



Community Power Group, LLC  
5636 Connecticut Ave #42729  
Washington, DC 20015

March 1, 2021

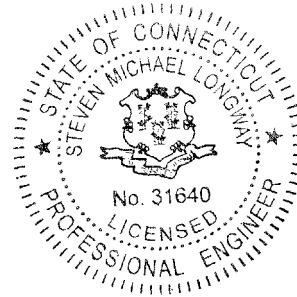
TO WHOM IT MAY CONCERN,

I, Steven M. Longway P.E. of LaBella Associates, Inc. hereby certify that the Average Annual Production for the project 24 Middle Solar, project size: 4MWac, located at 24 Middle Road, Ellington CT 06029 (Tolland County #ELLI M:053 B:47, L:0000) is true and correct to the best of my knowledge (Exhibit A). The calculations provided are based on the typical facility conditions for an average year. This letter is intended to serve as a "Connecticut Licensed Professional Engineer Certification" in regards to the 2021 SCEF RFP.

Sincerely,

A handwritten signature in black ink that reads "Steven M. Longway".

Steven M. Longway  
Professional Engineer,  
Licensed in the State of Connecticut





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**Exhibit A**

PVSyst Production Model - Variant: Ellington 550W 2.28.22 (following pages)

# PVsyst - Simulation report

## Grid-Connected System

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Project: Ellington2021

Variant: Ellington 550W 2.28.22

Tracking system

System power: 5866 kWp

Ellington - United States

**Author**

Community Power Group, LLC (United states)



# Project: Ellington2021

Variant: Ellington 550W 2.28.22

## PVsyst V7.2.12

VC3, Simulation date:  
28/02/22 16:06  
with v7.2.12

Community Power Group, LLC (United states)

### Project summary

<b>Geographical Site</b> Ellington United States	<b>Situation</b> Latitude 41.85 °N Longitude -72.45 °W Altitude 165 m Time zone UTC-5	<b>Project settings</b> Albedo 0.20
<b>Meteo data</b> 41.89478 -72.48407 Solar Anywhere, satellite data, SUNY model - TMY		

### System summary

<b>Grid-Connected System</b>	<b>Tracking system</b>	<b>Near Shadings</b>
<b>PV Field Orientation</b> Orientation Tracking plane, tilted axis Avg axis tilt 1.4 ° Avg axis azim. 0.0 °	<b>Tracking algorithm</b> Astronomic calculation	Linear shadings
<b>System information</b> <b>PV Array</b> Nb. of modules 10665 units Pnom total 5866 kWp	<b>Inverters</b> Nb. of units 32 units Pnom total 4000 kWac Pnom ratio 1.466	
<b>User's needs</b> Unlimited load (grid)		

### Results summary

Produced Energy	9 GWh/year	Specific production	1491 kWh/kWp/year	Perf. Ratio PR	81.84 %
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**PVsyst V7.2.12**

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**General parameters**

<b>Grid-Connected System</b>		<b>Tracking system</b>			
<b>PV Field Orientation</b>		<b>Tracking algorithm</b>		<b>Trackers configuration</b>	
<b>Orientation</b>		Astronomic calculation		Nb. of trackers 354 units	
Tracking plane, tilted axis				<b>Sizes</b>	
Avg axis tilt	1.4 °			Tracker Spacing 5.83 m	
Avg axis azim.	0.0 °			Collector width 2.17 m	
				Ground Cov. Ratio (GCR) 37.3 %	
				Phi min / max. +/- 52.0 °	
				<b>Shading limit angles</b>	
				Phi limits +/- 68.0 °	
<b>Models used</b>		<b>Near Shadings</b>		<b>User's needs</b>	
Transposition	Perez	Linear shadings		Unlimited load (grid)	
Diffuse	Imported				
Circumsolar	separate				
<b>Horizon</b>					
Free Horizon					
<b>Bifacial system</b>					
Model	2D Calculation				
	unlimited trackers				
<b>Bifacial model geometry</b>				<b>Bifacial model definitions</b>	
Tracker Spacing	5.83 m	Ground albedo		0.30	
Tracker width	2.17 m	Bifaciality factor		70 %	
GCR	37.3 %	Rear shading factor		5.0 %	
Axis height above ground	2.10 m	Rear mismatch loss		10.0 %	
		Shed transparent fraction		0.0 %	

**PV Array Characteristics**

<b>PV module</b>		<b>Inverter</b>	
Manufacturer	Centro Energy	Manufacturer	Chint Power Systems
Model	M550 Wp 144 cells Bifacial	Model	CPS SCA125KTL-DO/US-600
	(Original PVsyst database)		(Custom parameters definition)
Unit Nom. Power	550 Wp	Unit Nom. Power	125 kWac
Number of PV modules	10665 units	Number of inverters	32 units
Nominal (STC)	5866 kWp	Total power	4000 kWac
Modules	395 Strings x 27 In series	Operating voltage	870-1300 V
<b>At operating cond. (50°C)</b>		Pnom ratio (DC:AC)	1.47
Pmpp	5362 kWp		
U mpp	1016 V		
I mpp	5276 A		
<b>Total PV power</b>		<b>Total inverter power</b>	
Nominal (STC)	5866 kWp	Total power	4000 kWac
Total	10665 modules	Number of inverters	32 units
Module area	27562 m²	Pnom ratio	1.47
Cell area	25494 m²		



**PVsyst V7.2.12**

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**Array losses**

**Array Soiling Losses**

Loss Fraction 3.0 %

**Thermal Loss factor**

Module temperature according to irradiance

Uc (const) 20.0 W/m<sup>2</sup>K

Uv (wind) 0.0 W/m<sup>2</sup>K/m/s

**DC wiring losses**

Global array res. 3.2 mΩ

Loss Fraction 1.5 % at STC

**LID - Light Induced Degradation**

Loss Fraction 2.0 %

**Module Quality Loss**

Loss Fraction -0.8 %

**Module mismatch losses**

Loss Fraction 1.0 % at MPP

**Strings Mismatch loss**

Loss Fraction 0.1 %

**IAM loss factor**

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

**System losses**

**Unavailability of the system**

Time fraction 0.3 %  
1.0 days,  
3 periods

**AC wiring losses**

**Inv. output line up to MV transfo**

Inverter voltage 600 Vac tri

Loss Fraction 0.47 % at STC

**Inverter: CPS SCA125KTL-DO/US-600**

Wire section (32 Inv.) Copper 32 x 3 x 150 mm<sup>2</sup>

Average wires length 75 m

**AC losses in transformers**

**MV transfo**

Grid voltage 20 kV

**Operating losses at STC**

Nominal power at STC 5732 kVA

Iron loss (24/24 Connexion) 5.73 kW

Loss Fraction 0.10 % at STC

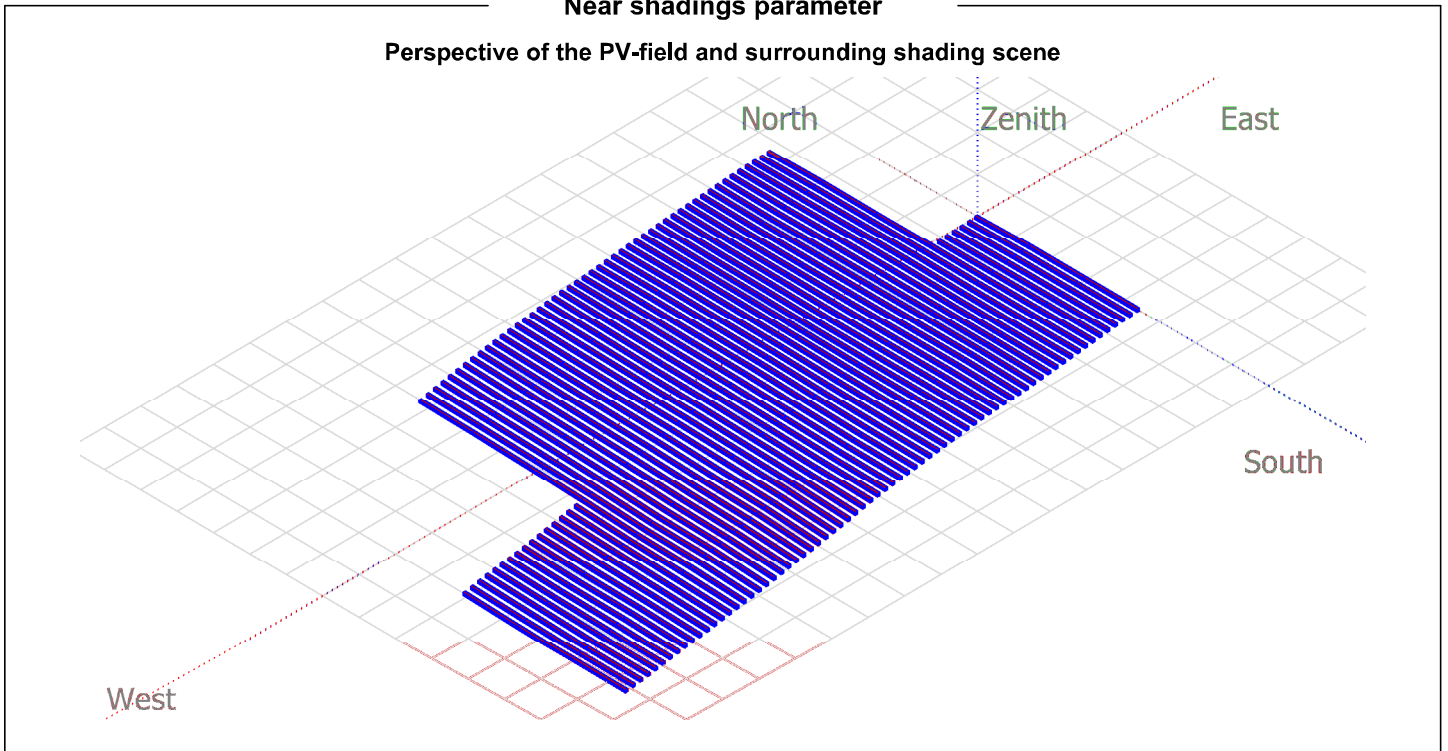
Coils equivalent resistance 3 x 0.63 mΩ

Loss Fraction 1.00 % at STC



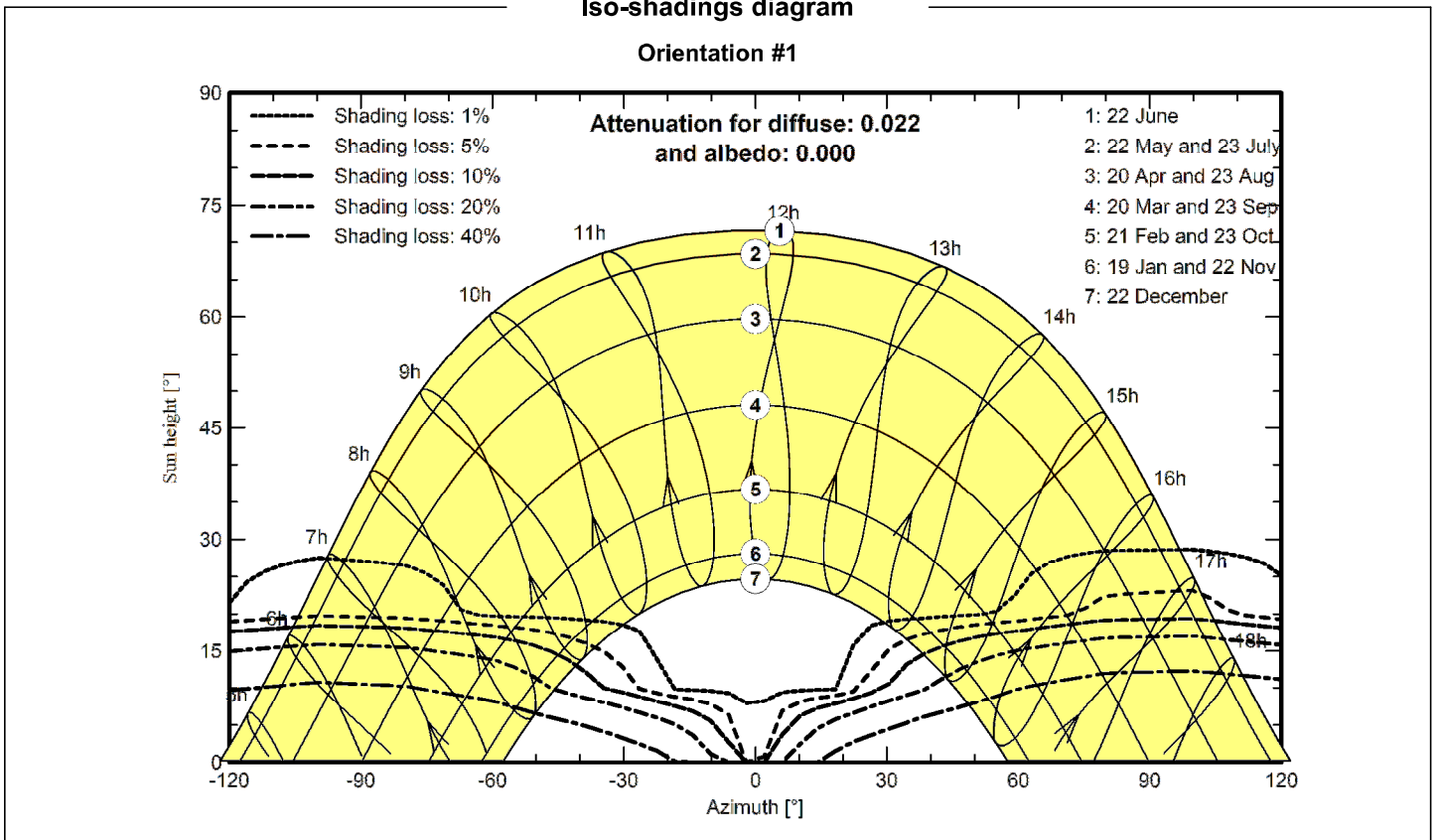
### Near shadings parameter

Perspective of the PV-field and surrounding shading scene



### Iso-shadings diagram

Orientation #1





**Main results**

**System Production**

Produced Energy

9 GWh/year

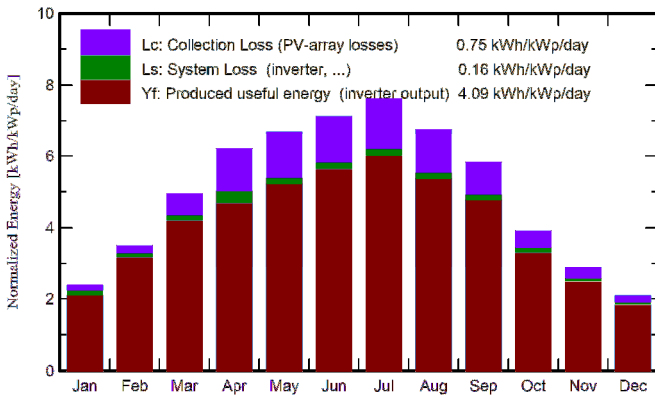
Specific production

1491 kWh/kWp/year

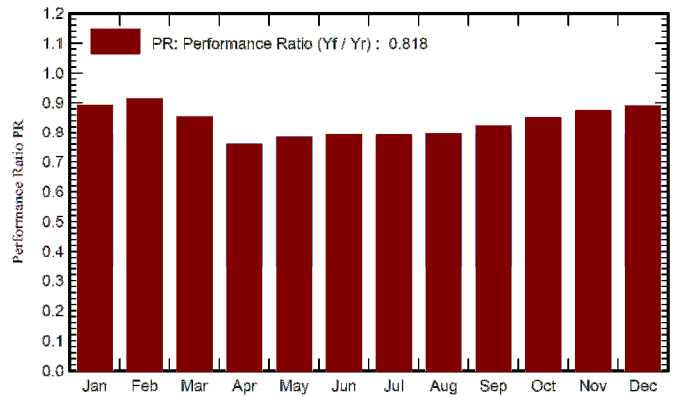
Performance Ratio PR

81.84 %

**Normalized productions (per installed kWp)**



**Performance Ratio PR**



**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 GWh	E_Grid GWh	PR ratio
January	54.0	28.92	-0.86	73.5	64.9	0.409	0.385	0.892
February	73.6	38.12	-0.56	97.8	87.6	0.542	0.525	0.915
March	115.6	55.75	2.84	153.2	138.7	0.793	0.767	0.854
April	143.2	60.71	10.54	185.8	171.1	0.887	0.828	0.760
May	165.2	74.60	15.93	207.2	191.5	0.983	0.952	0.783
June	173.5	80.00	19.33	213.6	199.2	1.026	0.995	0.794
July	186.5	80.22	23.25	236.0	219.4	1.129	1.095	0.791
August	158.1	65.22	22.24	209.1	192.6	1.009	0.978	0.797
September	129.0	50.89	18.98	174.4	159.3	0.869	0.842	0.823
October	85.4	36.61	10.36	121.2	107.9	0.629	0.605	0.851
November	60.0	27.14	7.30	85.7	75.4	0.454	0.439	0.874
December	46.0	25.19	0.75	64.5	55.6	0.349	0.337	0.889
Year	1390.0	623.37	10.90	1822.2	1663.2	9.080	8.747	0.818

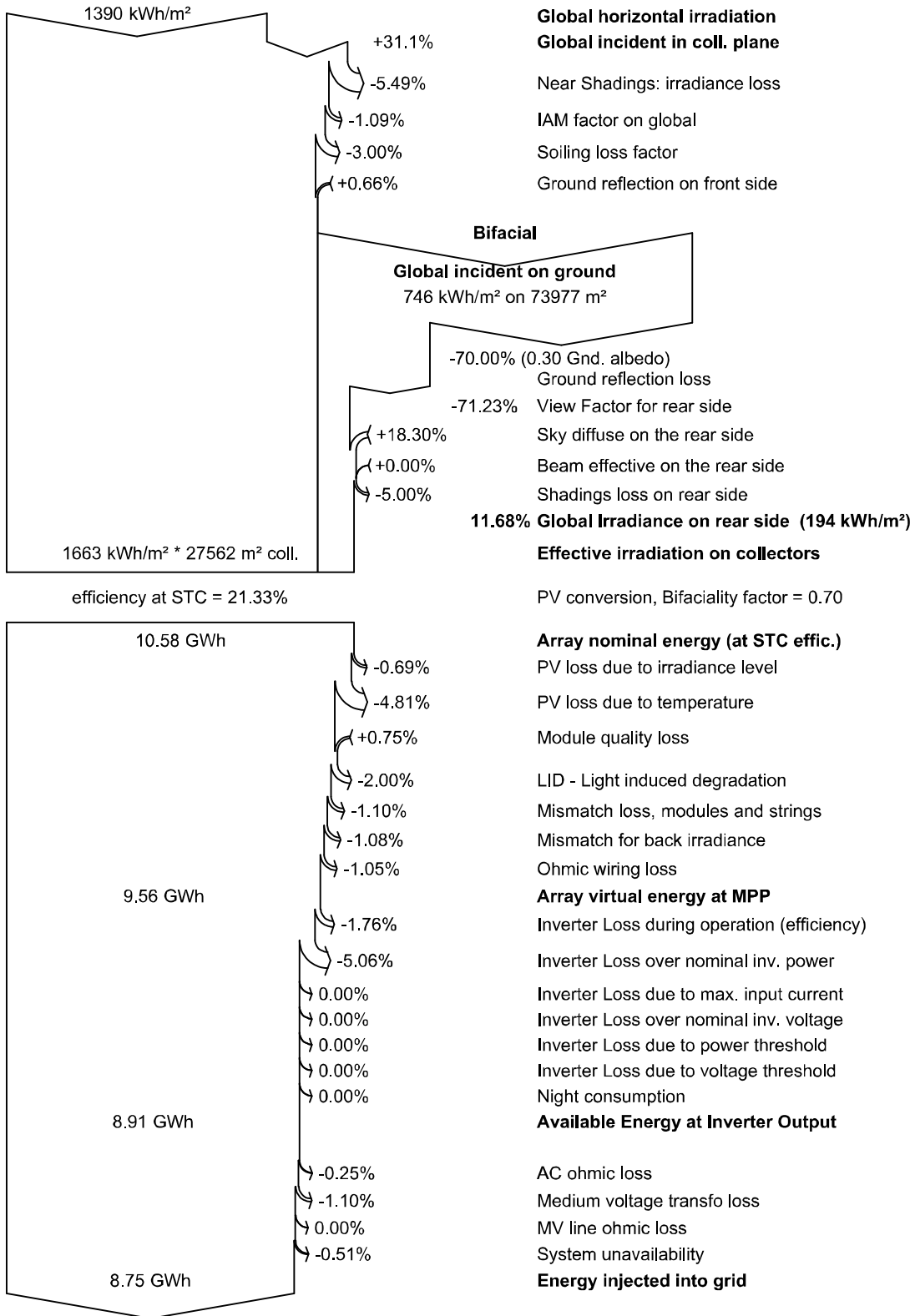
**Legends**

- GlobHor Global horizontal irradiation
- DiffHor Horizontal diffuse 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
- E\_Grid Energy injected into grid
- PR Performance Ratio





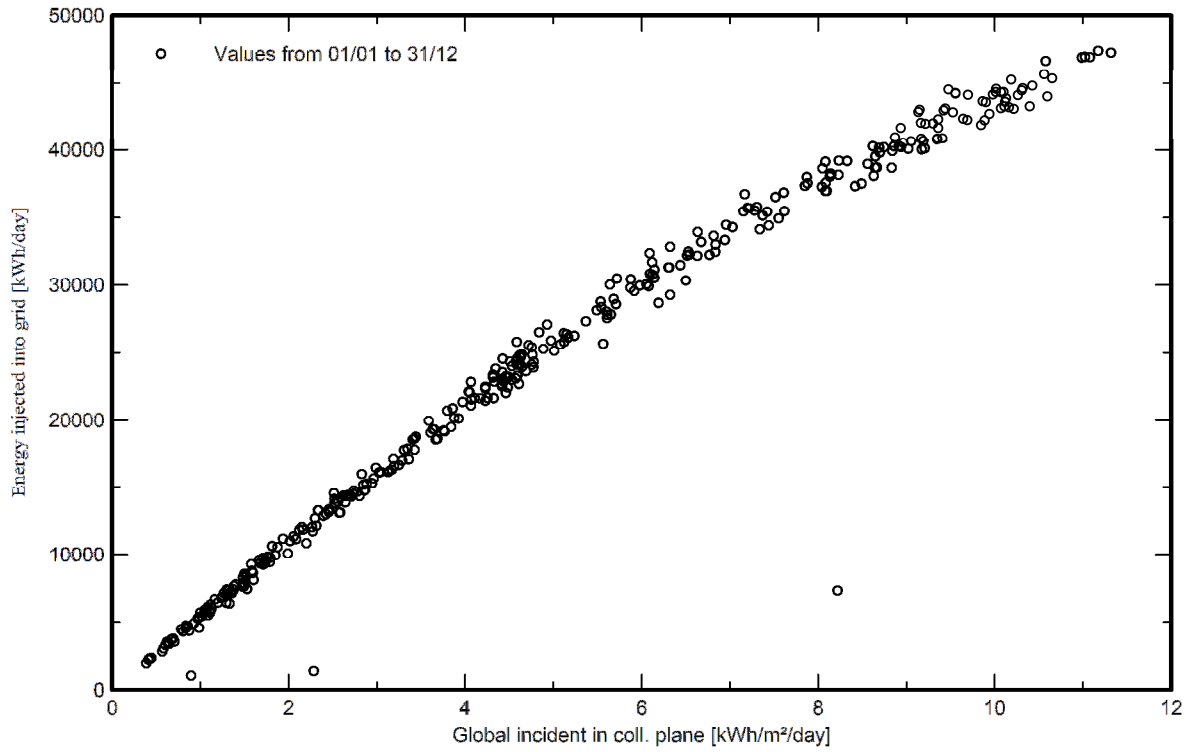
**Loss diagram**





Special graphs

Daily Input/Output diagram



System Output Power Distribution

