year	Specific production	1301 kWh/kWp/year	Perf. Ratio PR	94.57 %
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General parameters

Grid-Connected System		Unlimited sheds			
Orientation #1		Sheds configuration		Sizes	
Sheds		Nb. of sheds	558 units	Sheds spacing	12.0 m
Tilt	25 °	Unlimited sheds		Collector width	4.76 m
Azimuth	0 °	Shading limit angle		Average GCR	39.7 %
		Limit profile angle	14.8 °	Top inactive band	0.02 m
				Bottom inactive band	0.02 m
Models used		Horizon		Near Shadings	
Transposition	Perez	Free Horizon		Mutual shadings of sheds	
Diffuse	Perez, Meteonorm				
Circumsolar	separate				
Bifacial system definition				User's needs	
Orientation #1				Unlimited load (grid)	
Bifacial system					
Model	Unlimited Sheds 2D Model				
Bifacial model geometry					
Sheds spacing	12.00 m				
Sheds width	4.80 m				
Limit profile angle	14.8 °				
GCR	40.0 %				
Height above ground	1.00 m				
Nb. of sheds	558 units				
Bifacial model definitions					
Ground albedo	0.30				
Bifaciality factor	80 %				
Rear shading factor	5.0 %				
Rear mismatch loss	10.0 %				
Shed transparent fraction	0.0 %				

PV Array Characteristics

PV module		Inverter	
Manufacturer	ZNshine solar	Manufacturer	Kstar
Model	ZXM7-UPLDD144-590/N(2279×1134×30)	Model	G125KT7
	(Custom parameters definition)		(Custom parameters definition)
Unit Nom. Power	590 Wp	Unit Nom. Power	125 kWac
Number of PV modules	20088 units	Number of inverters	80 units
Nominal (STC)	11.85 MWp	Total power	10000 kWac
Array #1 - PV Array		Array #1 - PV Array	
Number of PV modules	19656 units	Number of inverters	78 units
Nominal (STC)	11.60 MWp	Total power	9750 kWac
Modules	1092 string x 18 In series		
At operating cond. (50°C)		At operating cond. (50°C)	
Pmpp	10.73 MWp	Operating voltage	200-1000 V
U mpp	711 V	Pnom ratio (DC:AC)	1.19
I mpp	15091 A	Power sharing within this inverter	



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PV Array Characteristics

Array #2 - Sub-array #2			
Number of PV modules	432 units	Number of inverters	2 units
Nominal (STC)	255 kWp	Total power	250 kWac
Modules	24 string x 18 In series		
At operating cond. (50°C)		Operating voltage	200-1000 V
Pmpp	236 kWp	Pnom ratio (DC:AC)	1.02
U mpp	711 V	Power sharing within this inverter	
I mpp	332 A		
Total PV power		Total inverter power	
Nominal (STC)	11852 kWp	Total power	10000 kWac
Total	20088 modules	Number of inverters	80 units
Module area	51915 m ²	Pnom ratio	1.19
Cell area	46572 m ²		

Array losses

Array Soiling Losses		Thermal Loss factor		LID - Light Induced Degradation				
Loss Fraction	3.0 %	Module temperature according to irradiance		Loss Fraction	2.0 %			
		Uc (const)	29.0 W/m ² K					
		Uv (wind)	0.0 W/m ² K/m/s					
Module Quality Loss								
Loss Fraction	-0.8 %							
Module mismatch losses								
Array #1 - PV Array								
Loss Fraction	2.0 % at MPP							
Array #2 - Sub-array #2								
Loss Fraction	2.0 % at MPP							
IAM loss factor								
Incidence effect (IAM): User defined profile								
0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	1.000	1.000	1.000	0.986	0.964	0.925	0.837	0.000

DC wiring losses

Global wiring resistance	0.75 mΩ		
Loss Fraction	1.5 % at STC		
Array #1 - PV Array		Array #2 - Sub-array #2	
Global array res.	0.77 mΩ	Global array res.	35 mΩ
Loss Fraction	1.5 % at STC	Loss Fraction	1.5 % at STC



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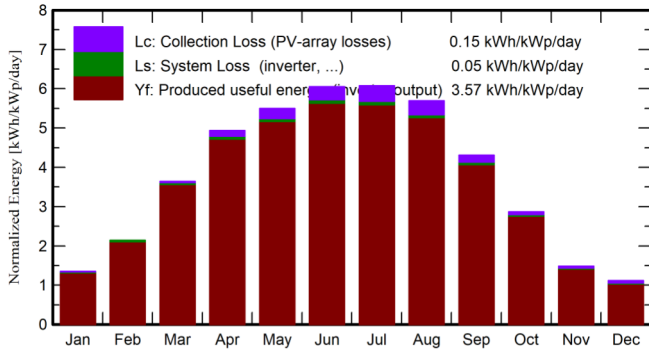
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Main results

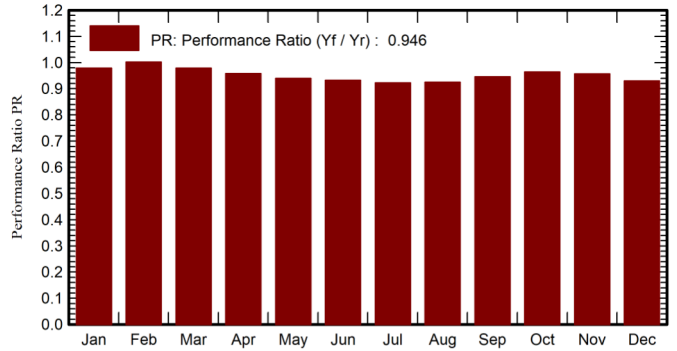
System Production

Produced Energy 15423 MWh/year Specific production 1301 kWh/kWp/year
Perf. Ratio PR 94.57 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray MWh	E_Grid MWh	PR ratio
January	27.5	18.52	-3.98	41.8	39.2	494	485	0.979
February	42.9	26.32	-3.00	59.0	56.2	712	701	1.002
March	89.2	45.68	2.05	113.0	107.8	1330	1310	0.978
April	131.1	69.97	9.19	148.1	141.2	1706	1681	0.958
May	162.9	79.13	15.06	170.6	162.5	1927	1899	0.939
June	179.9	76.36	17.72	181.5	173.1	2036	2005	0.933
July	182.9	76.75	19.91	188.3	179.7	2088	2057	0.922
August	159.1	69.00	19.51	176.6	168.5	1964	1935	0.925
September	105.9	53.10	14.01	129.3	123.4	1470	1449	0.945
October	64.7	34.30	8.15	88.9	84.8	1031	1015	0.964
November	29.5	19.16	3.22	44.4	41.6	512	503	0.957
December	20.7	13.28	-1.73	34.6	31.6	389	381	0.930
Year	1196.3	581.56	8.41	1376.0	1309.6	15660	15423	0.946

Legends

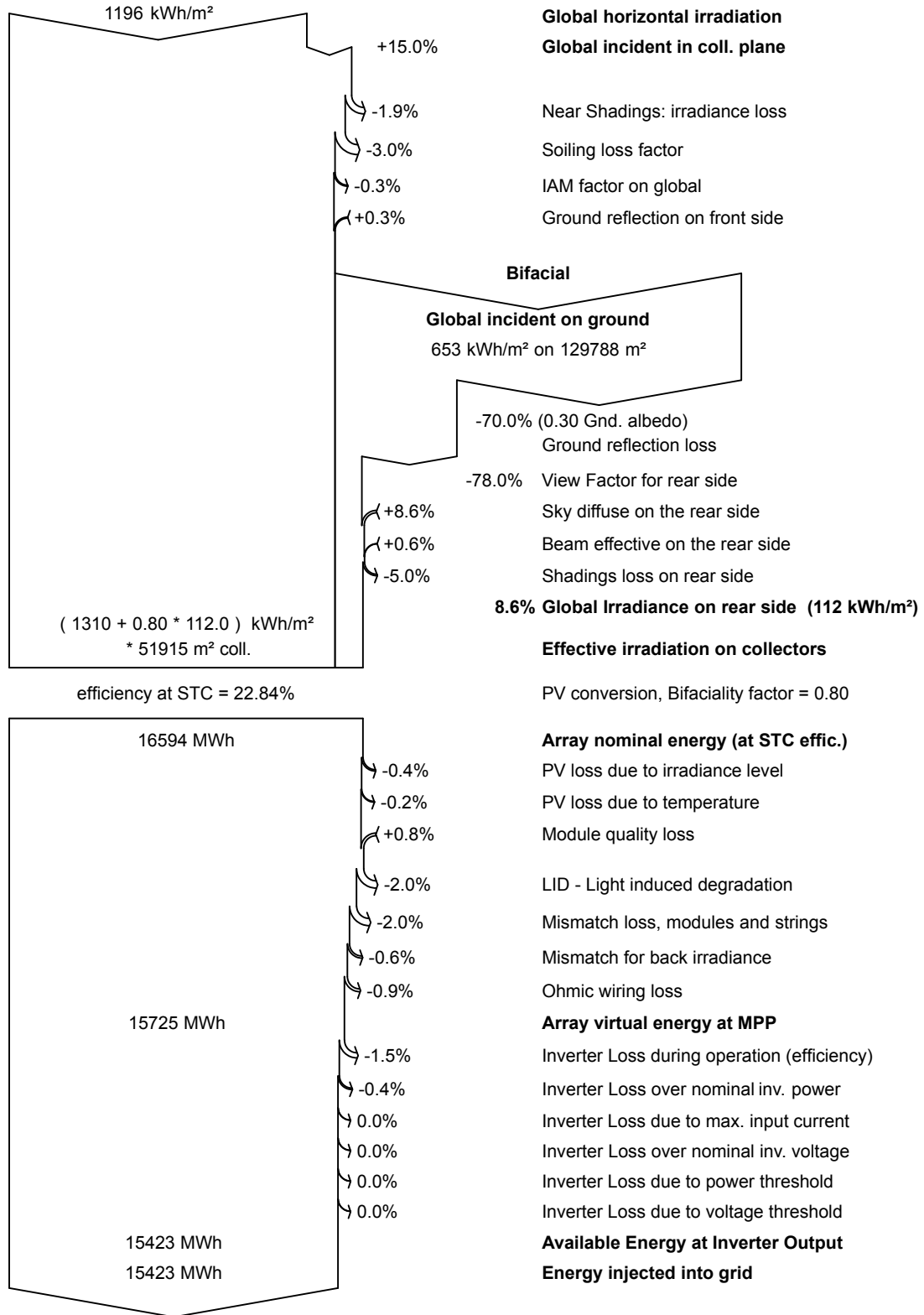
- GlobHor Global horizontal irradiation
- DiffHor Horizontal diffuse irradiation
- T_Amb Ambient Temperature
- GlobInc Global incident in coll. plane
- GlobEff Effective Global, corr. for IAM and shadings
- EArray Effective energy at the output of the array
- E_Grid Energy injected into grid
- PR Performance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



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Loss diagram



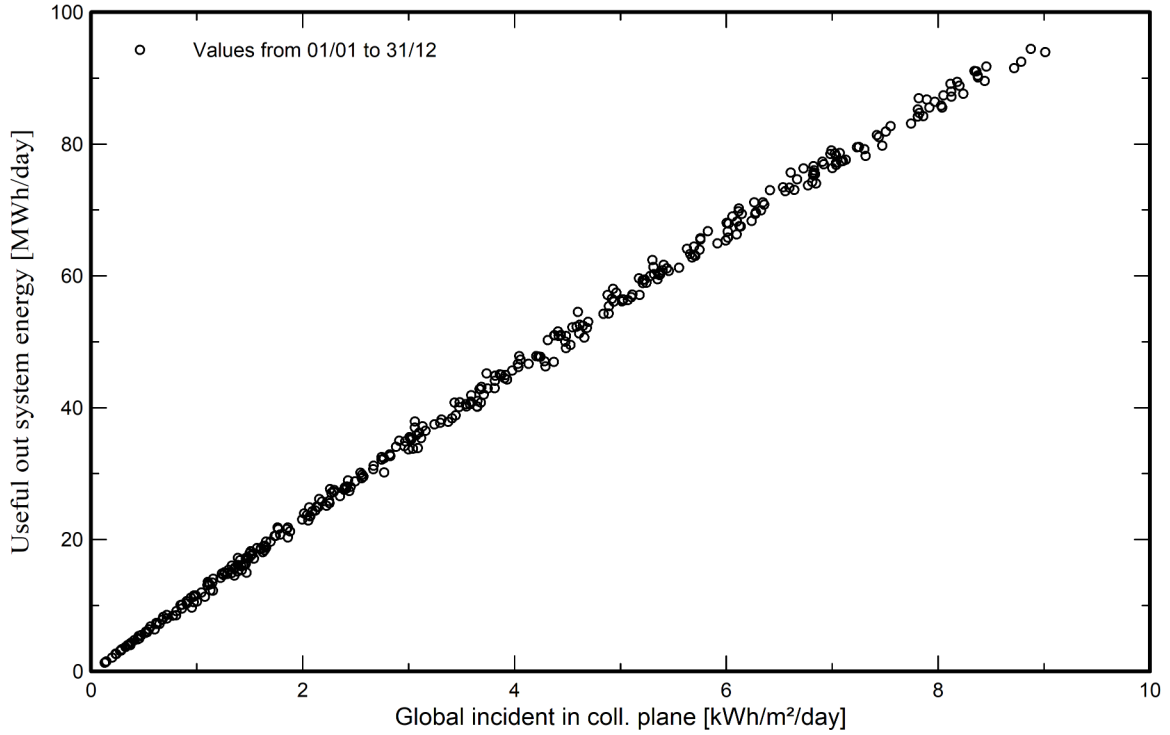


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Predef. graphs

Daily Input/Output diagram



System Output Power Distribution

