



Proposal:
ON Grid PV System

INFORMATION ONLY

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INFORMATION ONLY

GreenSun Simulations: System Design and Performance Prediction

Client/Project Name: The Safe Deals

Site data and Product Summary

Simulation Time stamp

Simulation Date & Time: 18/2/2013, 13:54:00

Location Data

Town/City and Country:	Gujranwala, Pakistan	
Metrological Source:	NASA	
Latitude:	32.15	Deg
Longitude:	74.18	Deg

Mounting Configuration

Mounting Type:	Angle Adjustable	
No. of panels per mounting:	Two	
Axis Tilt Angle(for tracker only):	0.0	Deg
Summer tilt Angle:	17.0	Deg
Winter tilt Angle:	47.0	Deg
Height of mounting (max):	1.53	meters
Area Required:		sqm

Environmental Shading Parameters

Site Shading Area/Loss:	No data available	%
Inter-Array Shading Loss:	0	%

Module Characteristics

Brand Name:	Sunpower	
Module Model:	SPR-327NE-WHT-D	
Module Type:	Maxeon	
Nameplate Rating (STC):	327	W
Efficiency (STC):	20.1	%
Cells Per Module in Series:	96	
Power Temperature Coefficient:	-0.38	%/°C

Inverter Characteristics

Brand Name:	SunGrow	
Inverter Model:	SG15KTL	
Inverter Type:	String (Grid Tied)	
Nameplate Rating:	15	KW
Maximum DC Input:	15.8	KW
DC power input for this system:	15.7	KW
Efficiency:	98.0	%

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Losses and System Design Configuration

Balance of System

LOSS SCHEME:	CUSTOM	
Dust Loss:	0	%
Tracker Misalignment Loss:	N/A	%
Angle-of-Incidence Loss:	0	%
DC Wiring Loss:	2.00	%
Module Mismatch Loss:	0.80	%
Inverter Loss:	1.00	%
AC Wiring Loss:	1.7	%
HV transformer efficiency Loss:	N/A	%
System Performance Ratio:	86.37	%

Array Sizing

Total DC System Size:	15.7	Kwp
Total AC System Size:	14.4	Kwp
Total Number of Modules:	48	Nos.
Number of Modules per String:	12	Nos.
Number of Parallel Strings per Inverter:	4	Nos.
Number of Inverters:	1	Nos.

Itemized Annual Energy Losses & Calculations

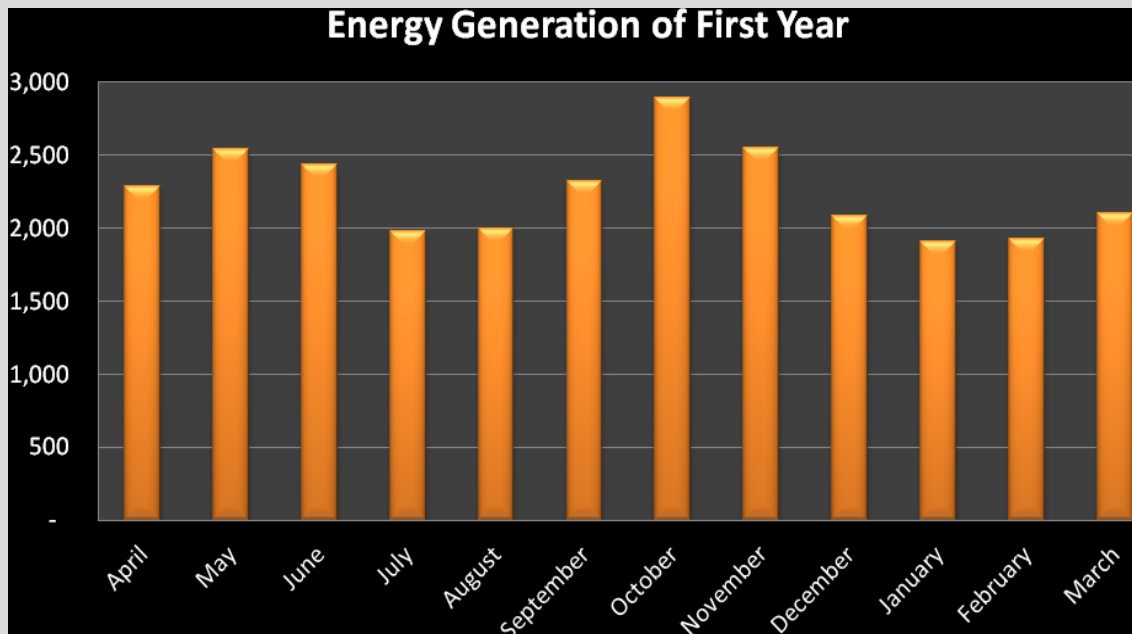
Total System Losses	5.5	%
Average irradiance for Gujranwala	6.16	Kwh/sqm.day
Sunny days/ year	305	days/year
Energy Generation for First year	27,025	Kwhs
Avg. Energy generation for 25 years	25,669	Kwhs/year

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Monthly Energy Simulations

Month	Irradiance (kWh/m ²)	AC Energy (kWh/day)	AC Energy (kWh/month)
April	6.63	94	2,281
May	7.21	100	2,536
June	7.14	98	2,438
July	5.96	83	1,975
August	5.77	81	1,994
September	6.18	88	2,325
October	6.94	100	2,888
November	6.33	93	2,547
December	5.3	80	2,087
January	4.95	75	1,912
February	5.61	84	1,925
March	5.84	85	2,100
	Avg : 6.16		Total: 27,008



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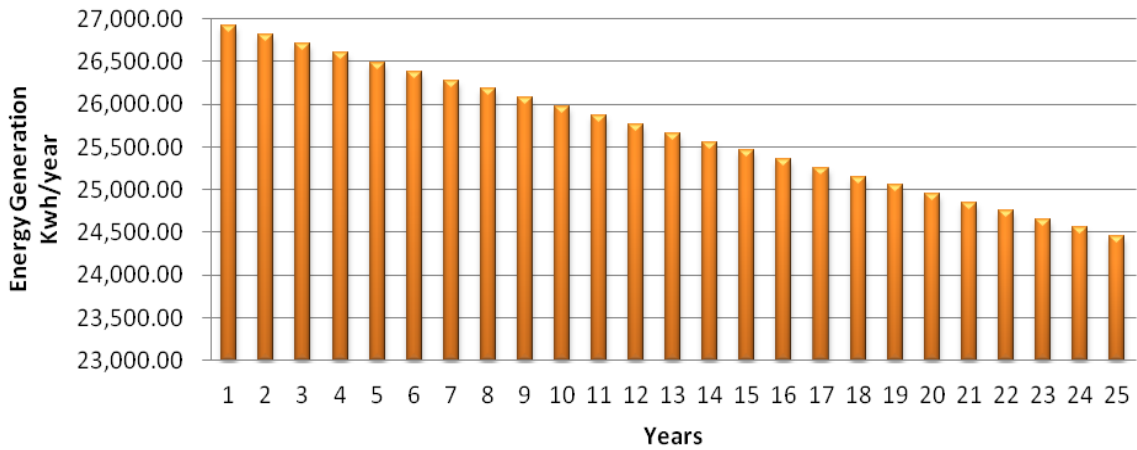
Yearly Energy Simulations

S. No.	Power Generation	Kwh/yr	Plant Efficiency %	Performance Ratio %
1	27,025	26,917.16	99.60	86.37
2	27,025	26,809.92	99.20	86.03
3	27,025	26,703.11	98.81	85.68
4			98.42	85.34
5			98.02	85.00
6			97.63	84.66
7			97.24	84.33
8			96.86	83.99
9			96.47	83.66
10			96.09	83.32
11			95.70	82.99
12			95.32	82.66
13	27,025	25,658.11	94.94	82.33
14	27,025	25,555.89	94.56	82.00
15	27,025	25,454.07		
16	27,025	25,352.66		
17	27,025	25,251.65		
18	27,025	25,151.05		
19	27,025	25,050.85		
20	27,025	24,951.04		
21	27,025	24,851.64		
22	27,025	24,752.63	91.59	79.42
23	27,025	24,654.01	91.23	79.11
24	27,025	24,555.79	90.86	78.79
25	27,025	24,457.95	90.50	78.48
		641,719		

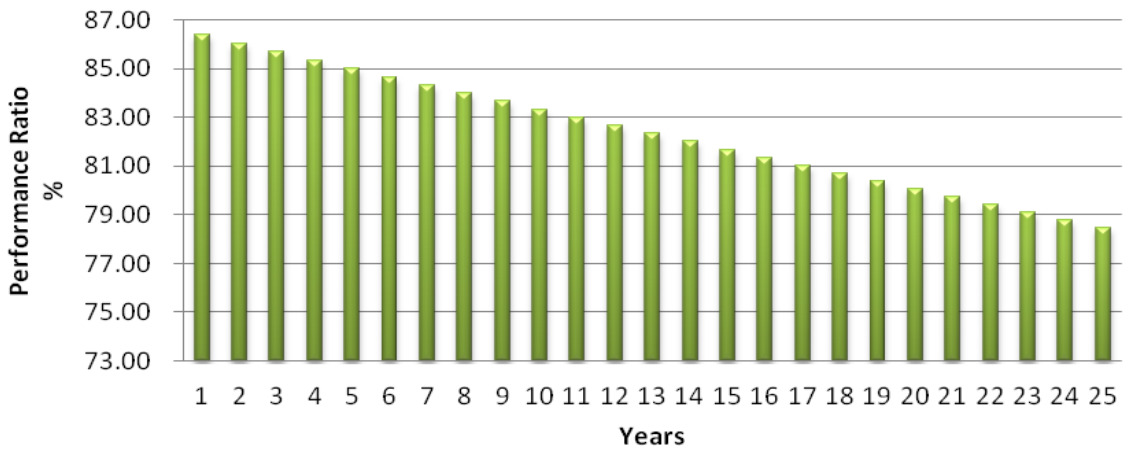
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Energy Generation



Performance Ratio

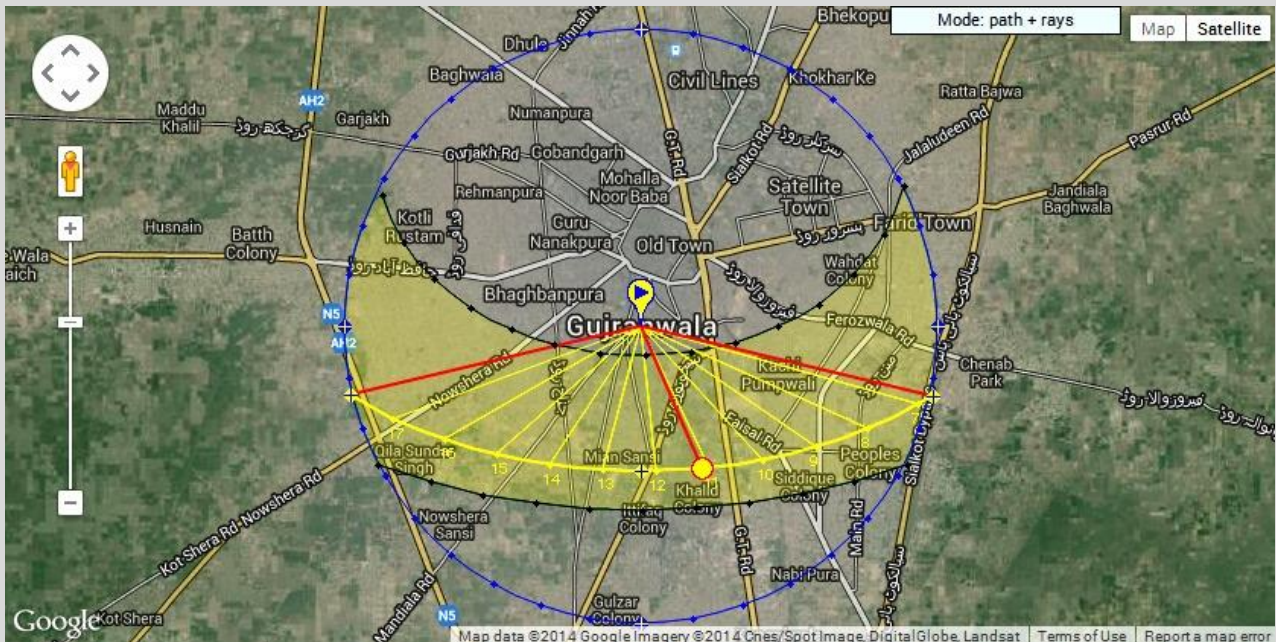




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Solar Geometrical and Metrological data

Parameter for Tilted Solar Modules		
Yearly Average irradiance on given recommended tilt angles		
Direct (for tracker only)	6.71	Kwh/sqm.day
Tilt angle 17° (Summer angle)	6.48	Kwh/sqm.day
Tilt angle 47° (Winter angle)	5.83	Kwh/sqm.day
Avg irradiance with recommended seasonal angle	6.16	Kwh/sqm.day
Tilt angle 32° (For Fixed tilt mounting/latitude)	5.88	Kwh/sqm.day
Average Daylight hours per day	12.14	Hrs/day
Average Daylight Cloud	16.5	%
Average Earth Skin Temperature	21.68	°C



Sunpath and Sun rays direction on Gujranwala

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Quotation

Components	Make	Model	Specs	Qty	Amount ex-kar
Solar panel	Sunpower	SPR-327NE-WHT-D	327 W	48	
Inverter	Sungrow	SG15KTL	15 Kw	1	
DC Breakers			10 Amp , 2 pole	4	
AC Breaker			50 Amp , 4 pole	1	
Panel Mountings	Limitless Solutions	GI Sheet 14 gauge , angle adjustable		24	
Cables					
Civil Work					
Installation Charges (ex-karachi)					

Total Excluding Tax

System Warranties, Terms & Conditions

Warranties

Component	Warranty
Solar Module	25 years workmanship
Inverter	5 years

Terms & Conditions

- Price:** Prices quote are ex-Karachi, and are valid for 30 days.
- Payment term:** 50% at the time of order, 40% at the time of Dispatch of goods from warehouse, & 10% after commissioning of System
- Order Confirmation:** Order will be confirmed upon receiving of 50% advance payment.
- Taxes:** Price quoted is exclusive of all the taxes.
- Delivery Time:** 50 to 60 Days after confirmation of order.
- Installation Time:** Tentative Installation time will be 20~25 days.
- Transportation:** Transportation of goods and installation team will be charge as per actual