

PVsyst - Simulation report

Grid-Connected System

Project: Ombrière foot Madonne et Lamerey

Variant: Nouvelle variante de simulation

Sheds on ground

System power: 135 kWp

Madonne-et-Lamerey - France



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SEM TERR'ENR (France)

PVsyst V7.3.4

VCO, Simulation date:
14/09/23 15:12
with v7.3.4

Project summary

Geographical Site Madonne-et-Lamerey France	Situation Latitude 48.21 °N Longitude 6.23 °E Altitude 332 m Time zone UTC+1	Project settings Albedo 0.20
Meteo data Madonne-et-Lamerey PVGIS api TMY		

System summary

Grid-Connected System	Sheds on ground	
PV Field Orientation Fixed plane Tilt/Azimuth 10 / -17 °	Near Shadings Linear shadings	User's needs Unlimited load (grid)
System information		
PV Array		Inverters
Nb. of modules 330 units		Nb. of units 1 unit
Pnom total 135 kWp		Pnom total 125 kWac
		Pnom ratio 1.082

Results summary

Produced Energy 155066 kWh/year	Specific production 1146 kWh/kWp/year	Perf. Ratio PR 88.44 %
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General parameters

Grid-Connected System		Sheds on ground			
PV Field Orientation		Sheds configuration		Models used	
Orientation		Nb. of sheds		Transposition	
Fixed plane		2 units		Perez	
Tilt/Azimuth		Sizes		Diffuse	
10 / -17 °		Sheds spacing		Imported	
		8.80 m		Circumsolar	
		Collector width		separate	
		4.60 m			
		Ground Cov. Ratio (GCR)			
		52.2 %			
		Shading limit angle			
		Limit profile angle			
		10.6 °			
Horizon		Near Shadings		User's needs	
Average Height		Linear shadings		Unlimited load (grid)	
1.9 °					

PV Array Characteristics

PV module		Inverter	
Manufacturer	Longi Solar	Manufacturer	SMA
Model	LR5-54HIH-410M	Model	Sunny Highpower SHP125-US-20-PEAK3
(Original PVsyst database)		(Original PVsyst database)	
Unit Nom. Power	410 Wp	Unit Nom. Power	125 kWac
Number of PV modules	330 units	Number of inverters	1 unit
Nominal (STC)	135 kWp	Total power	125 kWac
Modules	11 Strings x 30 In series	Operating voltage	684-1450 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.08
Pmpp	124 kWp		
U mpp	847 V		
I mpp	146 A		
Total PV power		Total inverter power	
Nominal (STC)	135 kWp	Total power	125 kWac
Total	330 modules	Number of inverters	1 unit
Module area	644 m ²	Pnom ratio	1.08
Cell area	594 m ²		

Array losses

Thermal Loss factor		DC wiring losses		Module Quality Loss				
Module temperature according to irradiance		Global array res.		Loss Fraction				
Uc (const)		96 mΩ		-0.4 %				
20.0 W/m ² K		Loss Fraction						
Uv (wind)		1.5 % at STC						
0.0 W/m ² K/m/s								
Module mismatch losses		Strings Mismatch loss						
Loss Fraction		Loss Fraction						
2.0 % at MPP		0.2 %						
IAM loss factor								
Incidence effect (IAM): User defined profile								
0°	25°	45°	60°	65°	70°	75°	80°	90°
1.000	1.000	0.995	0.962	0.936	0.903	0.851	0.754	0.000



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Horizon definition

Horizon from PVGIS website API, Lat=48°12'42', Long=6°13'42', Alt=332m

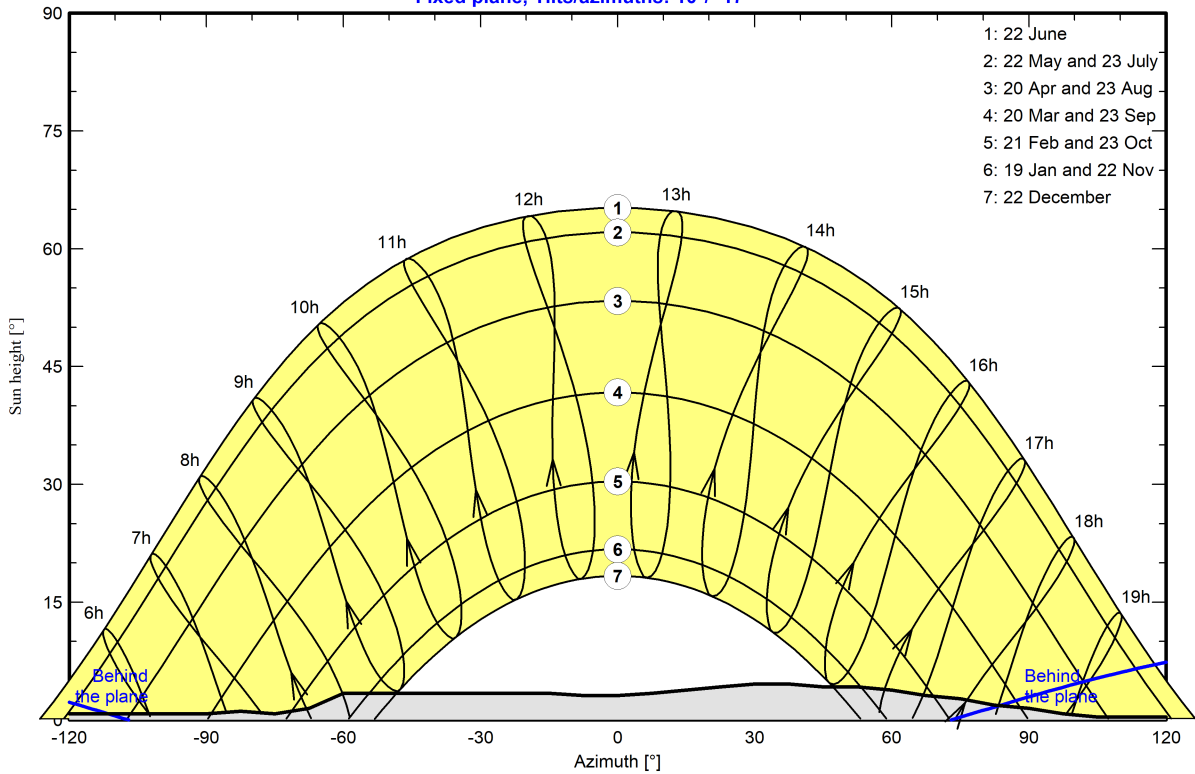
Average Height	1.9 °	Albedo Factor	0.83
Diffuse Factor	0.99	Albedo Fraction	100 %

Horizon profile

Azimuth [°]	-180	-158	-150	-143	-135	-90	-83	-75	-68	-60	-15	-8
Height [°]	0.8	0.8	1.1	1.1	0.8	0.8	1.1	0.8	1.5	3.4	3.4	3.1
Azimuth [°]	0	8	15	23	30	38	45	53	60	68	75	83
Height [°]	3.1	3.4	3.8	4.2	4.6	4.6	4.2	4.2	3.8	3.1	2.7	1.9
Azimuth [°]	90	98	105	120	128	135	143	158	165	173	180	
Height [°]	1.5	0.8	0.4	0.4	0.0	0.4	0.0	0.0	0.4	0.4	0.8	

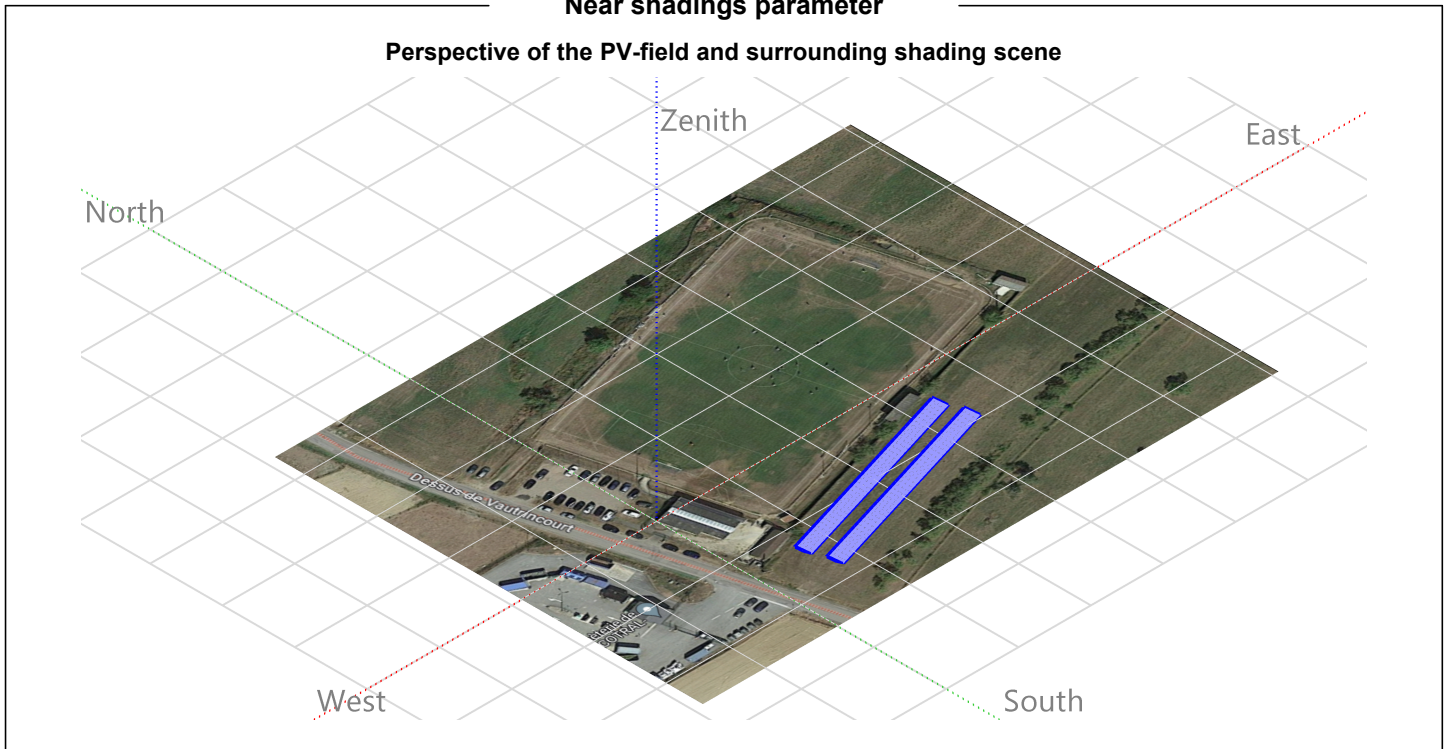
Sun Paths (Height / Azimuth diagram)

Fixed plane, Tilts/azimuths: 10°/-17°





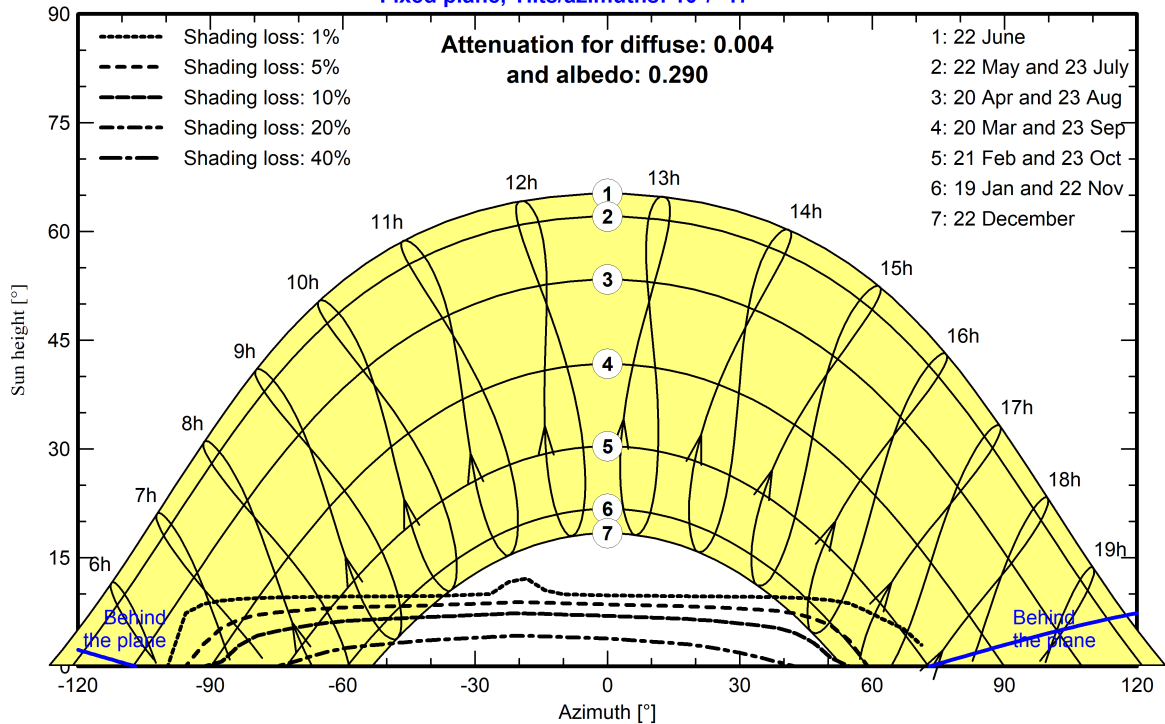
Near shadings parameter



Iso-shadings diagram

Orientation #1

Fixed plane, Tilts/azimuths: 10°/-17°





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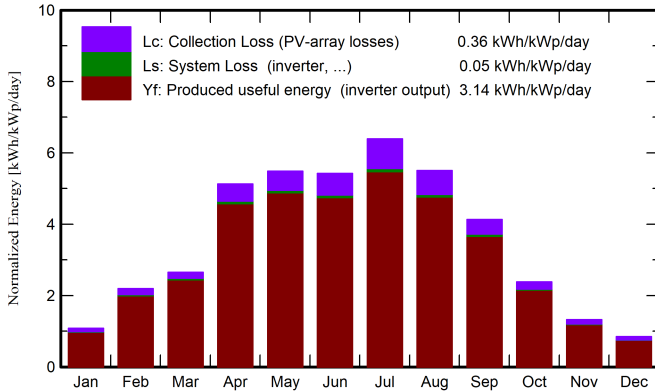
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Main results

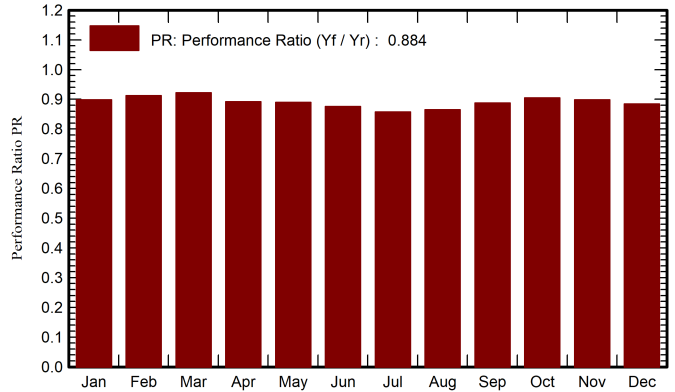
System Production

Produced Energy (P50) 155066 kWh/year Specific production (P50) 1146 kWh/kWp/year Perf. Ratio PR 88.44 %
 Produced Energy (P90) 151482 kWh/year Specific production (P90) 1120 kWh/kWp/year
 Produced Energy (P75) 153182 kWh/year Specific production (P75) 1132 kWh/kWp/year

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

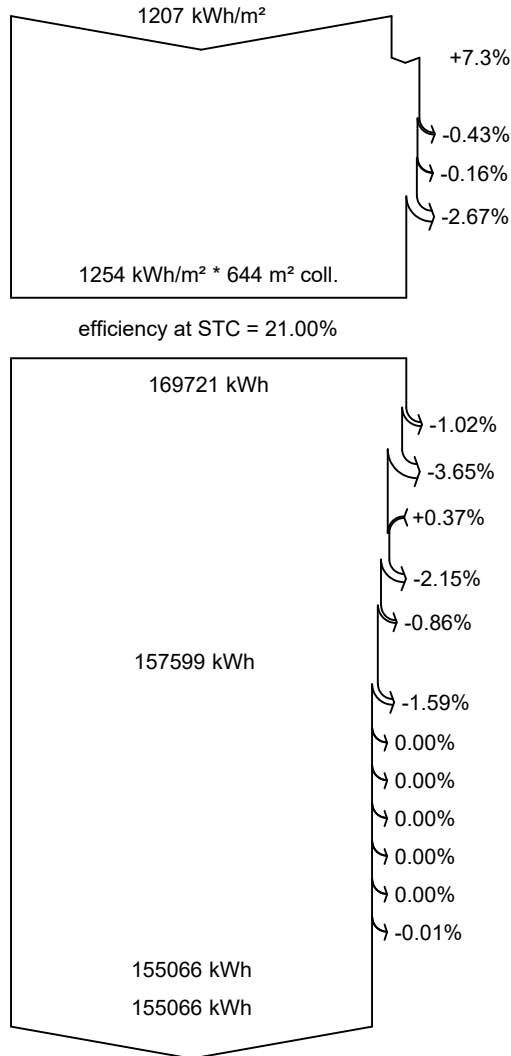
	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	kWh	kWh	ratio
January	27.8	18.22	1.72	33.6	31.0	4155	4081	0.898
February	51.3	26.33	5.48	61.4	58.5	7697	7574	0.912
March	75.5	44.69	3.60	82.3	79.4	10440	10270	0.923
April	142.8	56.81	9.48	153.8	149.6	18883	18575	0.892
May	165.0	82.75	12.64	170.0	165.7	20805	20471	0.890
June	160.0	86.10	17.04	162.6	158.4	19577	19266	0.876
July	192.2	76.16	20.14	198.1	193.4	23343	22975	0.857
August	160.9	64.52	19.54	170.7	166.4	20303	19987	0.865
September	112.7	49.23	13.02	123.9	120.2	15130	14892	0.888
October	64.6	36.99	9.67	73.7	70.7	9177	9033	0.905
November	32.9	21.82	5.41	39.6	36.9	4897	4814	0.899
December	21.5	15.04	0.61	26.2	23.8	3190	3128	0.884
Year	1207.2	578.66	9.88	1295.9	1253.9	157599	155066	0.884

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		



Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Far Shadings / Horizon

Near Shadings: irradiance loss

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

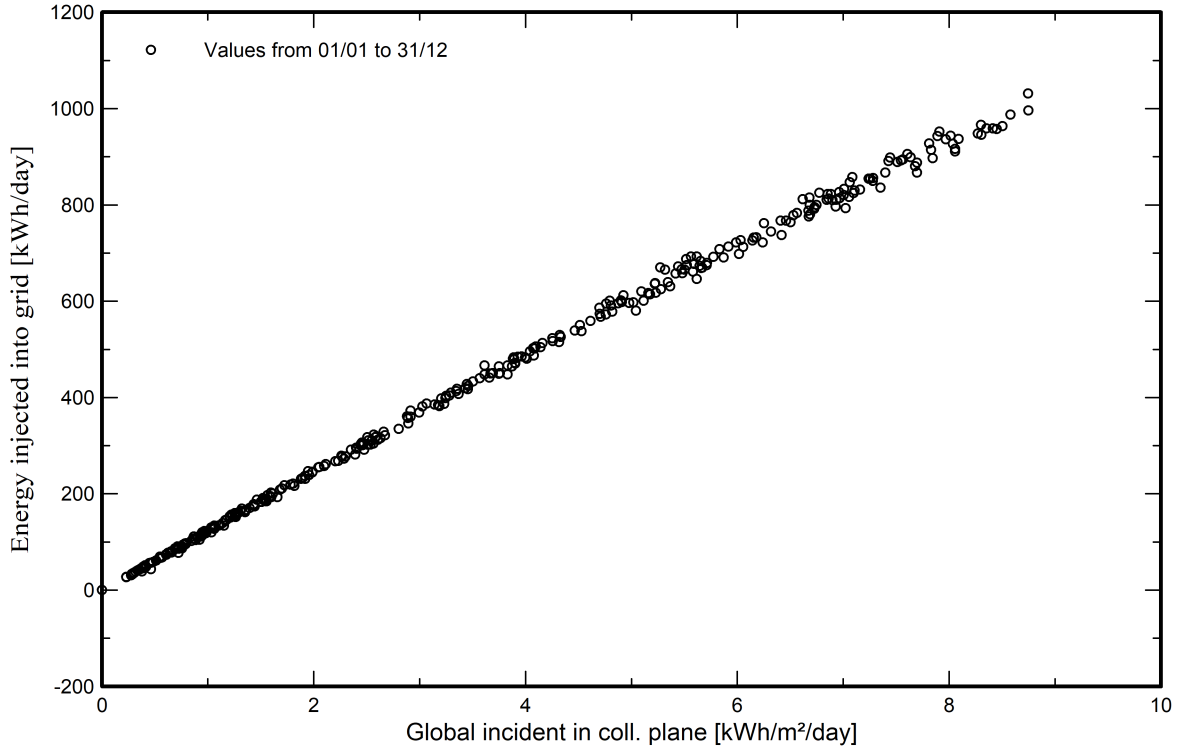
Available Energy at Inverter Output

Energy injected into grid

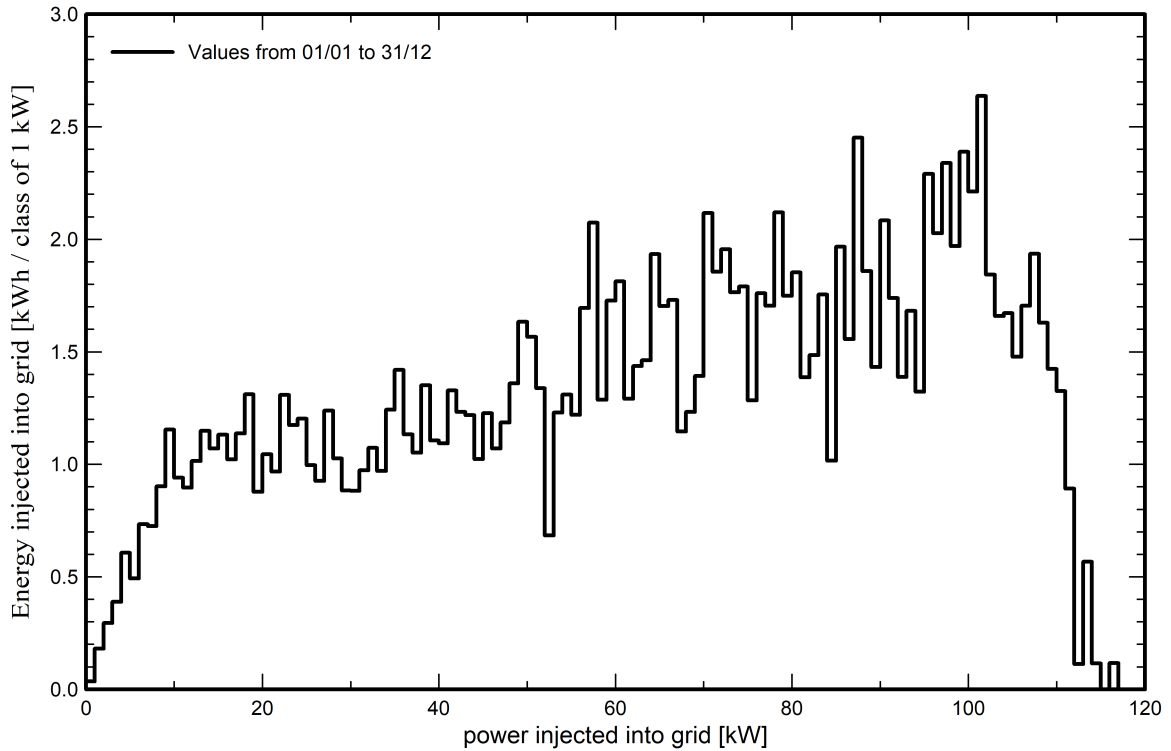


Predef. graphs

Diagramme d'entrée/sortie journalier



Distribution de la puissance de sortie système





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P50 - P90 evaluation

Meteo data

Source PVGIS api TMY
Kind Not defined
Year-to-year variability(Variance) 0.0 %

Specified Deviation

Global variability (meteo + system)

Variability (Quadratic sum) 1.8 %

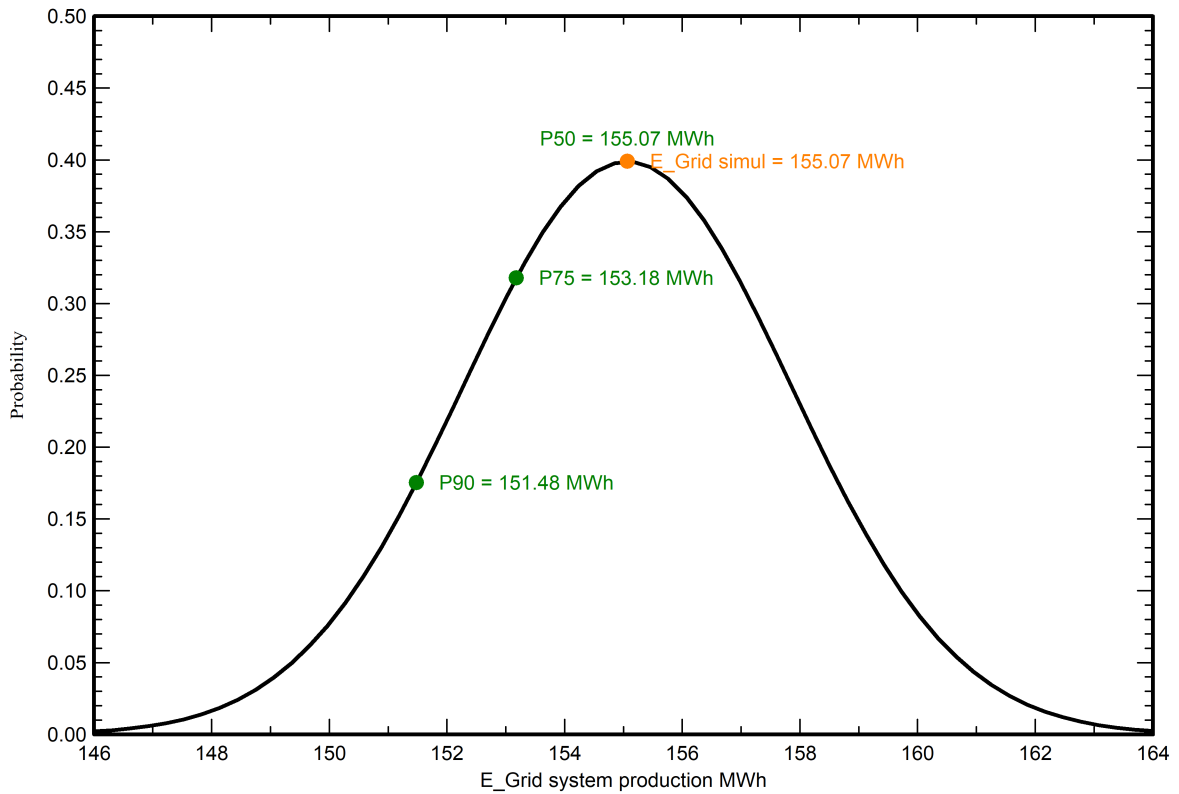
Simulation and parameters uncertainties

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

Annual production probability

Variability 2.80 MWh
P50 155.07 MWh
P90 151.48 MWh
P75 153.18 MWh

Probability distribution

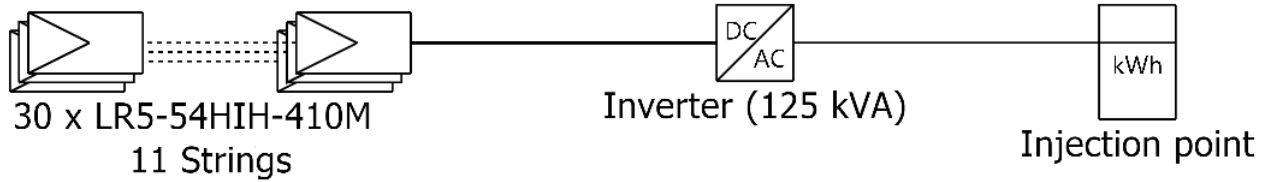




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Single-line diagram



PV module	LR5-54HIH-410M
Inverter	Sunny Highpower SHP125-US-20-PEAK3
String	30 x LR5-54HIH-410M

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