Grid-Connected System: Simulation parameters

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 losses**

Simulation date	17/05/23 11h03
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 :	Unlimited load (grid)			

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

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

Coefficient Set	C0	C1	C2	C3	C4	C5
	0	0	0	0	0	0

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Unavailability of the system	7.3 days, 3 periods	Time fraction	2.0 %

Grid-Connected System: Main results

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Simulation for the 10th year of operation

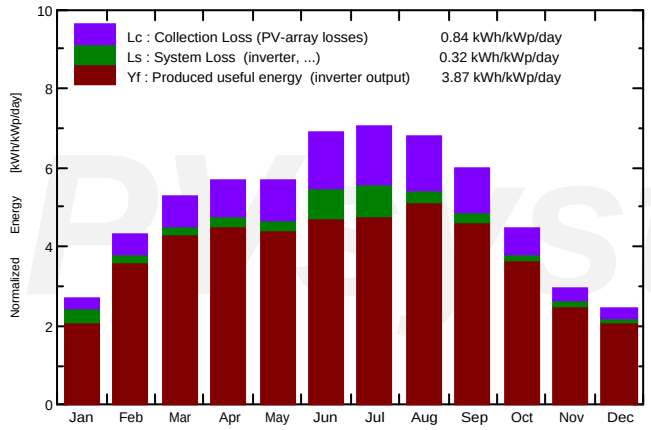
Main system parameters				
System type	**No 3D scene defined, no shadings**			
PV Field Orientation	tilt	35°	azimuth	0°
PV modules	Model	Q.PLUS L-G4.1 340	Pnom	340 Wp
PV Array	Nb. of modules	165	Pnom total	**56.1 kWp**
Inverter	Model	Ingecon Sun 50	Pnom	50.0 kW ac
User's needs	Unlimited load (grid)			

Main simulation results

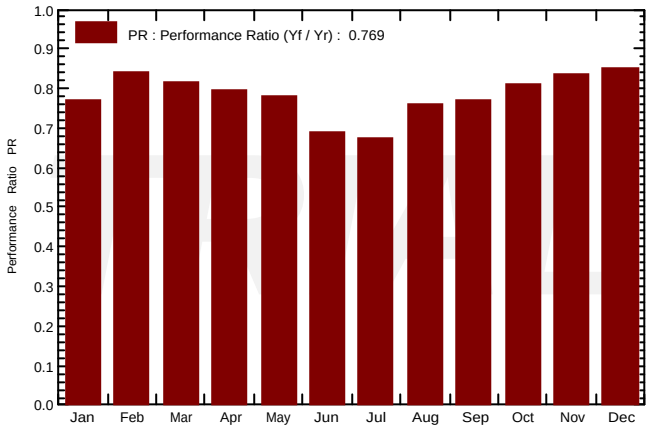
System Production — **Produced Energy** **79.16 MWh/year** — Specific prod. 1411 kWh/kWp/year

Performance Ratio PR 76.93 %

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



Performance Ratio PR



Variant with losses

Balances and main results

	GlobHor kWh/m²	DiffHor kWh/m²	T_Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	PR
January	50.6	24.46	3.84	84.5	80.6	4.256	3.639	0.768
February	79.8	32.35	5.33	121.0	115.6	5.997	5.703	0.840
March	127.9	51.81	8.71	163.4	155.3	7.852	7.468	0.815
April	157.4	63.57	10.55	170.2	161.3	7.994	7.577	0.794
May	182.5	78.05	14.83	176.2	166.5	8.132	7.692	0.778
June	222.8	71.33	20.24	206.7	195.3	9.263	7.984	0.689
July	229.0	65.91	22.03	218.4	206.7	9.688	8.268	0.675
August	199.6	63.26	21.64	210.4	199.6	9.412	8.949	0.758
September	146.3	42.84	17.58	179.3	170.5	8.166	7.749	0.771
October	97.1	40.28	12.90	139.1	132.6	6.667	6.332	0.811
November	57.0	28.90	6.95	89.3	85.2	4.433	4.183	0.835
December	44.1	22.93	4.17	75.6	72.2	3.840	3.613	0.852
Year	1594.2	585.68	12.44	1834.1	1741.3	85.699	79.157	0.769

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_Grid	Energy injected into grid
GlobInc	Global incident in coll. plane	PR	Performance Ratio

Grid-Connected System: Special graphs

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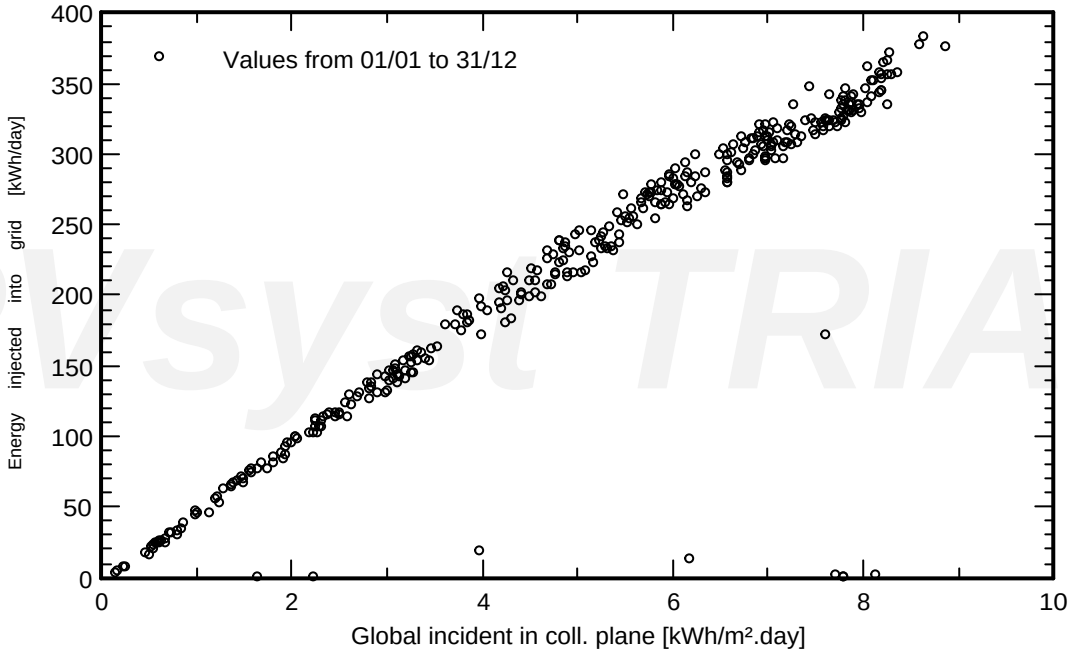
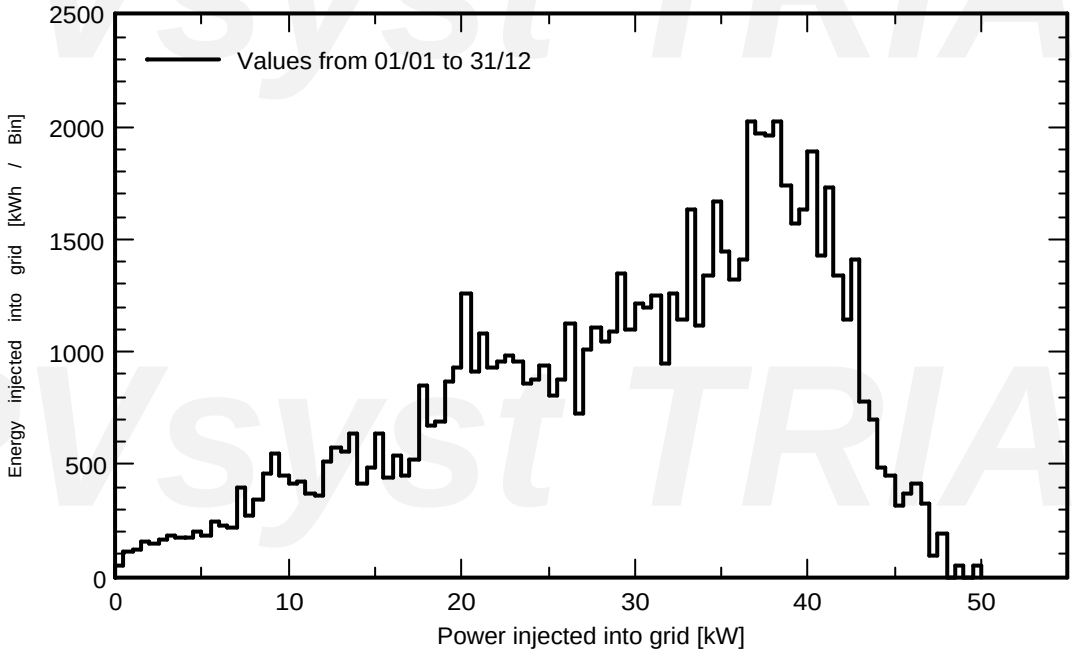
Daily Input/Output diagram



System Output Power Distribution



Grid-Connected System: Loss diagram

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Simulation variant : **Variant with losses**

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Loss diagram over the whole year