

PVSYST V6.88		24/05/23		Page 1/6																			
<h2 style="text-align: center;">Grid-Connected System: Simulation parameters</h2>																							
Project : Valladolid_Grid																							
Geographical Site		IdUva Building		Country Spain																			
Situation		Latitude 41.66° N		Longitude -4.71° W																			
Time defined as		Legal Time Time zone UT+1		Altitude 708 m																			
		Albedo 0.20																					
Meteo data:		IdUva Building		Meteonorm 7.2 (1995-2007) - Synthetic																			
Simulation variant : Variant with self consumption 2																							
		Simulation date 24/05/23 10h56																					
		Simulation for the		10th year of operation																			
Simulation parameters																							
		System type		No 3D scene defined, no shadings																			
Collector Plane Orientation		Tilt 35°		Azimuth 0°																			
Models used		Transposition Perez		Diffuse Perez, Meteonorm																			
Horizon		Free Horizon																					
Near Shadings		No Shadings																					
User's needs :		daily profile		Seasonal modulation																			
		average		147 kWh/Day																			
PV Array Characteristics																							
PV module		Si-poly Model		Q.PLUS L-G4.1 340																			
Original PVsyst database		Manufacturer		Hanwha Q Cells																			
Number of PV modules		In series		15 modules																			
Total number of PV modules		Nb. modules		165																			
Array global power		Nominal (STC)		56.1 kWp																			
Array operating characteristics (50°C)		U mpp		510 V																			
Total area		Module area		329 m²																			
				In parallel 11 strings																			
				Unit Nom. Power 340 Wp																			
				At operating cond. 50.5 kWp (50°C)																			
				I mpp 99 A																			
				Cell area 289 m²																			
Inverter																							
Original PVsyst database		Model		Ingecon Sun 50																			
Characteristics		Manufacturer		Ingeteam																			
		Operating Voltage		405-750 V																			
				Unit Nom. Power 50.0 kWac																			
Inverter pack		Nb. of inverters		1 units																			
				Total Power 50 kWac																			
				Pnom ratio 1.12																			
PV Array loss factors																							
Array Soiling Losses				Loss Fraction 3.0 %																			
Thermal Loss factor		Uc (const) 29.0 W/m²K		Uv (wind) 0.0 W/m²K / m/s																			
Wiring Ohmic Loss		Global array res. 86 mOhm		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 -0.4 %																			
Module Mismatch Losses				Loss Fraction 1.0 % at MPP																			
Strings Mismatch loss				Loss Fraction 0.10 %																			
Module average degradation		Year no 10		Loss factor 0.4 %/year																			
Mismatch due to degradation		Imp RMS dispersion 0.4 %/year		Vmp RMS dispersion 0.4 %/year																			
Incidence effect (IAM): User defined profile																							
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>0°</td> <td>20°</td> <td>40°</td> <td>60°</td> <td>70°</td> <td>75°</td> <td>80°</td> <td>85°</td> <td>90°</td> </tr> <tr> <td>1.000</td> <td>1.000</td> <td>1.000</td> <td>0.970</td> <td>0.900</td> <td>0.830</td> <td>0.690</td> <td>0.440</td> <td>0.000</td> </tr> </table>						0°	20°	40°	60°	70°	75°	80°	85°	90°	1.000	1.000	1.000	0.970	0.900	0.830	0.690	0.440	0.000
0°	20°	40°	60°	70°	75°	80°	85°	90°															
1.000	1.000	1.000	0.970	0.900	0.830	0.690	0.440	0.000															
Spectral correction FirstSolar model. Precipitable water estimated from relative humidity																							
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Coefficient Set</td> <td>C0</td> <td>C1</td> <td>C2</td> <td>C3</td> <td>C4</td> <td>C5</td> </tr> <tr> <td>Polycrystalline Si</td> <td>0,8409</td> <td>-0,027539</td> <td>-0,0079224</td> <td>0,1357</td> <td>0,038024</td> <td>-0,0021218</td> </tr> </table>						Coefficient Set	C0	C1	C2	C3	C4	C5	Polycrystalline Si	0,8409	-0,027539	-0,0079224	0,1357	0,038024	-0,0021218				
Coefficient Set	C0	C1	C2	C3	C4	C5																	
Polycrystalline Si	0,8409	-0,027539	-0,0079224	0,1357	0,038024	-0,0021218																	

Grid-Connected System: Simulation parameters

Unavailability of the system

7.3 days, 3 periods

Time fraction

2.0 %

PVsyst TRIAL

PVsyst TRIAL

PVsyst TRIAL

PVsyst TRIAL

Grid-Connected System: Detailed User's needs

Project : Valladolid_Grid
Simulation variant : Variant with self consumption 2
 Simulation for the 10th year of operation

Main system parameters

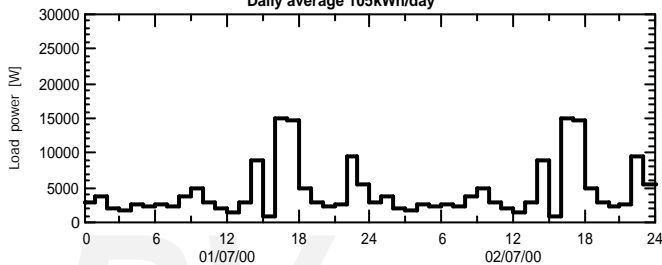
PV Field Orientation	System type	No 3D scene defined, no shadings	
PV modules	tilt	35°	azimuth 0°
PV Array	Model	Q.PLUS L-G4.1 340	Pnom 340 Wp
Inverter	Nb. of modules	165	Pnom total 56.1 kWp
User's needs	Model	Ingecon Sun 50	Pnom 50.0 kW ac
	daily profile	Seasonal modulation	Global 53.8 MWh/year

daily profile, Seasonal modulation, average = 147 kWh/day

	0 h	1 h	2 h	3 h	4 h	5 h	6 h	7 h	8 h	9 h	10 h	11 h	
	12 h	13 h	14 h	15 h	16 h	17 h	18 h	19 h	20 h	21 h	22 h	23 h	
Summer	2.94	3.73	2.14	1.73	2.46	2.29	2.53	2.18	3.65	5.01	2.83	1.89	kW
	1.57	2.90	8.85	0.80	14.91	14.74	4.99	2.96	2.22	2.61	9.50	5.60	kW
Autumn	4.42	5.59	3.22	2.59	3.70	3.43	3.79	3.26	5.47	7.51	4.25	2.83	kW
	2.35	4.34	13.27	1.20	22.37	22.10	7.49	4.44	3.34	3.91	14.26	8.40	kW
Winter	5.52	6.99	4.02	3.24	4.62	4.29	4.74	4.08	6.84	9.39	5.31	3.54	kW
	2.94	5.43	16.59	1.50	27.96	27.63	9.36	5.55	4.17	4.89	17.82	10.50	kW
Spring	3.68	4.66	2.68	2.16	3.08	2.86	3.16	2.72	4.56	6.26	3.54	2.36	kW
	1.96	3.62	11.06	1.00	18.64	18.42	6.24	3.70	2.78	3.26	11.88	7.00	kW

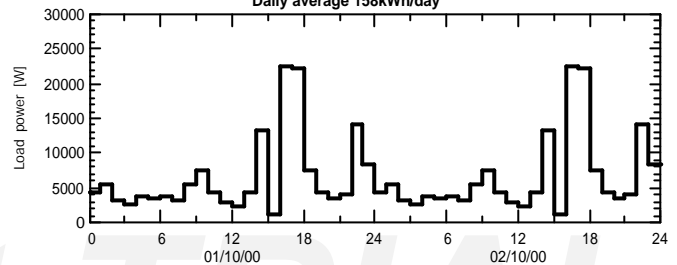
Summer (Jun-Aug)

Daily average 105kWh/day



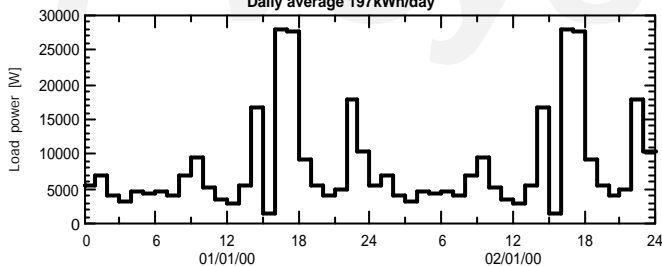
Autumn (Sep-Nov)

Daily average 158kWh/day



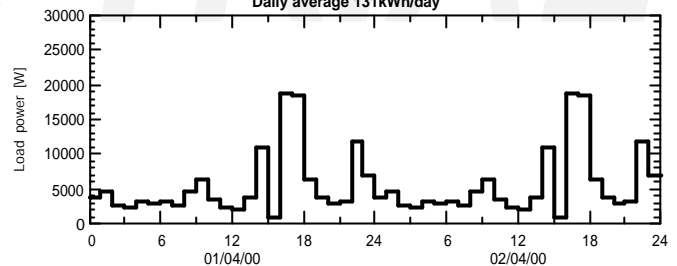
Winter (Dec-Feb)

Daily average 197kWh/day



Spring (Mar-May)

Daily average 131kWh/day



Grid-Connected System: Main results

Project : Valladolid_Grid
Simulation variant : Variant with self consumption 2
 Simulation for the 10th year of operation

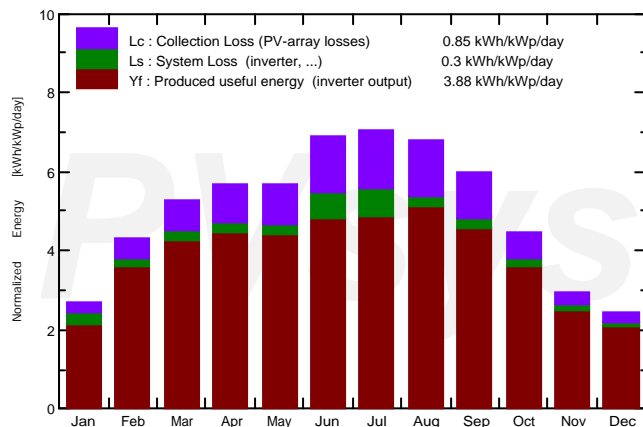
Main system parameters

PV Field Orientation	System type	No 3D scene defined, no shadings		
PV modules	tilt	35°	azimuth	0°
PV Array	Model	Q.PLUS L-G4.1 340	Pnom	340 Wp
Inverter	Nb. of modules	165	Pnom total	56.1 kWp
User's needs	Model	Ingecon Sun 50	Pnom	50.0 kW ac
	daily profile	Seasonal modulation	Global	53.8 MWh/year

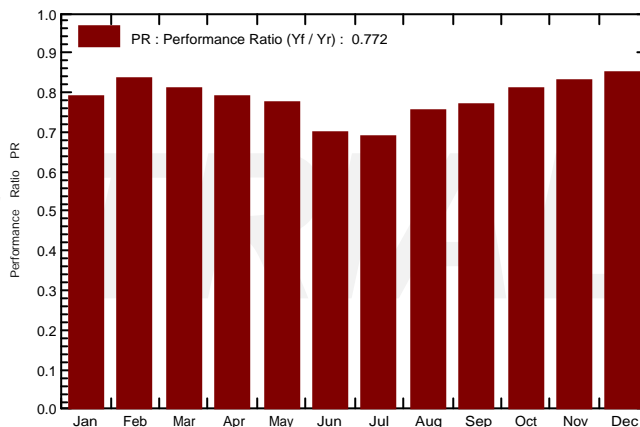
Main simulation results

System Production	Produced Energy	81.09 MWh/year	Specific prod.	1446 kWh/kWp/year
	Performance Ratio PR	77.22 %	Solar Fraction SF	42.53 %

Normalized productions (per installed kWp): Nominal power 56.1 kWp



Performance Ratio PR



Variant with self consumption 2

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_User MWh	E_Solar MWh	E_Grid MWh	EFrGrid MWh
January	50.6	24.46	3.84	84.4	80.6	4.246	6.105	1.564	2.179	4.541
February	79.8	32.35	5.33	121.0	115.6	5.984	5.514	2.048	3.642	3.466
March	127.9	51.81	8.71	163.4	155.3	7.836	4.070	2.131	5.322	1.939
April	157.4	63.57	10.55	170.2	161.3	7.979	3.938	2.121	5.441	1.817
May	182.5	78.05	14.83	176.2	166.5	8.118	4.070	2.241	5.437	1.828
June	222.8	71.33	20.24	206.7	195.3	9.247	3.151	1.971	6.148	1.179
July	229.0	65.91	22.03	218.5	206.8	9.671	3.256	2.017	6.427	1.239
August	199.6	63.26	21.64	210.4	199.6	9.394	3.256	1.969	6.963	1.287
September	146.3	42.84	17.58	179.3	170.5	8.150	4.726	2.281	5.453	2.445
October	97.1	40.28	12.90	139.1	132.6	6.653	4.884	1.919	4.399	2.965
November	57.0	28.90	6.95	89.3	85.2	4.423	4.726	1.299	2.875	3.427
December	44.1	22.92	4.17	75.6	72.2	3.831	6.105	1.320	2.285	4.784
Year	1594.2	585.68	12.44	1834.1	1741.3	85.533	53.799	22.882	56.573	30.917

Legends:	GlobHor	Horizontal global irradiation	GlobEff	Effective Global, corr. for IAM and shadings
	DiffHor	Horizontal diffuse irradiation	EArray	Effective energy at the output of the array
	T_Amb	T amb.	E_User	Energy supplied to the user
	GlobInc	Global incident in coll. plane	E_Solar	Energy from the sun
			E_Grid	Energy injected into grid
			EFrGrid	Energy from the grid

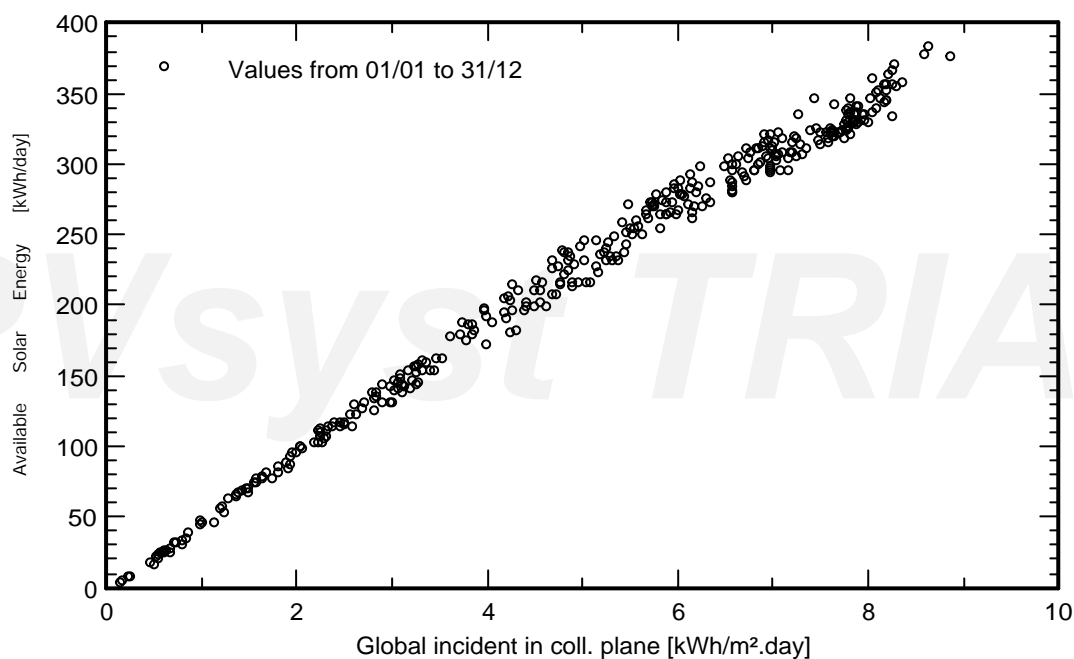
Grid-Connected System: Special graphs

Project : Valladolid_Grid
Simulation variant : Variant with self consumption 2
Simulation for the 10th year of operation

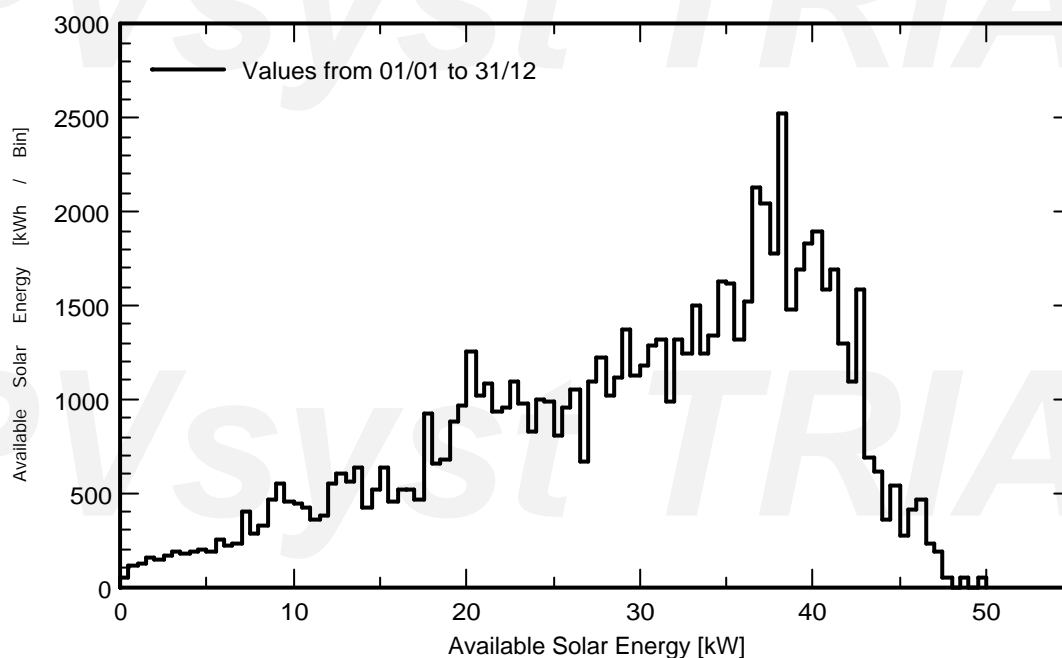
Main system parameters

PV Field Orientation	System type	No 3D scene defined, no shadings		
PV modules	tilt	35°	azimuth	0°
PV Array	Model	Q.PLUS L-G4.1 340	Pnom	340 Wp
Inverter	Nb. of modules	165	Pnom total	56.1 kWp
User's needs	Model	Ingecon Sun 50	Pnom	50.0 kW ac
	daily profile	Seasonal modulation	Global	53.8 MWh/year

Daily Input/Output diagram



System Output Power Distribution



Grid-Connected System: Loss diagram

Project : Valladolid_Grid
Simulation variant : Variant with self consumption 2
Simulation for the 10th year of operation

Main system parameters

PV Field Orientation	System type	No 3D scene defined, no shadings		
PV modules	tilt	35°	azimuth	0°
PV Array	Model	Q.PLUS L-G4.1 340	Pnom	340 Wp
Inverter	Nb. of modules	165	Pnom total	56.1 kWp
User's needs	Model	Ingecon Sun 50	Pnom	50.0 kW ac
	daily profile	Seasonal modulation	Global	53.8 MWh/year

Loss diagram over the whole year

