



Since 1979

MASCHINEN & TECHNIK, INC.

Solar Rooftop Market in the Philippines (A Pioneer Project)

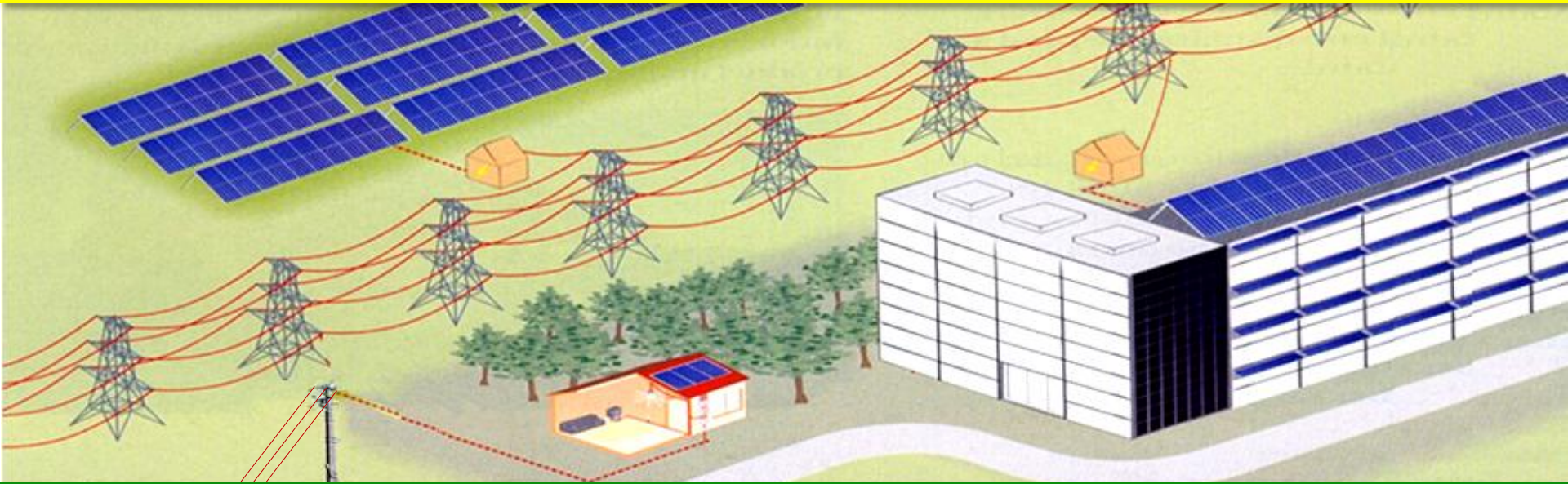
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Vice President
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German-Philippines Chamber of Commerce and Industry, Inc.
Philippines Solar Power Alliance Inc.
European Chamber of Commerce of the Philippines

- **Definition of rooftop category**
- **A pioneer project**
 - MATEC EPC services based on German technology**
 - Layout, mounting and installation**
- **Motivation of QE for rooftop investment**
 - Financial**
 - Psychological**
 - Environmental consciousness**

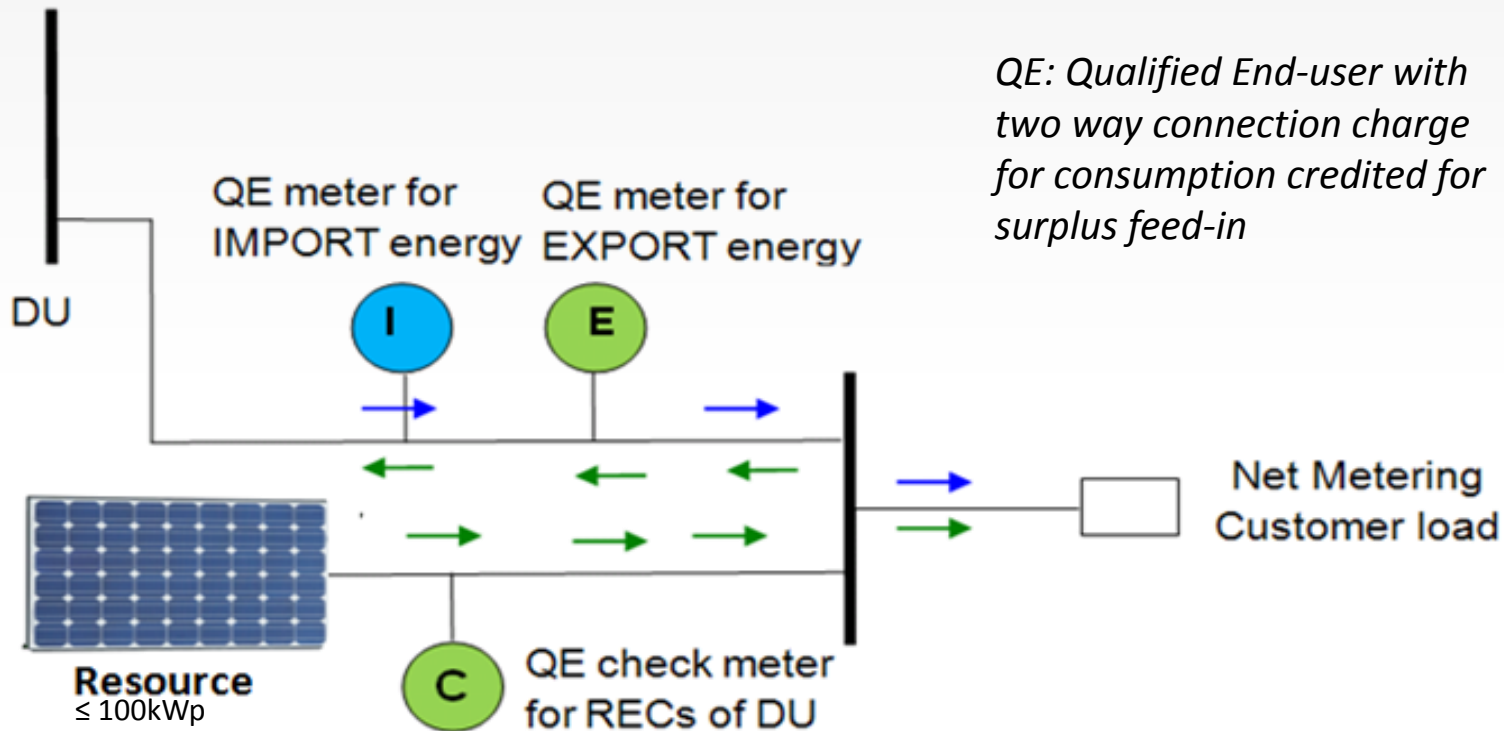
BIPV Categories

**> 100kWp (Utility scale) → RE Developer → FIT
→ Fiscal Incentives**



**≤ 100kWp (distributed generation) → QE → Net Metering
→ Fiscal Incentives ?
other incentives?**

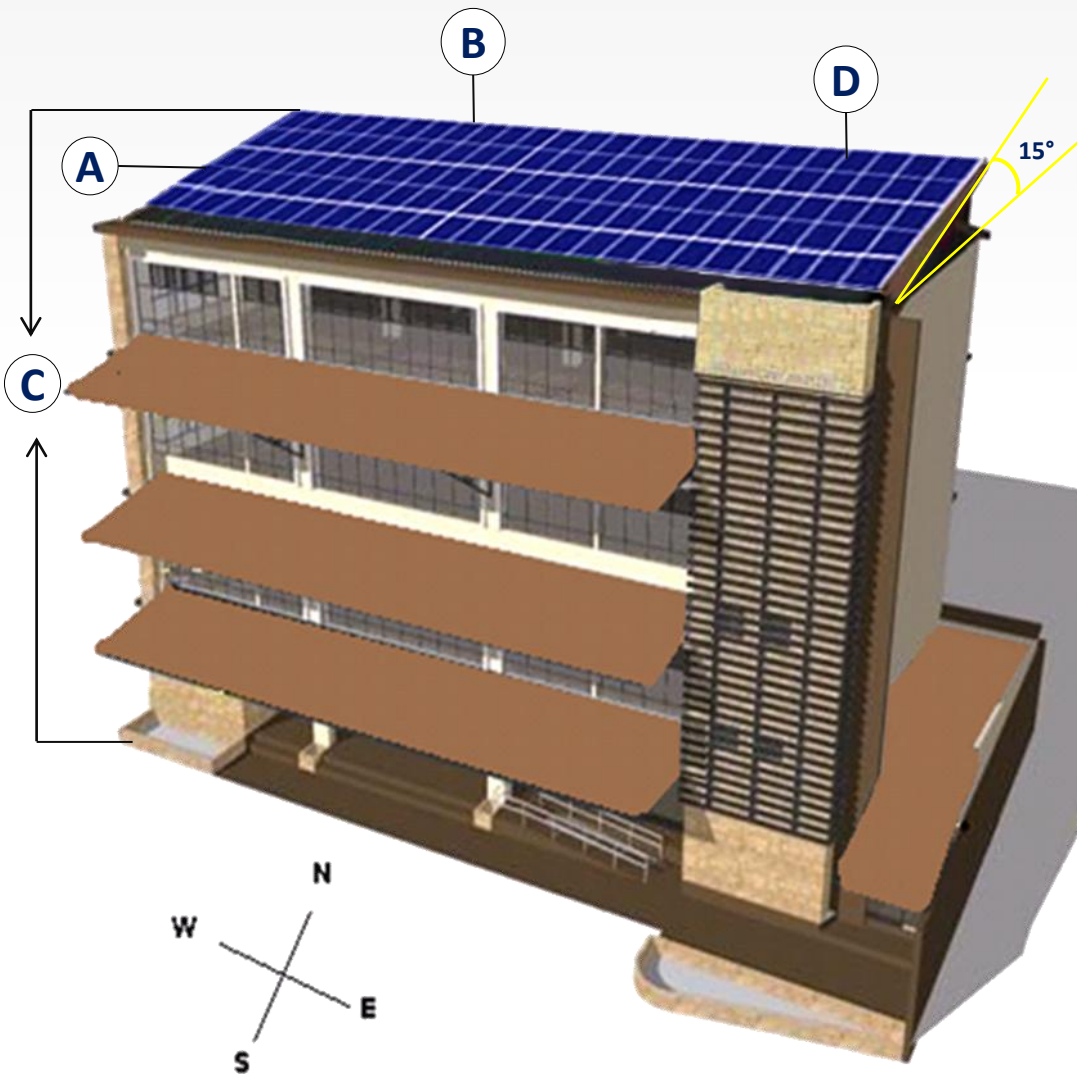
Default Inter-Connection Set-Up



The interconnection set –up shall be equipped by three meters.

- I** - Import meter to measure the import of energy from the distribution system to the QE's premises.
- E** - Export meter to measured the export of excess energy for the RE System to the distribution system.
- C** - Third meter to monitor the energy production of the RE System for purposes issuing RE Certificate in favor of the DU.

OFFICE BUILDING IN METRO MANILA



- A** Width: 21.36 meter
- B** Length: 10.75 meter
- C** Height: 15295 mm
- D** Active PV Surface Area: 164,55m²



5 rows x 21
=105 polycrystalline
panels

**Evergreen
ES-A Series**

210 W

Dimension:

1650.5 x 951.3 x 46mm

Weight: 18.8Kg

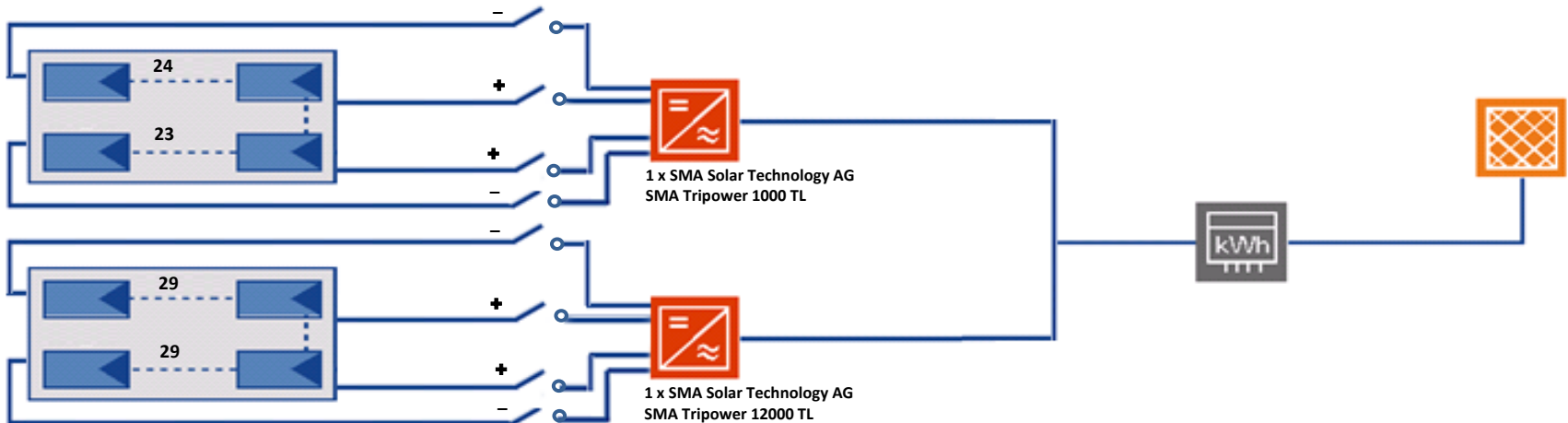
Canopy not usable
due to shading

ARRANGEMENT

Location: Manila
 Climate Data Record:
 PV Installation: 22,05kWp
 Gross/Active PV Surface Area: 164,76 / 164,55m²

Irradiation onto Horizontal: 304 260kWh/a
 PV Array Irradiation: 310 264kWh/a
 Irradiation minus Reflection: 296 850kWh/a
 Energy Produced by PV Array: 32 610kWh
 Energy from Inverter(AC): 31 213kWh/a

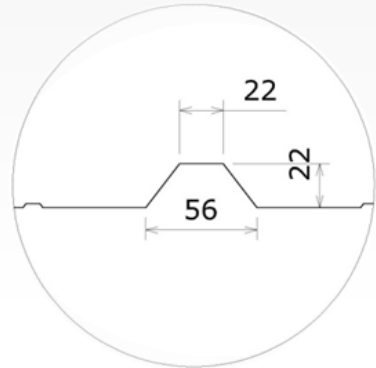
Final Yield: 3, 9 h/d
 Specific Annual Yield: 1 414kWh/kWp
 CO2 Emissions Avoided: ~ 27 631kg/a



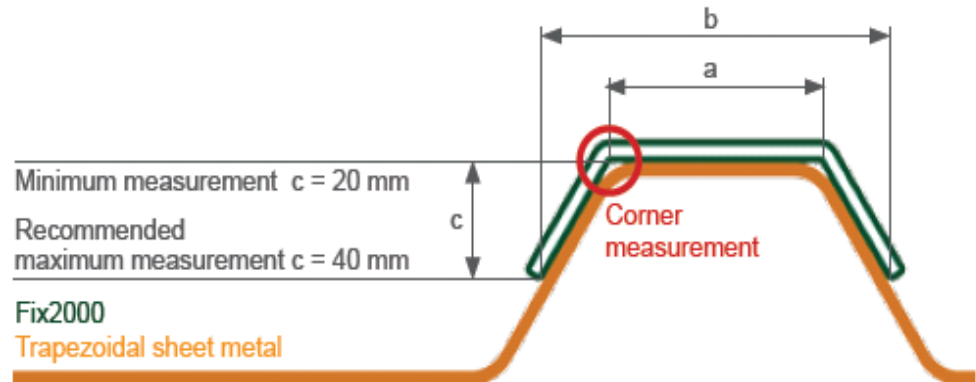
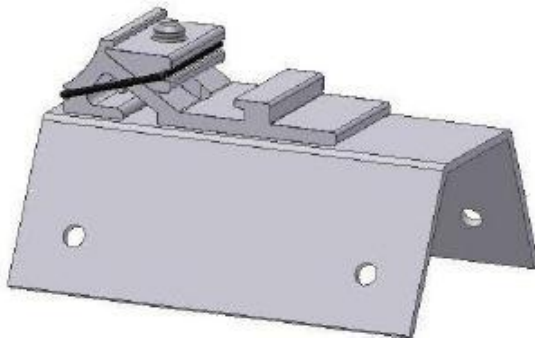
MOUNTING SYSTEM

Initial suggestion: Schletter fix 2000 system

Customer gave us the following profile.



Simple clamps can be applied



Can only be recommended **if** trapezoidal roof shape of material is **uniform exact**.

Mounting System

Final Choice: Single Fix-V Mounting Kit

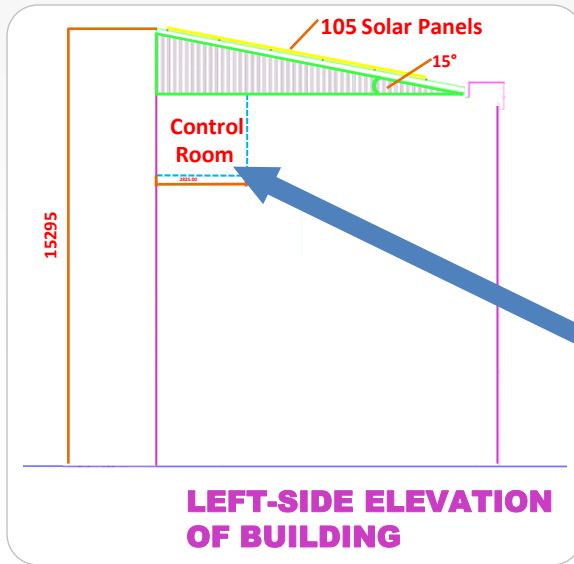
ADVANTAGE: Fits every trapezoidal shape, no problem with roof production tolerance.



SUNNY TRIPOWER

1 x 10000TL

1 x 12000TL



Efficient

- Maximum efficiency of 98.2%
- Best tracking efficiency with OptiTrac MPP tracking by SMA
- Bluetooth communication

Safe

- Triple protection with Optiprotect:
- Electronic string fuse
- Self-learning string failure detection
- DC surge arrester (Type II) can be integrated

Flexible

- DC input voltage up to 1000 V
- Integrated grid management functions
- Custom plant design with Optiflex

Simple

- Three-phase feed-in
- Cable connection without tools
- SUNCLIX DC plug-in system
- Easily accessible connection area

Pending: (From Meralco)

- ❖ Supply of 3 meters
- ❖ Determination of connecting point
- ❖ Net Metering Agreement (after ERC approval)

Will the investment pay off?

QE's COST

- ❖ Interest on Investment
- ❖ Permitting an Interconnection Charges
- ❖ Net Metering Equipment and its Accessories Including Cost of Installation
- ❖ Incremental Supply and Metering Charge
10% Increased ERC rate + PhP0.01/kWh to the QE
- ❖ 1.5% real state tax on investment
- ❖ Cost of facilitation of tax rebate exceed benefit as consultation of
DOST DOE DTI
is necessary

QE's BENEFIT??

Case A: $\text{kWh}_{\text{Used}} - \text{kWh}_{\text{Generated}} \geq 0$
i.e. no surplus to feed

➔ just lower bill no other benefit but all the cost

Case B: $\text{kWh}_{\text{Used}} - \text{kWh}_{\text{Generated}} \leq 0$

➔ Cash Reimbursement on surplus kWh on FIT equivalent pricing ?

Summary: If surplus is multiple of own consumption FIT benefit otherwise ROI basically only determined by savings on DU power bill with DU rates

➔ Maximize use of allowed 100kWp

For QE with normal rooftop size **low economic motivation** ➔ DU's benefits

DU's BENEFITS

- ❖ ERC controls that all DU services are only to recover cost (no profit out of RE)

- ❖ **RE Certificate**

The DU shall be entitled to any RE Certificate resulting from Net-Metering arrangements with the QE who is using an RE Resource to provide energy. Such RE Certificate shall be credited in compliance with the obligations of the DUs under the RPS

- ❖ **Surplus RE Certificate**

Half of the revenues derived from the sale of RE Certificates in the Renewable Energy (RE) Market shall be used to reduce the cost of purchased power of the DU.

➔ **QE helps to lower DU rate! But Financial Incentive for QE is marginal**

Billing of DU

DU Charges to Costumer			
Billing Concept	Base	Price	Amount
Generation Charge	P/kWh	xx	xx
Prev Mos Adj on Gen Cost	P/kWh	xx	xx
Power Act Reduction	P/kWh	xx	xx
Transmission Charge	P/kWh	xx	xx
Distribution Charge	P/kWh	xx	xx
Metering System Charge	P/Mo	xx	xx
Supply Charge	P/kWh	xx	xx
Fixed Supply Charge	P/Mo	xx	xx
Lifeline Rate Subsidy	P/kWh	xx	xx
Lifeline Discount	%	xx	xx
CERA	P/kWh	xx	xx
Local Franchise Tax:	%	xx	xx
Universal Charges:			
Missionary	P/kWh	xx	xx
Environmental	P/kWh	xx	xx
NPC Stranded Debt	P/kWh	xx	xx
NPC Stranded Contract Cost	P/kWh	xx	xx
Equ'l'n of Taxes & Royalties	P/kWh	Xx	xx
DU Stranded Contract Cost	P/kWh	Xx	xx
SUBTOTAL			xx

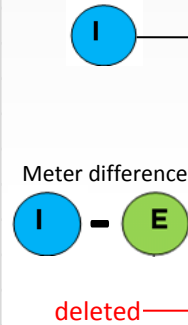
VALUE ADDED TAX			
Billing Concept	Base	Price	Amount
Generation Charge	%	xx	xx
Prev Mos Adj on Gen Cost	%	xx	xx
Power Act Reduction	%	xx	xx
Transmission Charge	%	xx	xx
System Loss Charge	%	xx	xx
Power Act Redn	%	xx	xx
Distribution Rev & Subs	%	xx	xx
SUBTOTAL			xx

ENERGY TAX			
First 650 kWh	kWh	xx	xx
Next 350 kWh	P/kWh	xx	xx
Next 500 kWh	P/kWh	xx	xx
Excess kWh	P/kWh	xx	xx
SUBTOTAL			xx

TOTAL CURRENT AMOUNT DU TO CUSTOMER	xx
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DU Charges to Costumer			
Billing Concept	Base	Price	Amount
Generation Charge	P/kWh	xx	(xx)
Benefit to Host Communities	P/kWh	xx	(xx)
TOTAL CURRENT AMOUNT DU TO CUSTOMER			(xx)

Net Metering Customer's Bill	
TOTAL CURRENT AMOUNT DU TO CUSTOMER	xx
LESS: TOTAL CURRENT AMOUNT CUSTOMER TO DU	(xx)
LESS: CREDIT AMOUNT FROM PREVIOUS MONTH	(xx)
Net Bill Amount	xx/(xx)
SUBTOTAL	xx



QE with normal rooftop size low economic motivation!
 ➔ **Maximize up to 100kWp!**

Other Motivation

- ➔ **Psychological**
- ➔ **Environmental**

Producing and using your own 'clean' energy can be



*wonderfully
empowering
and
liberating.*

Environmental Motivation



**HELP!
Install
Solar On
Your Roof**



Mother Earth says thank you

*Solar Energy reduces risks of global warming and supports a healthier earth.
1 Solar Module of 240Wp can replace 3 barrels of oil energy*