

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		Bari		Country Italy																			
Situation		Latitude 41.12° N		Longitude 16.87° E																			
Time defined as		Legal Time Time zone UT+1		Altitude 14 m																			
Meteo data:		Bari		Meteonorm 7.2 (1986-2005), Sat=100% - Synthetic																			
Simulation variant :		New simulation with self consumption																					
		Simulation date 24/05/23 11h20																					
		Simulation for the		10th year of operation																			
Simulation parameters		System type No 3D scene defined, no shadings																					
Collector Plane Orientation		Tilt 38°		Azimuth 0°																			
Models used		Transposition Perez		Diffuse Perez, Meteonorm																			
Horizon		Free Horizon																					
Near Shadings		No Shadings																					
User's needs :		daily profile		Seasonal modulation																			
		average		26.5 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		In parallel 11 strings																			
Total number of PV modules		Nb. modules 165		Unit Nom. Power 340 Wp																			
Array global power		Nominal (STC) 56.1 kWp		At operating cond. 50.5 kWp (50°C)																			
Array operating characteristics (50°C)		U mpp 510 V		I mpp 99 A																			
Total area		Module area 329 m²		Cell area 289 m²																			
Inverter		Model Ingecon Sun 50																					
Original PVsyst database		Manufacturer Ingeteam																					
Characteristics		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"> <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
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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"> <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 : New simulation with self consumption
 Simulation for the 10th year of operation

Main system parameters

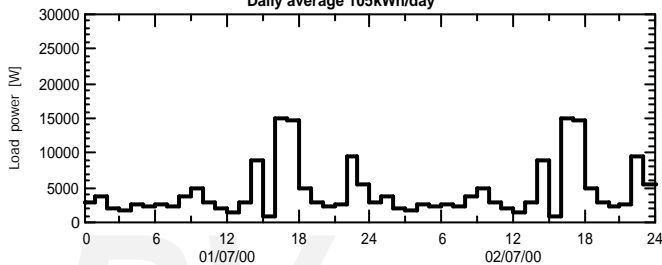
PV Field Orientation	System type	No 3D scene defined, no shadings	
PV modules	tilt	38°	azimuth 0°
PV Array	Model	Q.PLUS L-G4.1 340	Pnom 340 Wp
Inverter	Nb. of modules	165	Pnom total 56.1 kWp
User's needs	Model	Ingecon Sun 50	Pnom 50.0 kW ac
	daily profile	Seasonal modulation	Global 9662 kWh/year

daily profile, Seasonal modulation, average = 26.5 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

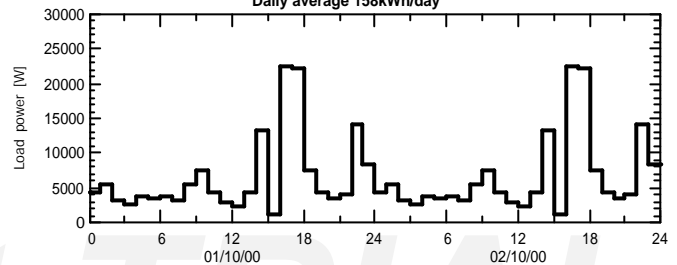
Summer (Jun-Aug)

Daily average 105kWh/day



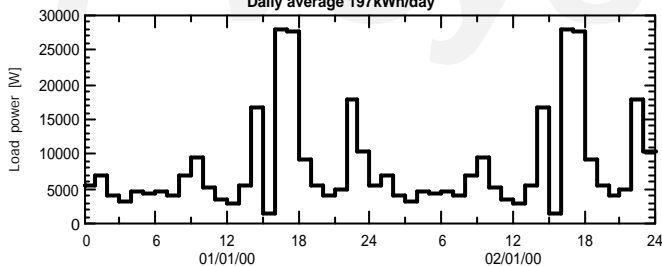
Autumn (Sep-Nov)

Daily average 158kWh/day



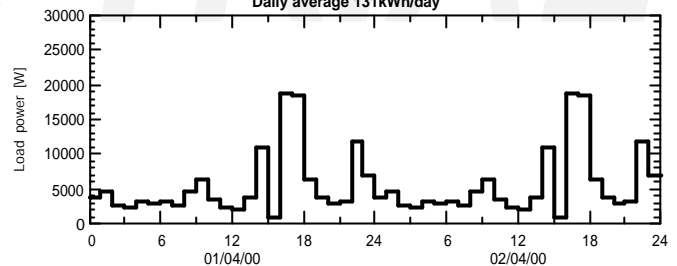
Winter (Dec-Feb)

Daily average 197kWh/day



Spring (Mar-May)

Daily average 131kWh/day



Grid-Connected System: Main results

Project : Valladolid_Grid
Simulation variant : New simulation with self consumption
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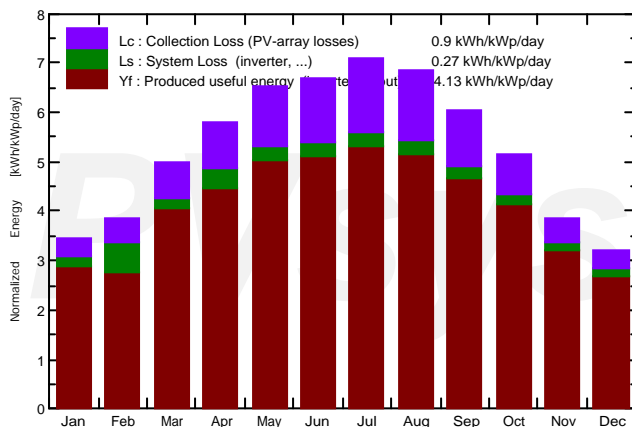
Main system parameters

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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

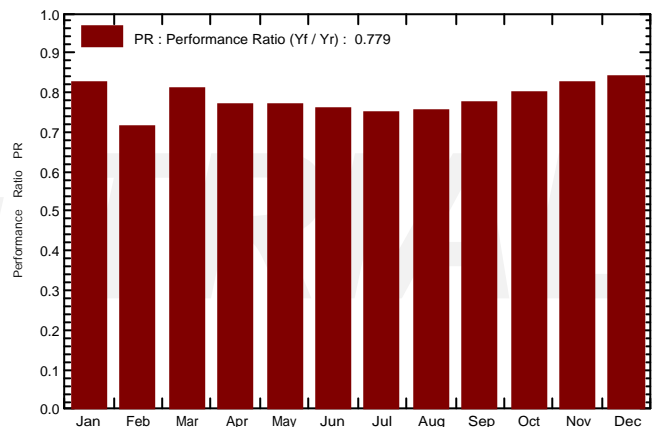
Main simulation results

System Production	Produced Energy	85.63 MWh/year	Specific prod.	1526 kWh/kWp/year
	Performance Ratio PR	77.87 %	Solar Fraction SF	33.50 %

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



Performance Ratio PR



New simulation with self consumption

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	61.2	27.37	7.99	107.5	102.9	5.361	6.105	1.428	3.567	4.676
February	72.7	31.71	8.02	108.1	103.2	5.287	5.514	1.472	2.862	4.042
March	122.6	54.07	11.07	154.7	147.3	7.399	4.070	1.440	5.587	2.630
April	161.1	62.21	13.62	174.6	165.4	8.167	3.938	1.553	5.978	2.386
May	209.5	74.71	18.93	202.4	191.4	9.244	4.070	1.757	7.016	2.313
June	219.4	81.72	22.68	201.1	190.0	9.060	3.151	1.553	7.050	1.598
July	236.0	62.40	25.68	220.0	208.0	9.722	3.256	1.618	7.610	1.638
August	201.8	60.83	25.17	212.5	201.5	9.456	3.256	1.506	7.481	1.750
September	148.8	50.43	20.43	180.6	171.7	8.276	4.726	1.705	6.165	3.021
October	109.2	38.94	17.04	159.9	152.8	7.556	4.884	1.459	5.732	3.425
November	68.9	29.16	12.48	116.3	111.2	5.678	4.726	1.216	4.181	3.510
December	53.0	22.66	9.28	99.6	95.3	4.951	6.105	1.319	3.378	4.785
Year	1664.3	596.20	16.08	1937.2	1840.6	90.157	53.799	18.025	66.608	35.774

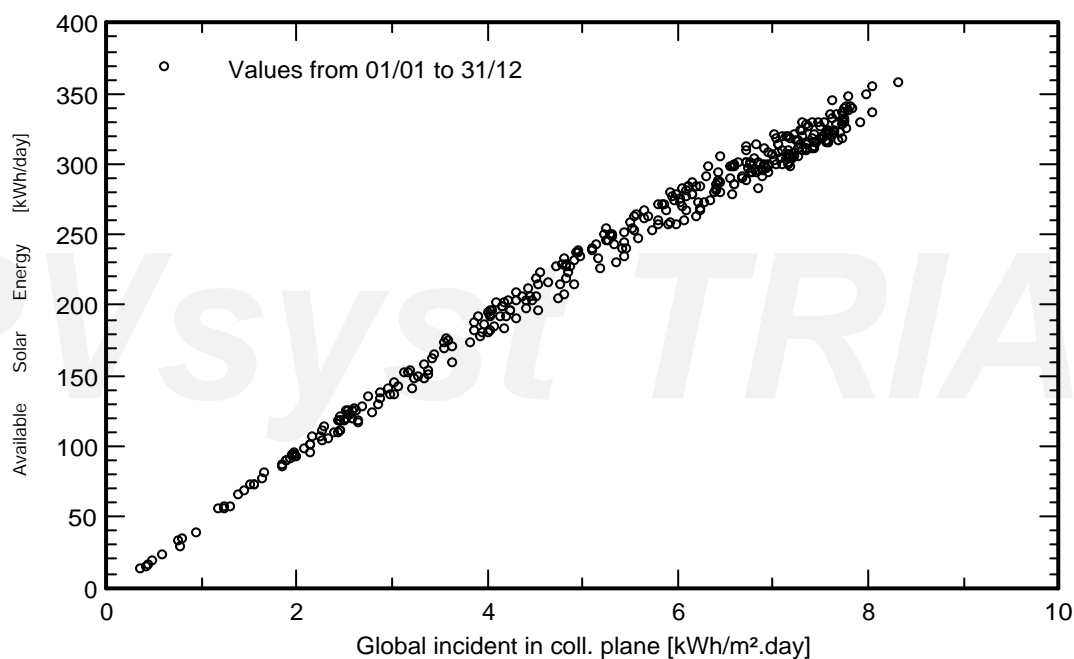
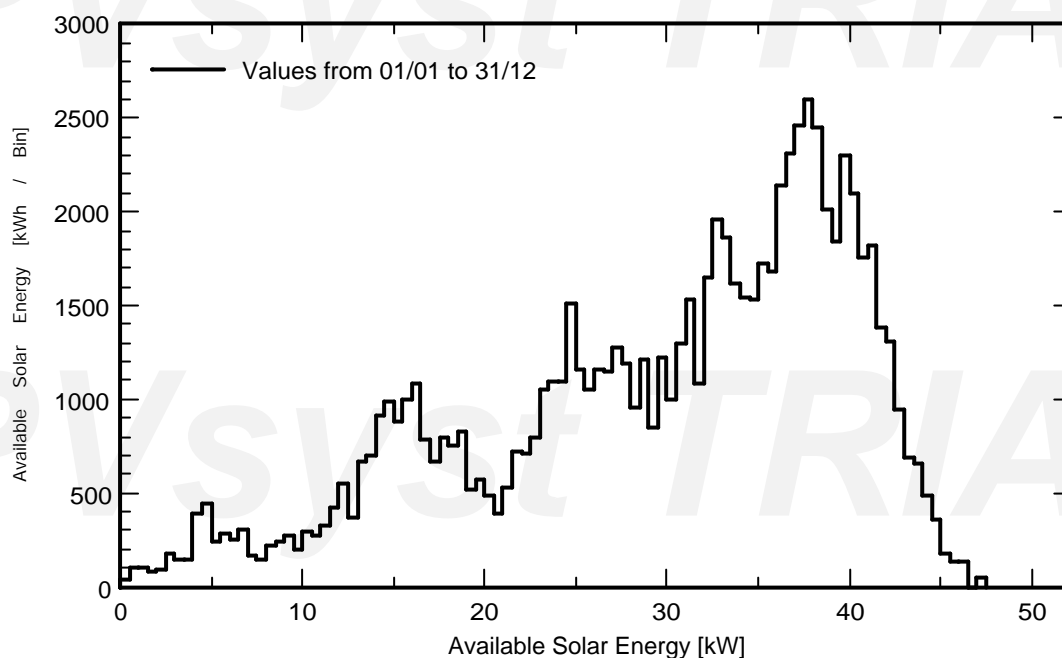
Legends:	GlobHor	Horizontal global irradiation	GlobEff	Effective Global, corr. for IAM and shadings
	DiffHor	Horizontal diffuse irradiation	EArray	Effective energy at the output of the array
	T_Amb	T amb.	E_User	Energy supplied to the user
	GlobInc	Global incident in coll. plane	E_Solar	Energy from the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

Grid-Connected System: Special graphs

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Daily Input/Output diagram**System Output Power Distribution**

Grid-Connected System: Loss diagram

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Simulation variant : New simulation with self consumption
Simulation for the 10th year of operation

Main system parameters

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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

