

PVsyst - Simulation report

Grid-Connected System

Project: 2024-132_GPMB-H42B_FAI-PVSyst

Variant: Simulation 410 KWc

No 3D scene defined, no shadings

System power: 410 kWp

Port de Bassens - France



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PVsyst V8.0.6

VC0, Simulation date:

04/02/25 15:02

with V8.0.6

TECSOL S.A. (France)

Project summary

Geographical Site	Situation	Project settings
Port de Bassens	Latitude 44.89 °N	Albedo 0.20
France	Longitude -0.53 °W	
	Altitude 7 m	
	Time zone UTC+1	
Weather data		
Port de Bassens		
Meteonorm 8.2 (2001-2020), Sat=16 % - Synthétique		

System summary

Grid-Connected System	No 3D scene defined, no shadings	
Orientation #1	Orientation #2	Near Shadings
Fixed plane	Fixed plane	no Shadings
Tilt/Azimuth 6 / 83 °	Tilt/Azimuth 6 / -97 °	
System information		
PV Array	Inverters	
Nb. of modules 912 units	Nb. of units 3 units	
Pnom total 410 kWp	Pnom total 330 kWac	
	Pnom ratio 1.244	
User's needs		
Unlimited load (grid)		

Results summary

Produced Energy 452.78 MWh/year	Specific production 1103 kWh/kWp/year	Perf. Ratio PR 82.39 %
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General parameters

Grid-Connected System		No 3D scene defined, no shadings	
Orientation #1		Models used	
Fixed plane		Transposition	Perez
Tilt/Azimuth	6 / 83 °	Diffuse	Perez, Meteonorm
		Circumsolar	separate
Orientation #2		Horizon	
Fixed plane		Free Horizon	
Tilt/Azimuth	6 / -97 °		
Near Shadings		User's needs	
no Shadings		Unlimited load (grid)	

PV Array Characteristics

PV module		Inverter	
Manufacturer	Longi Solar	Manufacturer	Goodwe
Model	LR5-54HTH-450M	Model	GW110K-HT
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	450 Wp	Unit Nom. Power	110 kWac
Number of PV modules	912 units	Number of inverters	3 units
Nominal (STC)	410 kWp	Total power	330 kWac
Array #1 - Ouest #1			
Orientation	#1		
Tilt/Azimuth	6/83 °		
Number of PV modules	264 units	Number of inverters	10 * MPPT 8% 0.8 unit
Nominal (STC)	119 kWp	Total power	91.7 kWac
Modules	11 string x 24 In series		
At operating cond. (50°C)		Operating voltage	180-1000 V
Pmpp	111 kWp	Max. power (=>45°C)	121 kWac
U mpp	731 V	Pnom ratio (DC:AC)	1.30
I mpp	151 A	No power sharing between MPPTs	
Array #2 - Ouest #2			
Orientation	#1		
Tilt/Azimuth	6/83 °		
Number of PV modules	40 units	Number of inverters	2 * MPPT 8% 0.2 unit
Nominal (STC)	18.00 kWp	Total power	18.3 kWac
Modules	2 string x 20 In series		
At operating cond. (50°C)		Operating voltage	180-1000 V
Pmpp	16.75 kWp	Max. power (=>45°C)	121 kWac
U mpp	609 V	Pnom ratio (DC:AC)	0.98
I mpp	27 A		
Array #3 - Ouest #3			
Orientation	#1		
Tilt/Azimuth	6/83 °		
Number of PV modules	152 units	Number of inverters	6 * MPPT 8% 0.5 unit
Nominal (STC)	68.4 kWp	Total power	55.0 kWac
Modules	8 string x 19 In series		
At operating cond. (50°C)		Operating voltage	180-1000 V
Pmpp	63.7 kWp	Max. power (=>45°C)	121 kWac
U mpp	579 V	Pnom ratio (DC:AC)	1.24
I mpp	110 A		



PV Array Characteristics

Array #4 - Est #1

Orientation	#2		
Tilt/Azimuth	6/-97 °		
Number of PV modules	264 units	Number of inverters	10 * MPPT 8% 0.8 unit
Nominal (STC)	119 kWp	Total power	91.7 kWac
Modules	11 string x 24 In series		
At operating cond. (50°C)		Operating voltage	180-1000 V
Pmpp	111 kWp	Max. power (=>45°C)	121 kWac
U mpp	731 V	Pnom ratio (DC:AC)	1.30
I mpp	151 A	No power sharing between MPPTs	

Array #5 - Est #2

Orientation	#2		
Tilt/Azimuth	6/-97 °		
Number of PV modules	40 units	Number of inverters	2 * MPPT 8% 0.2 unit
Nominal (STC)	18.00 kWp	Total power	18.3 kWac
Modules	2 string x 20 In series		
At operating cond. (50°C)		Operating voltage	180-1000 V
Pmpp	16.75 kWp	Max. power (=>45°C)	121 kWac
U mpp	609 V	Pnom ratio (DC:AC)	0.98
I mpp	27 A		

Array #6 - Est #3

Orientation	#2		
Tilt/Azimuth	6/-97 °		
Number of PV modules	152 units	Number of inverters	6 * MPPT 8% 0.5 unit
Nominal (STC)	68.4 kWp	Total power	55.0 kWac
Modules	8 string x 19 In series		
At operating cond. (50°C)		Operating voltage	180-1000 V
Pmpp	63.7 kWp	Max. power (=>45°C)	121 kWac
U mpp	579 V	Pnom ratio (DC:AC)	1.24
I mpp	110 A		
Total PV power		Total inverter power	
Nominal (STC)	410 kWp	Total power	330 kWac
Total	912 modules	Nb. of inverters	3 units
Module area	1781 m²		0.0 unused
Cell area	1631 m²	Pnom ratio	1.24
		No power sharing	

Array losses

Array Soiling Losses		Thermal Loss factor		Module Quality Loss	
Loss Fraction	3.0 %	Module temperature according to irradiance		Loss Fraction	-0.8 %
		Uc (const)	20.0 W/m²K		
		Uv (wind)	0.0 W/m²K/m/s		
Module mismatch losses					
Array #1 - Ouest #1					
Loss Fraction	2.0 % at MPP				
Array #2 - Ouest #2					
Loss Fraction	2.0 % at MPP				
Array #3 - Ouest #3					
Loss Fraction	2.0 % at MPP				
Array #4 - Est #1					
Loss Fraction	2.0 % at MPP				



Array losses

Module mismatch losses

Array #5 - Est #2

Loss Fraction 2.0 % at MPP

Array #6 - Est #3

Loss Fraction 2.0 % at MPP

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	0.963	0.892	0.814	0.679	0.438	0.000

DC wiring losses

Global wiring resistance 10 mΩ

Loss Fraction 1.0 % at STC

Array #1 - Ouest #1

Global array res. 53 mΩ

Loss Fraction 1.0 % at STC

Array #3 - Ouest #3

Global array res. 57 mΩ

Loss Fraction 1.0 % at STC

Array #5 - Est #2

Global array res. 241 mΩ

Loss Fraction 1.0 % at STC

Array #2 - Ouest #2

Global array res. 241 mΩ

Loss Fraction 1.0 % at STC

Array #4 - Est #1

Global array res. 53 mΩ

Loss Fraction 1.0 % at STC

Array #6 - Est #3

Global array res. 57 mΩ

Loss Fraction 1.0 % at STC

System losses

Unavailability of the system

Time fraction 2.0 %

7.3 days,

5 periods

AC wiring losses

Inv. output line up to injection point

Inverter voltage 400 Vac tri

Loss Fraction 1.34 % at STC

Inverter: GW110K-HT

Wire section (3 Inv.) Copper 3 x 3 x 120 mm²

Average wires length 104 m



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Main results

System Production

Produced Energy

452.78 MWh/year

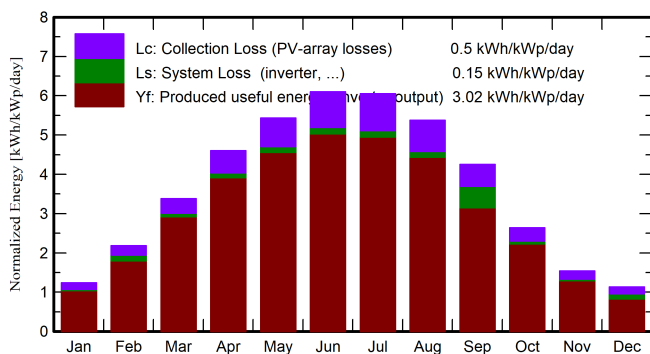
Specific production

1103 kWh/kWp/year

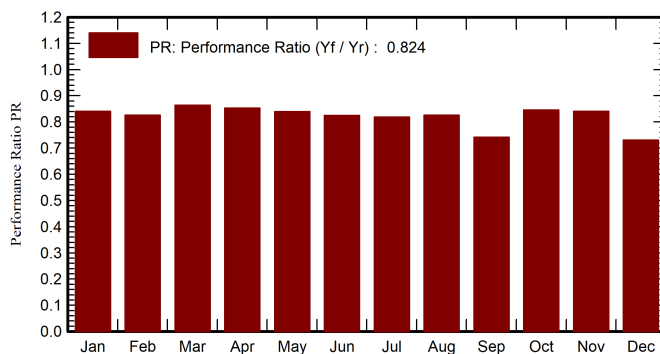
Perf. Ratio PR

82.39 %

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	38.6	23.60	6.69	38.4	34.1	13.65	13.23	0.840
February	61.3	31.97	7.06	61.1	55.8	22.36	20.72	0.826
March	105.1	48.90	10.18	104.8	97.4	38.31	37.17	0.864
April	138.4	66.77	12.61	138.0	129.4	49.78	48.28	0.853
May	168.9	87.02	16.13	168.5	158.6	59.94	58.09	0.840
June	183.5	84.90	19.86	183.1	173.0	64.02	62.00	0.825
July	188.0	82.96	21.70	187.6	177.0	65.09	63.03	0.819
August	166.9	74.11	21.51	166.6	156.8	58.30	56.48	0.826
September	127.9	55.97	18.24	127.7	119.2	45.51	38.84	0.741
October	82.1	37.48	14.85	81.9	75.4	29.32	28.43	0.846
November	46.4	27.25	9.72	46.2	41.5	16.45	15.95	0.841
December	35.3	19.70	7.15	35.2	30.7	12.21	10.55	0.731
Year	1342.2	640.63	13.85	1339.1	1248.9	474.93	452.78	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

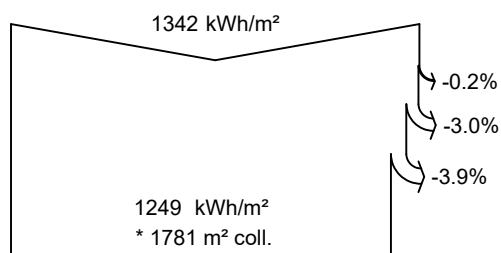
EArray Effective energy at the output of the array

E_Grid Energy injected into grid

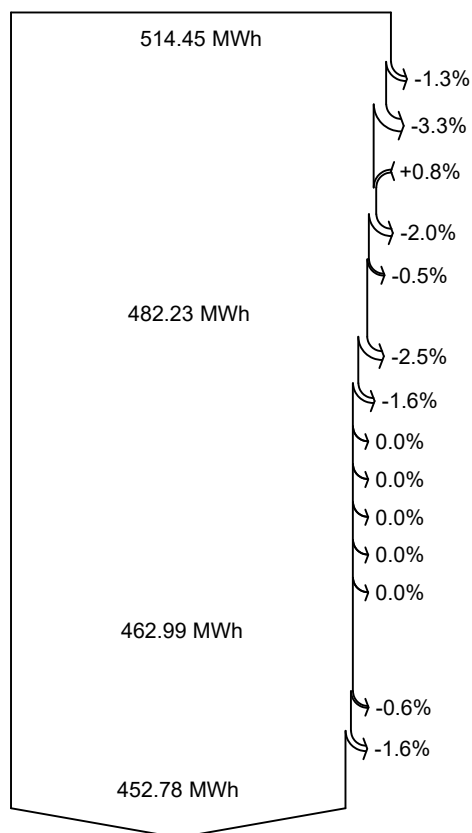
PR Performance Ratio



Loss diagram



efficiency at STC = 23.13%



Global horizontal irradiation

Global incident in coll. plane

Soiling loss factor

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

AC ohmic loss

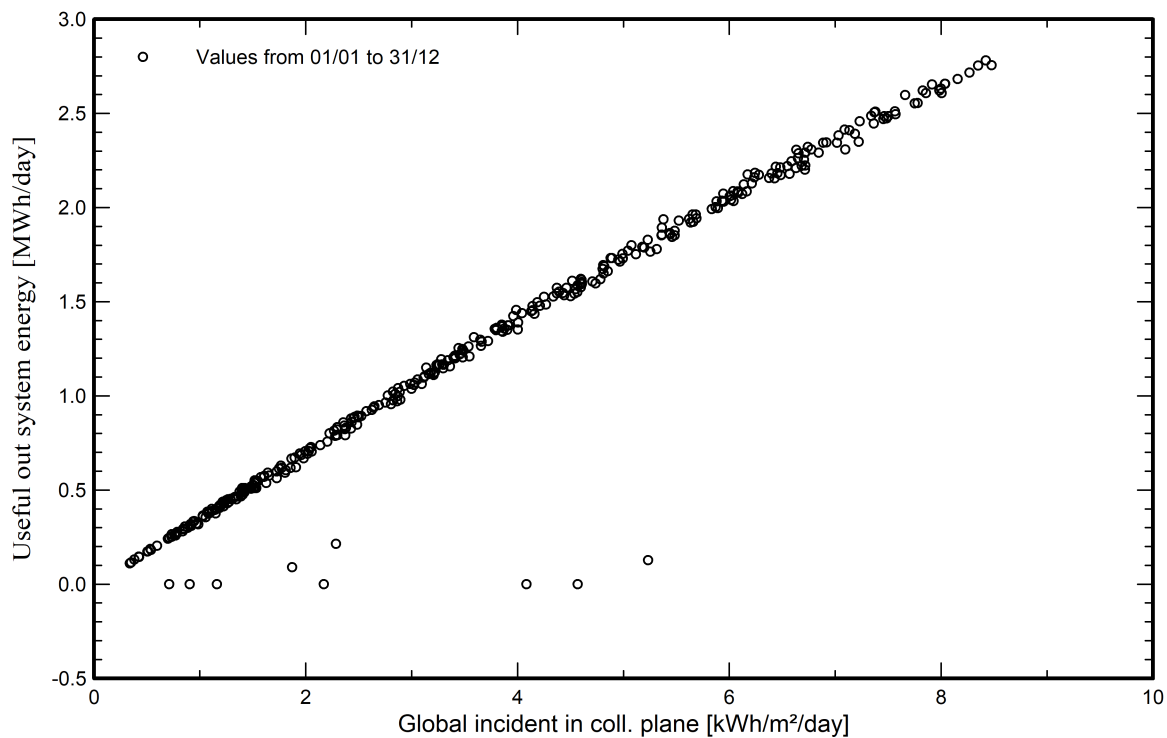
System unavailability

Energy injected into grid

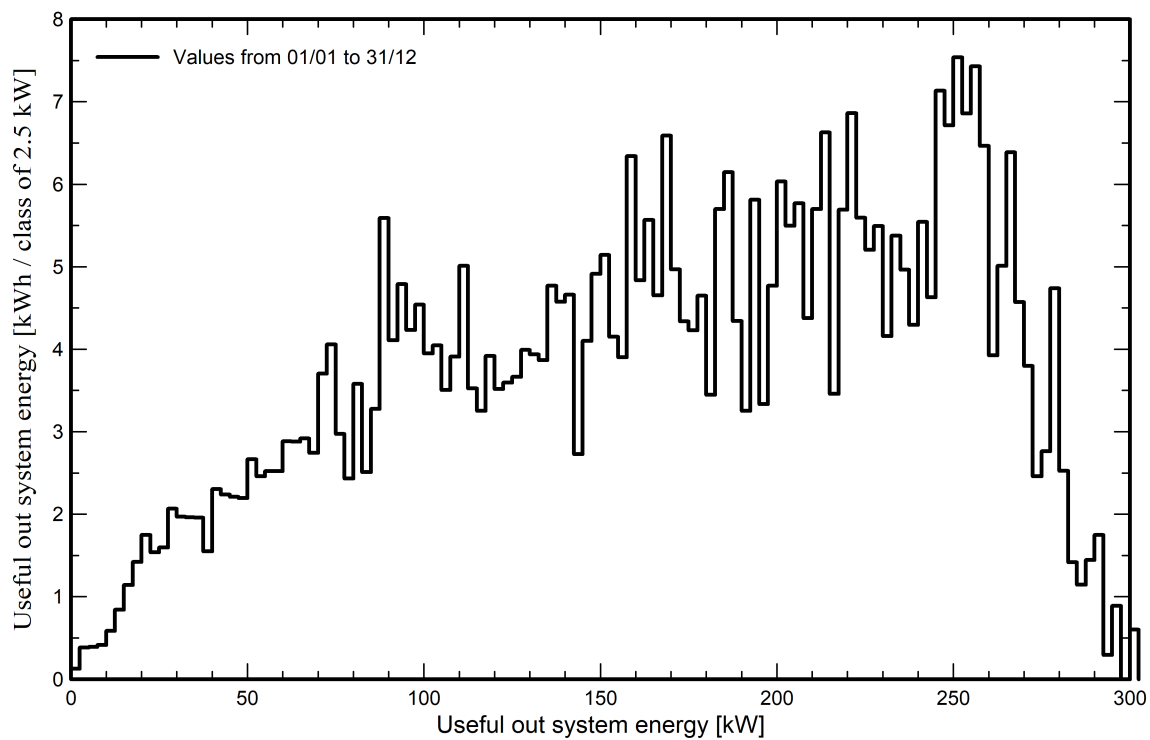


Predef. graphs

Diagramme d'entrée/sortie journalier



Distribution de la puissance de sortie système





P50 - P90 evaluation

Weather data

Source Meteonorm 8.2 (2001-2020), Sat=16 %
Kind Monthly averages
Synthétique - Multi-year average
Year-to-year variability(Variance) 3.7 %
Specified Deviation
Climate change 0.0 %

Simulation and parameters uncertainties

PV module modelling/parameters 1.0 %
Inverter efficiency uncertainty 0.5 %
Soiling and mismatch uncertainties 1.0 %
Degradation uncertainty 1.0 %

Global variability (weather data + system)

Variability (Quadratic sum) 4.2 %

Annual production probability

Variability 18.8 MWh
P50 452.8 MWh
P90 428.7 MWh
P95 421.9 MWh

Probability distribution

