

### Grid-Connected System: Simulation parameters

**Project :** Sofiyivka

**Geographical Site** Sofiyivka Country **Ukraine**

**Situation**  
 Time defined as Latitude 46.59° N Longitude 32.28° E  
 Legal Time Time zone UT+2 Altitude 8 m  
 Albedo 0.20

**Meteo data:** Sofiyivka Meteororm 7.2 (1991-2010), Sat=100% - Synthetic

**Simulation variant :** Rizen 320W, tilt 36deg

Simulation date 25/07/19 16h56

**Simulation parameters** System type **No 3D scene defined, no shadings**  
**Collector Plane Orientation** Tilt 30° Azimuth 0°  
**Models used** Transposition Perez Diffuse Perez, Meteororm  
**Horizon** Free Horizon  
**Near Shadings** No Shadings  
**User's needs :** Unlimited load (grid)

**PV Array Characteristics**

**PV module** Si-mono Model **RSM120-6-320M**  
 Custom parameters definition Manufacturer Risen Energy Co., Ltd  
 Number of PV modules In series 23 modules In parallel 7 strings  
 Total number of PV modules Nb. modules 161 Unit Nom. Power 320 Wp  
 Array global power Nominal (STC) **51.5 kWp** At operating cond. 46.5 kWp (50°C)  
 Array operating characteristics (50°C) U mpp 691 V I mpp 67 A  
 Total area Module area **269 m<sup>2</sup>** Cell area 236 m<sup>2</sup>

**Inverter** Model **GW50KN-MT**  
 Custom parameters definition Manufacturer Goodwe  
 Characteristics Operating Voltage 200-1000 V Unit Nom. Power 50.0 kWac  
 Inverter pack Nb. of inverters 1 units Total Power 50 kWac  
 Pnom ratio 1.03

**PV Array loss factors**

Thermal Loss factor U<sub>c</sub> (const) 20.0 W/m<sup>2</sup>K U<sub>v</sub> (wind) 0.0 W/m<sup>2</sup>K / m/s  
 Wiring Ohmic Loss Global array res. 173 mOhm Loss Fraction 1.5 % at STC  
 LID - Light Induced Degradation Loss Fraction 2.5 %  
 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): User defined profile

0°	20°	30°	40°	50°	60°	70°	80°	90°
1.000	1.000	1.000	1.000	1.000	0.988	0.925	0.733	0.000

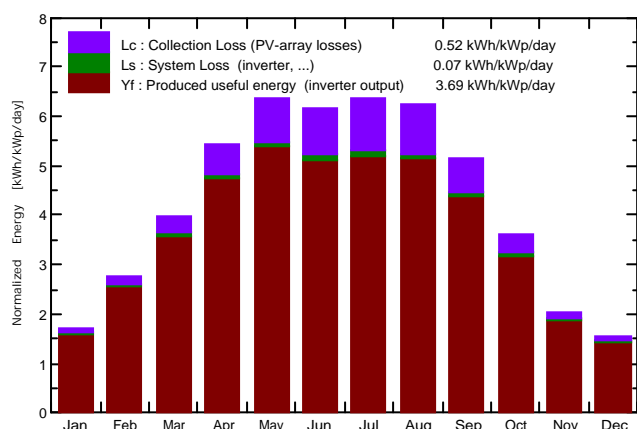
## Grid-Connected System: Main results

**Project :** Sofiyivka  
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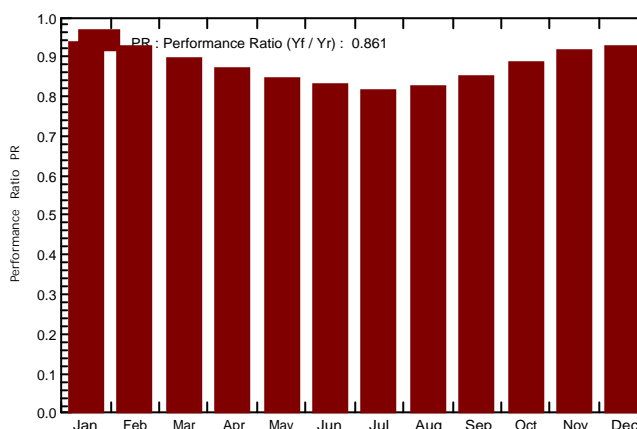
<b>Main system parameters</b>		System type	<b>No 3D scene defined, no shadings</b>	
PV Field Orientation		tilt	30°	azimuth 0°
PV modules		Model	RSM120-6-320M	Pnom 320 Wp
PV Array		Nb. of modules	161	Pnom total <b>51.5 kWp</b>
Inverter		Model	GW50KN-MT	Pnom 50.0 kW ac
User's needs		Unlimited load (grid)		

**Main simulation results**  
 System Production **Produced Energy 69.42 MWh/year** Specific prod. 1347 kWh/kWp/year  
 Performance Ratio PR **86.07 %**

**Normalized productions (per installed kWp): Nominal power 51.5 kWp**



**Performance Ratio PR**



Rizen 320W, tilt 36deg  
 Balances and main results

	GlobHor kWh/m <sup>2</sup>	DiffHor kWh/m <sup>2</sup>	T_Amb °C	GlobInc kWh/m <sup>2</sup>	GlobEff kWh/m <sup>2</sup>	EArray MWh	E_Grid MWh	PR
January	33.2	20.49	-1.39	53.3	52.7	2.640	2.576	0.938
February	53.6	29.50	-0.81	77.3	76.2	3.782	3.699	0.929
March	97.3	46.99	4.33	123.1	121.3	5.823	5.702	0.899
April	143.3	65.48	10.42	162.6	160.0	7.458	7.316	0.873
May	191.9	73.15	16.78	197.5	194.2	8.768	8.598	0.845
June	188.6	79.14	20.43	185.2	182.1	8.076	7.918	0.830
July	196.6	74.78	23.98	197.4	194.4	8.483	8.321	0.818
August	176.1	75.40	23.27	193.6	190.8	8.377	8.221	0.824
September	125.9	53.57	17.01	154.9	152.6	6.921	6.797	0.852
October	79.4	38.96	11.19	111.5	110.1	5.191	5.094	0.887
November	39.5	23.87	5.13	61.4	60.6	2.956	2.892	0.915
December	27.7	15.72	0.36	47.7	47.2	2.343	2.281	0.927
Year	1353.1	597.06	10.96	1565.5	1542.1	70.819	69.417	0.861

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

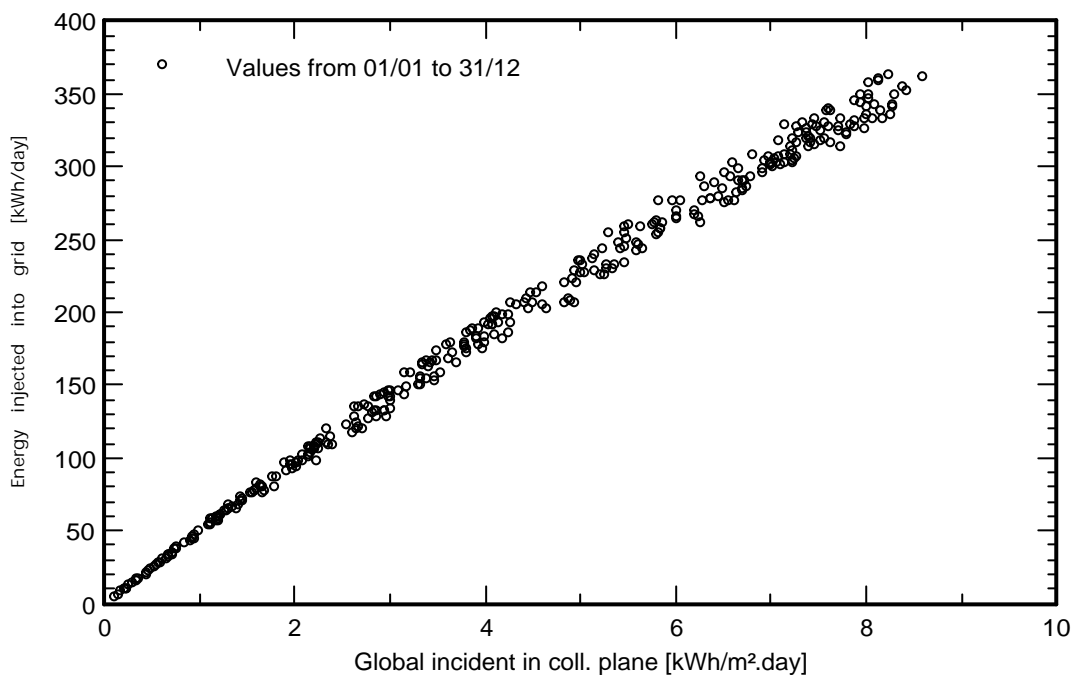
## Grid-Connected System: Special graphs

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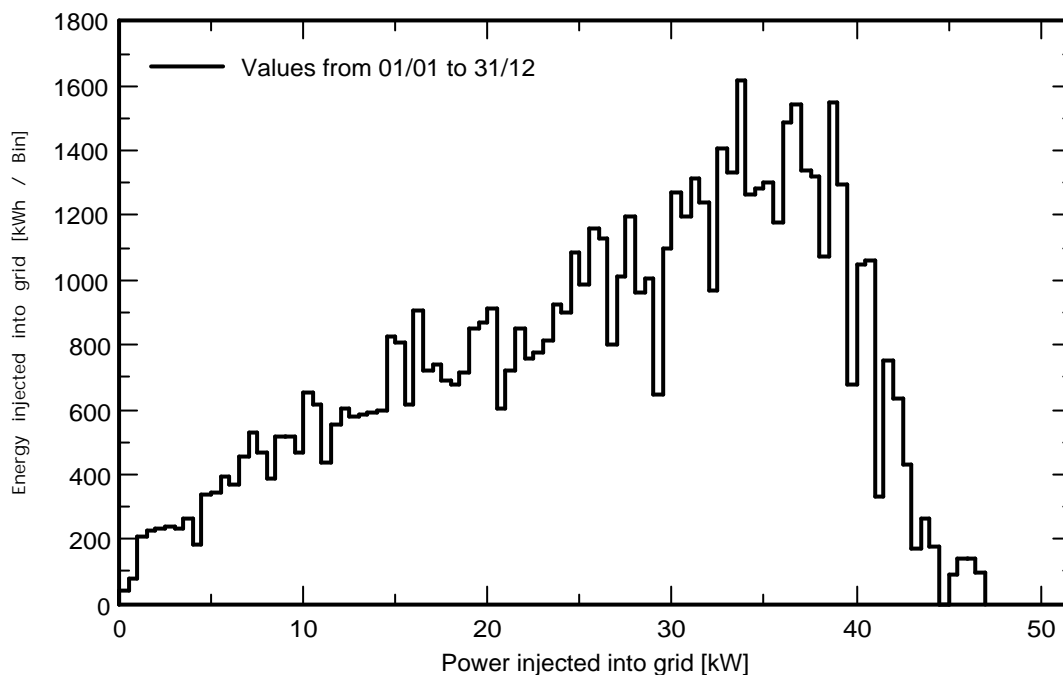
**Main system parameters**

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PV Array	Nb. of modules	161	Pnom total <b>51.5 kWp</b>
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User's needs	Unlimited load (grid)		

### Daily Input/Output diagram



### System Output Power Distribution



## Grid-Connected System: Loss diagram

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### Loss diagram over the whole year

