Grid-Connected System: Simulation parameters

Project : **Isfahan Uni**

Geographical Site	**Isfahan University**		Country	**Iran**
Situation	Latitude	32.62° N	Longitude	51.66° E
Time defined as	Legal Time	Time zone UT+3.5	Altitude	1596 m
	Albedo	0.20		
Meteo data:	**Isfahan University**	Meteonorm 7.2 (1985-2002), Sat=100% - Synthetic		

Simulation variant : **New simulation variant**

	Simulation date	01/01/20 23h05		
Simulation parameters	System type	**Tables on a building**		
Collector Plane Orientation	Tilt	32°	Azimuth	0°
Sheds configuration	Nb. of sheds	4		
	Sheds spacing	4.81 m	Collector width	3.29 m
Shading limit angle	Limit profile angle	40.9°	Ground cov. Ratio (GCR)	68.4 %
Models used	Transposition	Perez	Diffuse	Perez, Meteonorm
Horizon	Free Horizon			
Near Shadings	Linear shadings			
User's needs :	Unlimited load (grid)			

PV Array Characteristics

PV module	Si-mono	Model	**SSF-PM72**		
Custom parameters definition		Manufacturer	Solar Sanat Firoozeh		
Number of PV modules		In series	18 modules	In parallel	6 strings
Total number of PV modules		Nb. modules	108	Unit Nom. Power	370 Wp
Array global power		Nominal (STC)	**40.0 kWp**	At operating cond.	37.1 kWp (50°C)
Array operating characteristics (50°C)		U mpp	689 V	I mpp	54 A
Total area		Module area	**210 m²**		
Inverter		Model	**Powador 48.0 TL3 Park M**		
Original PVsyst database		Manufacturer	Kaco new energy		
Characteristics		Operating Voltage	200-800 V	Unit Nom. Power	40.0 kWac
Inverter pack		Nb. of inverters	3 * MPPT 33 %	Total Power	40 kWac
				Pnom ratio	1.00

PV Array loss factors

Thermal Loss factor	Uc (const)	20.0 W/m²K	Uv (wind)	0.0 W/m²K / m/s
Wiring Ohmic Loss	Global array res.	209 mOhm	Loss Fraction	1.5 % at STC
Module Quality Loss			Loss Fraction	-0.8 %
Module Mismatch Losses			Loss Fraction	1.0 % at MPP
Strings Mismatch loss			Loss Fraction	0.10 %
Incidence effect, ASHRAE parametrization	IAM =	1 - bo (1/cos i - 1)	bo Param.	0.05

Grid-Connected System: Near shading definition

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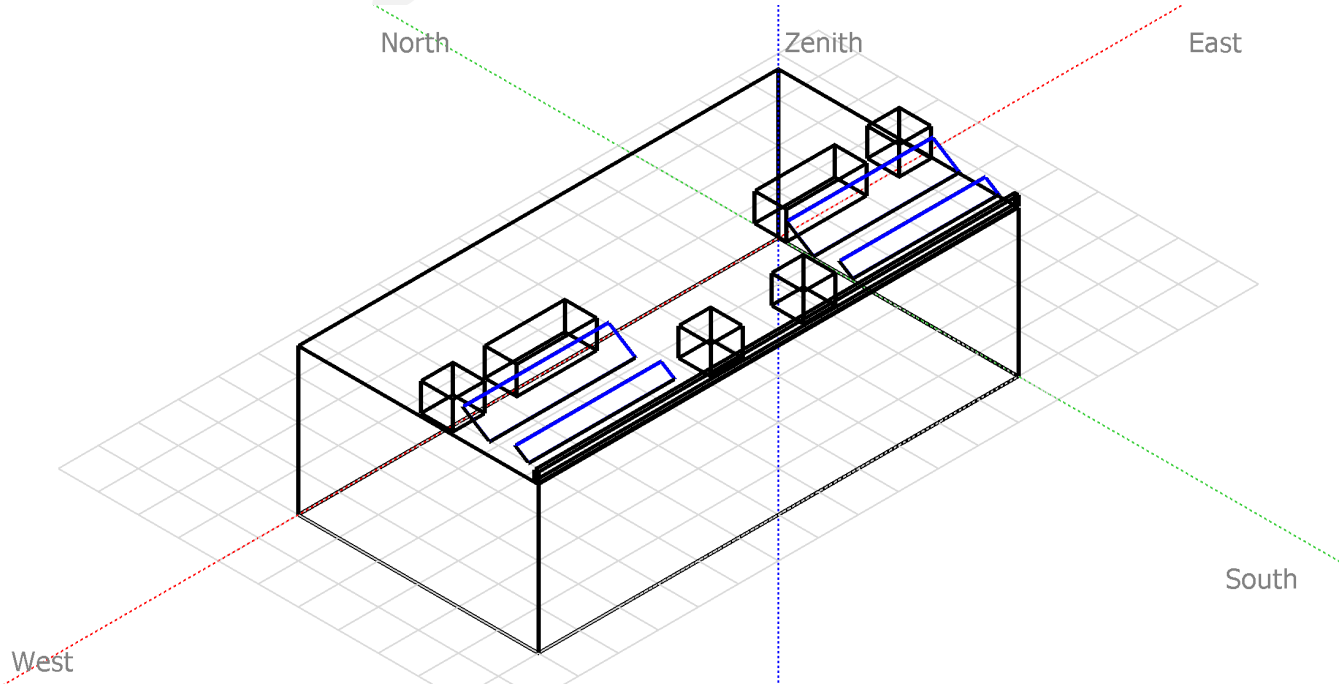
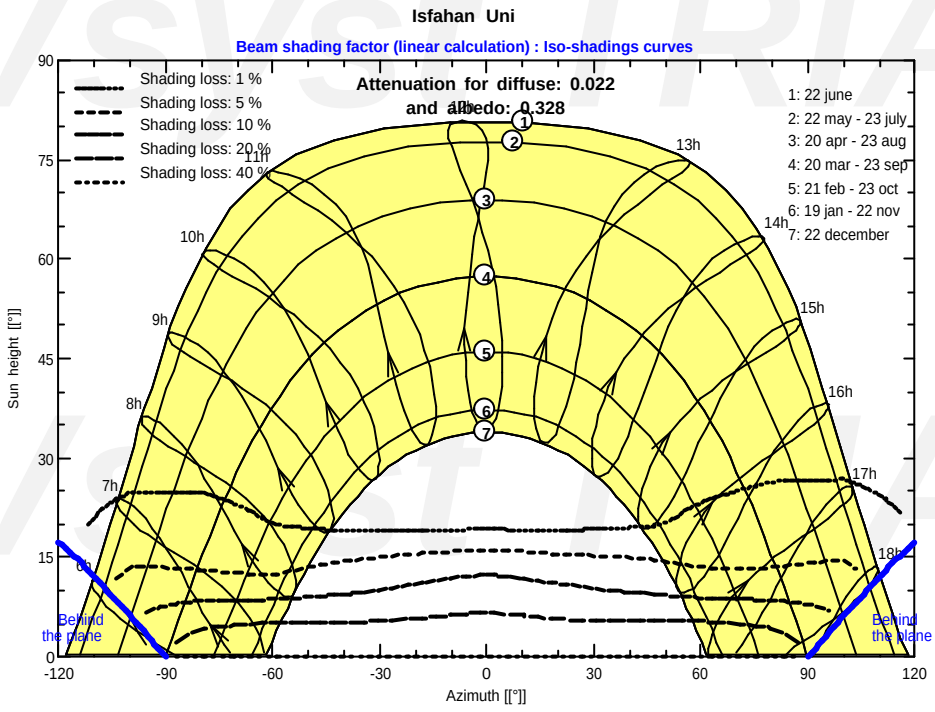
Simulation variant : **New simulation variant**

Main system parameters	System type	**Tables on a building**		
Near Shadings	Linear shadings			
PV Field Orientation	tilt	32°	azimuth	0°
PV modules	Model	SSF-PM72	Pnom	370 Wp
PV Array	Nb. of modules	108	Pnom total	**40.0 kWp**
Inverter	Model	Powador 48.0 TL3 Park M	Pnom	40.0 kW ac
User's needs	Unlimited load (grid)			

Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram



Grid-Connected System: Main results

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Simulation variant : **New simulation variant**

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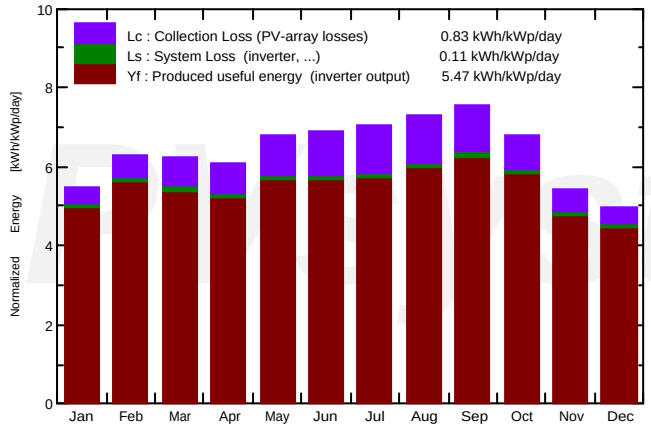
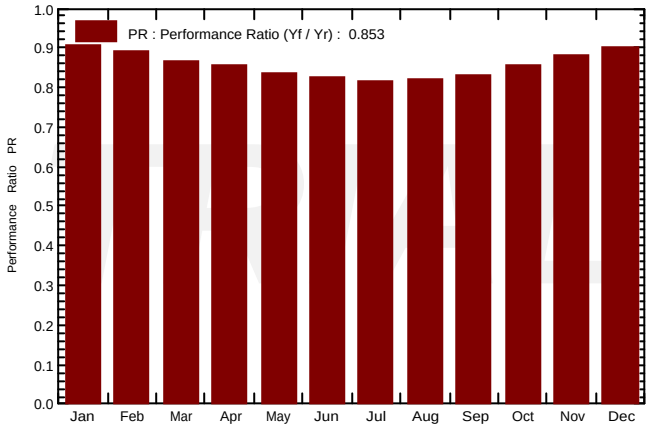
Main simulation results

System Production	**Produced Energy**	**79.76 MWh/year**	Specific prod.	1996 kWh/kWp/year
	Performance Ratio PR	85.34 %		

Normalized productions (per installed kWp): Nominal power 40.0 kWp



Performance Ratio PR



New simulation variant

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	106.6	27.03	1.77	169.7	164.0	6.285	6.159	0.908
February	126.0	31.61	5.57	176.6	170.9	6.420	6.292	0.891
March	162.9	49.59	11.22	192.9	185.9	6.826	6.692	0.868
April	178.0	62.27	16.11	183.0	175.3	6.373	6.251	0.855
May	224.1	63.21	21.92	210.7	201.7	7.188	7.048	0.837
June	233.1	61.16	26.77	207.3	198.1	6.954	6.821	0.824
July	240.1	61.29	30.00	218.3	208.9	7.241	7.102	0.814
August	226.1	55.81	28.24	226.3	217.4	7.548	7.405	0.819
September	198.0	39.43	23.30	226.2	218.1	7.648	7.501	0.830
October	156.4	32.23	17.33	210.9	204.3	7.342	7.200	0.854
November	107.2	30.27	8.75	162.9	157.2	5.852	5.738	0.881
December	94.5	27.54	3.75	154.1	148.6	5.666	5.552	0.901
Year	2052.8	541.42	16.29	2338.9	2250.4	81.342	79.760	0.853

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	Ambient Temperature	E_Grid	Energy injected into grid
GlobInc	Global incident in coll. plane	PR	Performance Ratio

Grid-Connected System: Loss diagram

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Loss diagram over the whole year