

## Grid-Connected System: Simulation parameters

**Project :** 111

<b>Geographical Site</b>	<b>AI kum</b>	<b>Country</b>	<b>Israel</b>
<b>Situation</b>	Latitude	31.53° N	Longitude 34.96° E
Time defined as	Legal Time	Time zone UT+2	Altitude 28 m
	Albedo	0.20	
<b>Meteo data:</b>	<b>AI kum</b>	Meteonorm 7.1 (1990-2004), Sat=44% - Synthetic	

**Simulation variant :** New simulation variant

Simulation date 09/05/19 02h13

<b>Simulation parameters</b>	System type	<b>No 3D scene defined</b>	
<b>Collector Plane Orientation</b>	Tilt	28°	Azimuth 0°
<b>Models used</b>	Transposition	Perez	Diffuse Perez, Meteonorm
<b>Horizon</b>	Free Horizon		
<b>Near Shadings</b>	No Shadings		

### PV Array Characteristics

<b>PV module</b>	Si-mono	Model	<b>LG 400 N2W-A5</b>	
Original PVsyst database		Manufacturer	LG Electronics	
Number of PV modules		In series	16 modules	In parallel 4 strings
Total number of PV modules		Nb. modules	64	Unit Nom. Power 400 Wp
Array global power		Nominal (STC)	<b>25.60 kWp</b>	At operating cond. 23.32 kWp (50°C)
Array operating characteristics (50°C)		U mpp	586 V	I mpp 40 A
Total area		Module area	<b>133 m<sup>2</sup></b>	Cell area 119 m <sup>2</sup>

### Inverter

Original PVsyst database	Model	<b>TRIO-27.6-TL-OUTD-400 (27.6 kWac max)</b>		
Characteristics	Manufacturer	ABB		
	Operating Voltage	200-950 V	Unit Nom. Power	27.6 kWac
Inverter pack	Nb. of inverters	2 * MPPT 50 %	Total Power	28 kWac
			Pnom ratio	0.93

### PV Array loss factors

Thermal Loss factor	Uc (const)	20.0 W/m <sup>2</sup> K	Uv (wind)	0.0 W/m <sup>2</sup> K / m/s
Wiring Ohmic Loss	Global array res.	242 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 (IAM): Fresnel AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.816	0.681	0.440	0.000

**User's needs :** Unlimited load (grid)

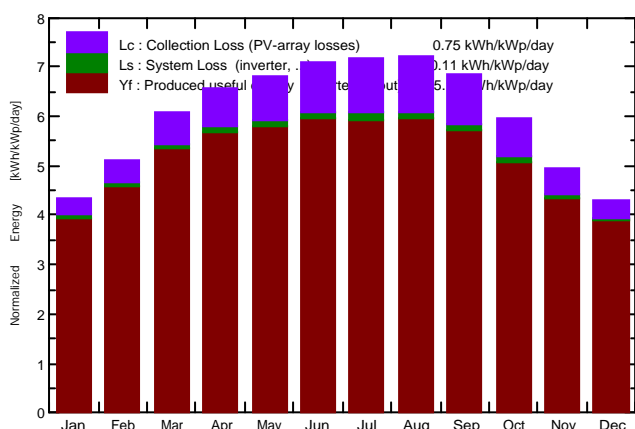
## Grid-Connected System: Main results

**Project :** 111  
**Simulation variant :** New simulation variant

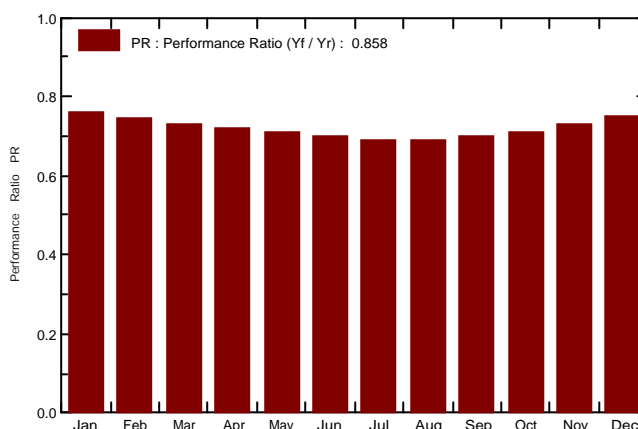
<b>Main system parameters</b>		System type	<b>Grid-Connected</b>	
PV Field Orientation	tilt	28°	azimuth	0°
PV modules	Model	LG 400 N2W-A5	Pnom	400 Wp
PV Array	Nb. of modules	64	Pnom total	<b>25.60 kWp</b>
Inverter	TRIO-27.6-TL-OUTD-400 (27.6 kWac max)		Pnom	27.60 kW ac
User's needs	Unlimited load (grid)			

**Main simulation results**  
 System Production **Produced Energy 48.47 MWh/year** Specific prod. 1893 kWh/kWp/year  
 Performance Ratio PR 85.84 %

**Normalized productions (per installed kWp): Nominal power 25.60 kWp**



**Performance Ratio PR**



### New simulation variant Balances and main results

	GlobHor	DiffHor	T Amb	GlobInc	GlobEff	EArray	E_Grid	PR
	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	°C	kWh/m <sup>2</sup>	kWh/m <sup>2</sup>	MWh	MWh	
<b>January</b>	94.7	42.89	13.06	134.4	131.7	3.196	3.133	0.911
<b>February</b>	110.4	43.89	13.72	143.2	140.3	3.345	3.280	0.895
<b>March</b>	161.8	62.72	16.34	188.7	184.6	4.327	4.240	0.878
<b>April</b>	188.8	72.50	19.20	197.4	192.6	4.453	4.361	0.863
<b>May</b>	222.5	77.04	22.44	211.7	206.1	4.703	4.605	0.850
<b>June</b>	234.0	68.58	25.07	212.9	207.0	4.671	4.572	0.839
<b>July</b>	239.3	67.45	27.65	222.0	216.0	4.815	4.710	0.829
<b>August</b>	222.1	62.81	27.94	223.8	218.5	4.839	4.733	0.826
<b>September</b>	182.7	55.66	26.05	205.1	200.7	4.486	4.391	0.836
<b>October</b>	145.4	49.53	23.66	184.7	180.9	4.117	4.033	0.853
<b>November</b>	104.9	39.52	18.88	148.1	145.4	3.400	3.332	0.879
<b>December</b>	90.2	36.60	15.10	133.6	131.1	3.142	3.081	0.901
<b>Year</b>	1996.8	679.20	20.80	2205.7	2154.9	49.496	48.472	0.858

Legends:

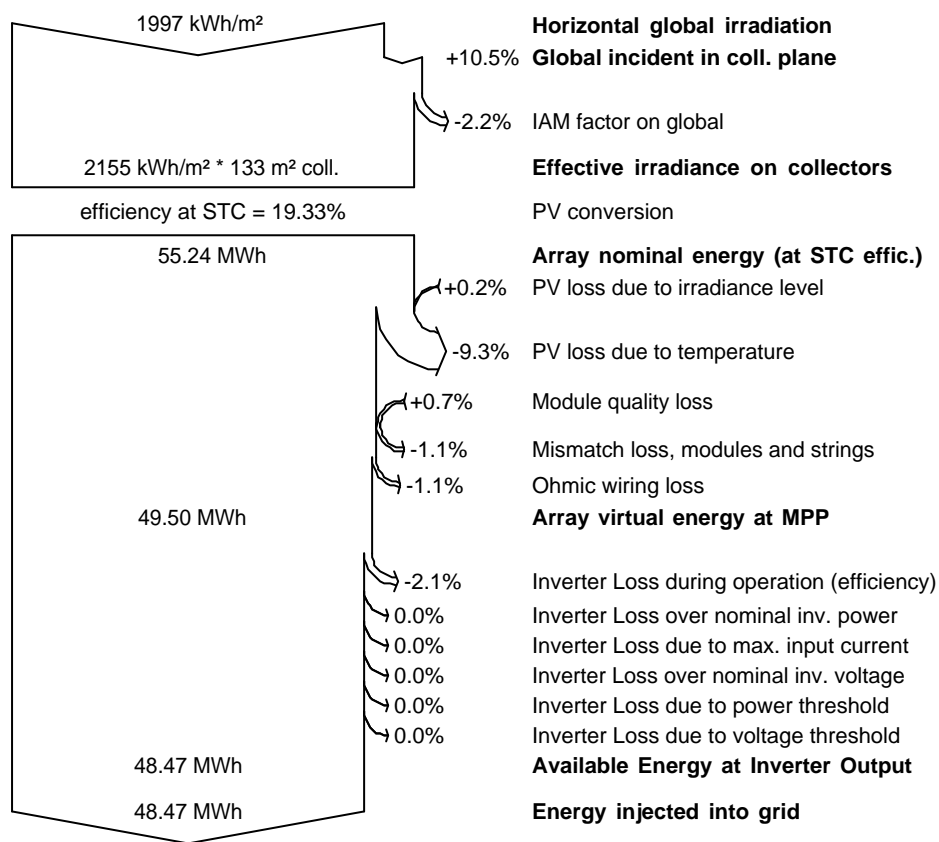
GlobHor	Horizontal global irradiation	GlobEff	Effective Global, corr. for IAM and shadings
DiffHor	Horizontal diffuse irradiation	EArray	Effective energy at the output of the array
T Amb	Ambient Temperature	E_Grid	Energy injected into grid
GlobInc	Global incident in coll. plane	PR	Performance Ratio

## Grid-Connected System: Loss diagram

**Project :** 111  
**Simulation variant :** New simulation variant

<b>Main system parameters</b>	System type <b>Grid-Connected</b>		
PV Field Orientation	tilt 28°	azimuth	0°
PV modules	Model LG 400 N2W-A5	Pnom	400 Wp
PV Array	Nb. of modules 64	Pnom total	<b>25.60 kWp</b>
Inverter	TRIO-27.6-TL-OUTD-400 (27.6 kWac max)	Pnom	27.60 kW ac
User's needs	Unlimited load (grid)		

### Loss diagram over the whole year



## Grid-Connected System: CO2 Balance

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<b>Main system parameters</b>	System type <b>Grid-Connected</b>	
PV Field Orientation	tilt 28°	azimuth 0°
PV modules	Model LG 400 N2W-A5	Pnom 400 Wp
PV Array	Nb. of modules 64	Pnom total <b>25.60 kWp</b>
Inverter	TRIO-27.6-TL-OUTD-400 (27.6 kWac max)	Pnom 27.60 kW ac
User's needs	Unlimited load (grid)	

**Produced Emissions** **Total: 43.90 tCO2**  
 Source: Detailed calculation from table below

**Replaced Emissions** **Total: 1016.4 tCO2**  
 System production: 48.47 MWh/yr Lifetime: 30 years  
Annual Degradation: 1.0 %  
 Grid Lifecycle Emissions: 699 gCO2/kWh  
 Source: IEA List Country: Israel

**CO2 Emission Balance** **Total: 838.0 tCO2**

**System Lifecycle Emissions Details:**

Item	Modules	Supports
LCE	1713 kgCO2/kWp	4.66 kgCO2/kg
Quantity	24.0 kWp	600 kg
Subtotal [kgCO2]	41105	2797

