

Simulazione Milano Sistema Inseguito +45 -45 Est-Ovest
Progetto Econtek

Grid-connected PV system: Simulation parameters

Project : **MILANO 10KWp INSEGUITO**

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 18h40

Simulation parameters :

Tracking plane, tilted axis Axis tilt 0° Axis Azimuth 37°
Rotation limitations Minimum Phi -45° Maximum Phi 45°

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 m²**

PV array loss factors :

Heat Loss Factor k (const) 29.0 W/m²K k (wind) 0.0 W/m²K / m/s
=> Nominal Oper. Coll. Temp. (800 W/m², 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

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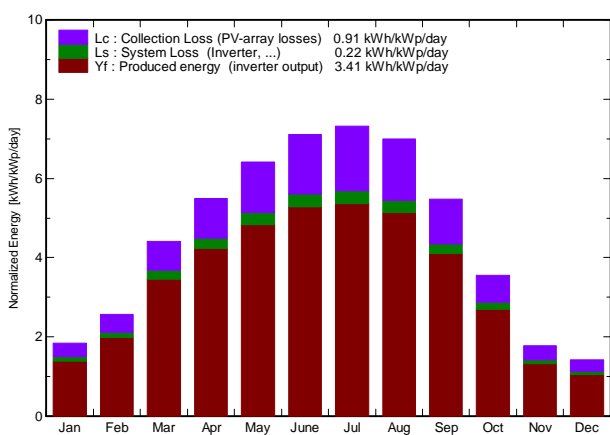
Simulation variant : Simulation variant

Main system parameters	System type	Grid-connected		
PV field orientation	Tracking, tilted axis, axis tilt:	37°	axis azimuth	0°
PV modules	Model	KC 175GT	Pnom	175 Wp
PV array	Nb of modules	60	Pnom total	11 kWp
Inverter	Model	IG 40 EI	Pnom	3.5 kWp ac
Inverter pack	Nb of units	3	Pnom total	11 kWp ac
User's needs	Unlimited load (grid)			

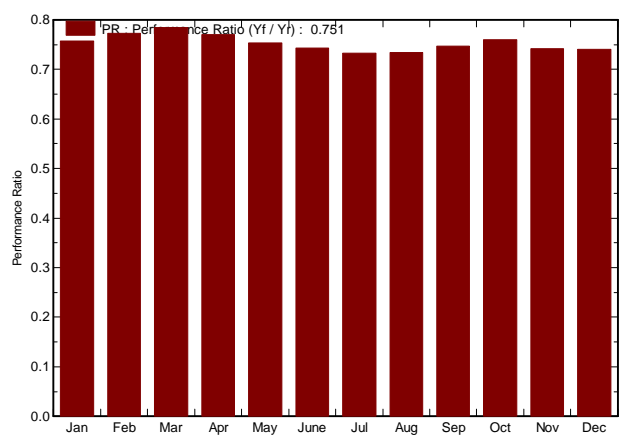
Main simulation results

System production	Produced energy	13.08 MWh/year	Specific	1245 kWh/kWp/year
	Performance ratio PR	75.1 %		

Normalized productions (per installed kWp): Nominal power 11 kWp



Performance Ratio



Simulation variant

Balances and main results

	GlobHor kWh/m ²	T Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	EOutInv kWh	EffArrR %	EffSysR %
January	33.0	2.80	57.2	55.9	488	455	11.12	10.38
February	50.0	4.00	72.1	70.4	625	585	11.30	10.58
March	96.0	7.10	136.8	134.0	1198	1126	11.43	10.75
April	129.0	10.00	164.8	161.3	1417	1332	11.22	10.55
May	162.0	14.80	198.9	194.6	1673	1573	10.97	10.32
June	179.0	18.60	213.2	208.4	1767	1663	10.81	10.18
July	188.0	21.70	226.8	221.9	1853	1744	10.66	10.03
August	164.0	21.50	216.6	212.5	1774	1670	10.69	10.06
September	117.0	18.60	164.5	161.3	1371	1290	10.88	10.24
October	73.0	12.70	110.1	107.9	935	878	11.08	10.40
November	36.0	6.70	53.6	52.2	447	417	10.91	10.16
December	28.0	3.20	44.0	42.9	368	342	10.92	10.15
Yearly sum	1255.0	11.85	1658.7	1623.1	13916	13076	10.95	10.29

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

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Grid-connected PV system: Loss diagram

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Loss diagram over the whole year

