

Roof Your Housetop with Solar Panels! Hurry!

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Abstract

Today's present electricity crisis, the huge bimonthly bills and the Power cuts faced by the people of Kerala made me take a deep rooted thought of the use of replacing our electric supply lines to the so called factory within the premise of our four walls at our reach. Solar energy refers primarily to the use of solar radiation for our immediate practical ends. However, all renewable energies, other than geothermal and tidal, are, derived from the energy of the sun.

Solar power is the conversion of sunlight into electricity, either directly using photovoltaic (PV) or indirectly using concentrated Solar Power (CSP).

Energy plays a key factor in determining the economic development of all countries. The Indian energy sector has witnessed a rapid growth in order to meet the demands of a developing nation. Areas like resource exploration and exploitation, capacity additions, and energy sector reforms have been revolutionized. There is a great possibility of attracting more NRI's to invest in this area. It is the need of the hour to make available Foreign currency to our Nation and this is greatly felt with the drastic fall in the Rupees with comparison to the rise in Dollars.

Keywords: Solar Energy, Solar Panels, Tariffs.

1. Introduction

As the days are getting hotter and humid and with the available facility of the scorching sun, we are blessed to meet the growing energy needs and increasing

environmental concern. This has paved the way for the alternative power ie. the Solar Energy.

Methods of collecting and storing solar energy vary depending on the uses planned for the solar generator. In general, there are three types of collectors and many forms of storage units.

The three types of collectors are flat-plate collectors, focusing collectors, and passive collectors.

Flat-plate collectors are the more commonly used type of collector today. They are arrays of solar panels arranged in a simple plane. They can be of any size, and have an output that is directly related to a few variables including size, facing, and cleanliness. These variables affect the amount of radiation that falls on the collector. These collectors face the sun.

Focusing collectors are essentially flat-plane collectors with optical devices arranged to maximize the radiation falling on the focus of the collector. These are currently used only in a few scattered areas. Solar furnaces are examples of this type of collector. In snow covered regions, this reflected radiation can be significant. One other problem with focusing collectors in general is due to temperature. The fragile silicon components that absorb the incoming radiation lose efficiency at high temperatures, and if they get too hot they can even be permanently damaged. The focusing collectors by their very nature can create much higher temperatures and need more safeguards to protect their silicon components.

Passive collectors are completely different from the other two types of collectors. The passive collectors absorb radiation and convert it to heat naturally, without being designed and built to do so.

People use energy for many things, but a few general tasks consume most of the energy. These tasks include transportation, heating, cooling, and the generation of electricity. Solar energy can be applied to all four of these tasks with different levels of success.

1. Statement of the Problem

A study on how a reduced electric bill could be obtained with the use of Solar Energy and eventually save money with a onetime investment of buying solar panels and installing them for Domestic and Industrial use. The study could be an help to the prospective NRI investors who are in a position to invest in Solar Panels.

2. Methodology

Primary Data was collected by talking to the exhibitors as well as the customers at the Electric Expo 2013 held at Jawaharlal Nehru Ground Ernakulum. Secondary data was sought from various websites available on Solar Panels.

3. Review of Literature

4.1 How do Solar Panels work?

There are two types of solar panel systems:

Solar thermal heating – this system uses the sun's energy to produce hot water. Flat plate collectors, the cheapest and most common option, work by transferring heat from a flat sheet of metal to pipes which run underneath that to an exchanger. In extremely cold weather evacuated tubes work better as they are made up of a series of insulated glass heat tubes and are 10-15% more efficient. Hot water is stored in a cylinder or linked to the domestic boiler or immersion heater for household use.

Solar photovoltaic (PV) – in these systems, cells (made up of layers of a material like silicone) are attached to the exterior walls or roof. When light shines on the cells they convert this energy into electricity for household use. Any excess electricity generated can be exported to the national grid or stored in a battery if the system is a standalone one.

Solar Panels are available in tiles or as a fixed attachment to the roof which is cheaper but less attractive. Each system has panels which come in different sizes and strengths; solar energy is measured by the amount of electricity or heat in kilowatts that the panels generate per hour (kWh).

According to the Energy Saving Trust (EST) anyone can have solar panels, but they will work best if on a south facing roof with a 35 degree slope which is unobstructed by any buildings or trees. You should insulate and make your home as energy efficient as possible before you consider installing any kind of renewable energy.

4.2 Steps taken by the Government

Feed-in Tariffs – the government have introduced a feed-in Tariff (FIT) system to provide cash back for renewable electricity generated at home. The government cut the FIT rate from 43.3p per Kilowatt hour (kWh) to 21p per kWh in March 2012. The tariff will be reduced further to 16p per kWh from August 1st 2012 and will be reviewed every three months after that date.

The payments are tax free and linked to inflation - they work across two tariffs:

- 1. Generation tariff** – depending on the size of panels, you are paid per kWh of metered energy that your panels generate. This amount is payable whether you use the electricity or export it.
- 2. Export tariff** – whatever size the panels are, you can choose to receive either 3p per kWh of electricity or sell it on the open market.

4.3 Benefits of using Solar Panels

Advantages of solar power are many. Although solar power is an energy source that we have only recently tapped into, it may easily become the most important energy source of the future.

- Solar power is a renewable and natural resource.

- Solar power is non-polluting. Unlike oil, solar power does not emit greenhouse gases or carcinogens into the air.
- Light and energy from the sun costs nothing. Once you purchase the equipment to collect and convert energy from the sun, it costs you nothing to run.
- Solar cells require little maintenance.
- Solar cells can last a lifetime.
- Solar power is silent.

Cost for a 5KW rooftop system for grid connection considered in Gujarat.
Cost varies with the choice of equipments.

Table 1

<u>No</u>	<u>Item Heads</u>	<u>Cost (Rs. '000)</u>
1	Photovoltaic Modules	3,25
2	Inverters	1,25
3	Module mounting structures	50
4	Building and Civil works	50
5	Isolation Transformer	30
6	Wires and Electricals	5
7	Engineering and Project Management	10
8	Contingency	55
	Total	6,50
	Cost per Killowat	1,30

4.4 Also Solar Energy frees you from:

Losing Money

As we all know the investment on a solar panel is a second thought process in terms of cost. The panel and battery is an initial investment, but the amount invested on the Panel has a guaranteed period of nearly 25 yrs. The question lies with the cost of battery? Even though it is an initial cost on the long run you could recover the cost back, since you no longer have to face an heavy bills.

You no longer have to fear Power cuts

Voltage fluctuations are not seen. The current flowing would be stable. Poor power supply can also cause electronic equipment to fail (especially computers) and may cause interference of radio or television reception.

You no longer have to fear the increase of unit rates called by the Government periodically.

4.5 Disadvantages of using Solar Panels

There are many more advantages than disadvantages of solar energy, yet this article will cover the disadvantages of using solar energy to generate electricity.

- One of the main disadvantages is the initial cost of the equipment used to harness the sun's energy.
- A solar energy installation requires a large area, and this could be a disadvantage where space is short or expensive.
- Pollution can be a disadvantage to solar panels, as pollution can degrade the efficiency of photovoltaic cells. Clouds also provide the same effect, as they can reduce the energy of the sun's rays. This certain disadvantage is more of an issue with older solar components, as newer designs integrate technologies to overcome the worst of these effects.
- Solar energy is only useful when the sun is shining. During the night/winter, your expensive solar equipment will be useless, however the use of solar battery chargers can help to reduce the effects of this disadvantage.
- The location of solar panels can affect performance, due to possible obstructions from the surrounding buildings or landscape.

4.6 Five Good reasons to get Solar Panels.

- Limitless and Abundant Energy.
- Affordable low cost energy.
- Environmentally Friendly Clean Energy.
- Efficient and Better Looking passes of as attractive roofing tiles.
- Investing in Your Energy for the Future

This Pie Diagram shows the various percentages of Power consumption for different household equipments. Solar water heaters could be used instead and hence a big portion of energy could be saved and prove economical to the common man

Figure: 1

2. Finding and Suggestions

In the case of a domestic unit, I feel the concept of **Reverse Meters** could be adopted. The cost of battery could be reduced to a possible extent if the Government enables the fact of receiving the solar energy produced at domestic units and the same lend back at

night which eventually the amount paid by the domestic unit would be the net effect of usage (balance to be paid for the extra units from the Electricity Board).

I feel the Government should make a onetime investment by providing units with solar panels and permitting easy installments for the payback scheme. For example the amount spent on Dams is also for the same purpose. I feel some concrete initiative should be taken by the Government to enable production of Electricity from the Sun.

Strict measures should be taken that the IT firms, schools, flats, Government offices and well established firms should make provision to generate solar energy within the premises and this should be an investment made along with the infrastructure which would not be a burden to the organizations.

During my interaction with the public at the Electric Expo 2013, many of them were contemplating the thought of converting their roofs to solar panels. But they were unable to take a decision due to the competing market force and the collaboration of Foreign investors in this Project. I feel our Government should create awareness in the mind of the People enabling them to take a quick and firm decision.

3. Conclusion

By the year 2020, the Department of Energy hopes that it will become commonplace to use solar power in the home. They hope to see normal energy consumption cut by about 70% in that timescale. Using solar energy to generate electricity is one of the greatest achievements by mankind, and is set for even greater things in the future. Think Green and save the planet!!. Our vision should be A Greener, cleaner world with cheap and abundant energy.

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