

Simulazione Milano 10KWp Fisso  
Progetto ECONSTEK

**Grid-connected PV system: Simulation parameters**

**Project :** **MILANO 10KWp FISSO**

**Geographical site :** **Milano2** **Country** **Italy**

**Situation :** Latitude 45.3°N Longitude 9.1°E  
Time defined as : Legal time Time zone UT+1 Altitude 100 m  
Albedo 0.20

**Meteo data :** Milano , synthetic hourly data

**Simulation variant :** **Simulation variant**

Simulation date 15/12/06 18h36

**Simulation parameters :**

**Collector Plane orientation** Tilt 33° Azimuth 0°

**Horizon** Free horizon

**Near shadings** No Shadings

**PV array characteristics :**

**PV module:** Si-poly Module name **KC 175GT**  
Manufacturer Kyocera

Number of PV modules : in serie 10 modules in parallel 6 strings  
Total number of PV modules : Nb. modules 60 unit nom. power 175 Wp  
Array global power Nominal (STC) **11 kWp** At oper. cond. 9.1 kWp (50°C)  
Array operating characteristics (50°C) U mpp 207 V I mpp 44 A  
Total area Module area **76.6 m<sup>2</sup>**

**PV array loss factors :**

Heat Loss Factor k (const) 29.0 W/m<sup>2</sup>K k (wind) 0.0 W/m<sup>2</sup>K / m/s  
=> Nominal Oper. Coll. Temp. (800 W/m<sup>2</sup>, Tamb=20°C, wind 1 m/s) NOCT 45 °C  
Wiring ohmic losses Global field res. 157.3 mOhm Loss fraction 3.1 % at STC  
Serie diode loss Voltage drop 0.7 V Loss fraction 0.3 % at STC  
Module quality losses Loss fraction 3.0 %  
Module mismatch losses Loss fraction 2.0 % at mpp  
Incidence effect: "Ashrae" parametrization IAM = 1-bo (1/cos i - 1) bo 0.05

**System parameter:** System type **Grid-connected**

**Inverter** Model **IG 40 EI**  
Manufacturer Fronius

Inverter characteristics Operating voltage 150-400 V Unit nom. power 3.5 kW AC  
Inverter pack Number of inverters 3 units Total power 10.5 kW AC

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

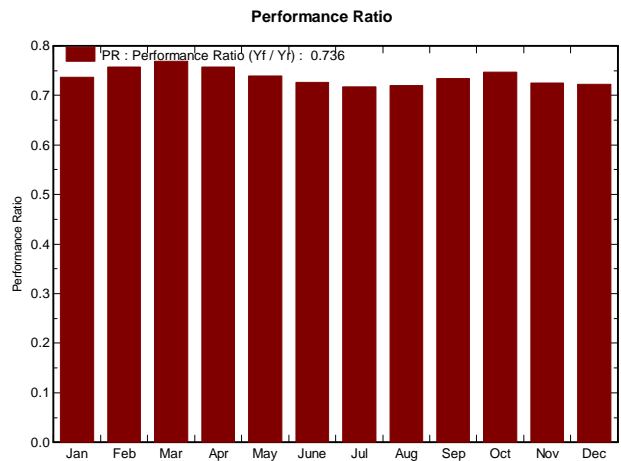
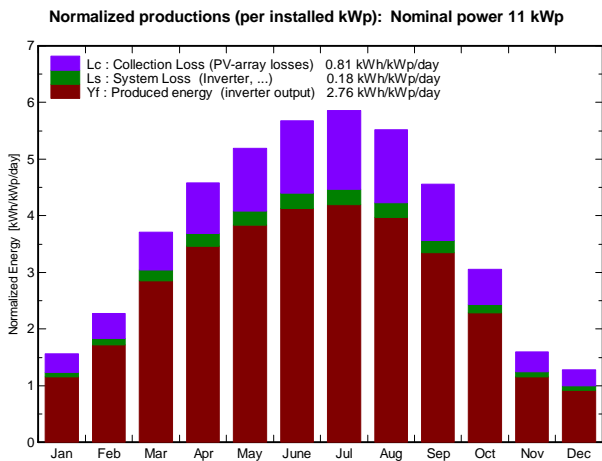
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Grid-connected PV system: Main results

**Project :** MILANO 10KWp FISSO  
**Simulation variant :** Simulation variant

<b>Main system parameters</b>	System type	<b>Grid-connected</b>		
PV field orientation	Tilt	33°	Azimet	0°
PV modules	Model	KC 175GT	Pnom	175 Wp
PV array	Nb of modules	60	Pnom total	<b>11 kWp</b>
Inverter	Model	IG 40 EI	Pnom	3.5 kWp ac
Inverter pack	Nb of units	3	Pnom total	<b>11 kWp ac</b>
User's needs	Unlimited load (grid)			

**Main simulation results**  
System production **Produced energy 10.57 MWh/year** Specific 1007 kWh/kWp/year  
Performance ratio PR **73.6 %**



**Simulation variant**  
**Balances and main results**

	GlobHor kWh/m <sup>2</sup>	T Amb °C	GlobInc kWh/m <sup>2</sup>	GlobEff kWh/m <sup>2</sup>	EArray kWh	EOutInv kWh	EffArrR %	EffSysR %
January	33.0	2.80	48.5	46.9	403	375	10.85	10.09
February	50.0	4.00	63.6	61.5	541	505	11.10	10.37
March	96.0	7.10	115.0	111.5	989	928	11.22	10.53
April	129.0	10.00	137.4	133.0	1163	1092	11.05	10.37
May	162.0	14.80	160.9	155.6	1329	1247	10.78	10.12
June	179.0	18.60	170.4	164.7	1384	1300	10.60	9.95
July	188.0	21.70	181.7	175.6	1455	1367	10.45	9.82
August	164.0	21.50	171.2	165.7	1376	1294	10.49	9.86
September	117.0	18.60	136.7	132.6	1122	1054	10.71	10.06
October	73.0	12.70	94.8	92.0	793	743	10.92	10.24
November	36.0	6.70	48.0	46.4	393	365	10.69	9.93
December	28.0	3.20	39.5	38.2	324	300	10.68	9.90
Yearly sum	1255.0	11.85	1367.6	1323.7	11271	10571	10.76	10.09

Legends: GlobHor Horizontal global irradiation EArray Effective energy at the output of the array  
 T Amb Ambient Temperature EOutInv Available Energy at Inverter Output  
 GlobInc Global incident in coll. plane EffArrR Effic. Eout array / rough area  
 GlobEff "Effective" Global, corr. for IAM and shadings EffSysR Effic. Eout system / rough area

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Grid-connected PV system: Loss diagram

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**Simulation variant :** Simulation variant

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Loss diagram over the whole year

