

Consumer Awareness & Its Expertise is the Greatest Challenge to Solar Energy

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Abstract:

Solar energy is a good & unique field. There is a vast scope of research in this field. In foreign countries it is very famous technology. This technology can provide us the cheapest resource of energy. Solar energy is not harmful as well as easier to use. But in India consumer awareness is the greatest challenge to solar energy. It is a great need to aware everyone about this technology so that uses of this resource of energy can be increased. The increasing prices for petroleum products, projection that petroleum resources would be exhausted in a relatively short period of time and the use of fossil fuel resources for political purposes will adversely affecting worldwide economic and social development. In addition, global warming caused largely by greenhouse gas emission from fossil fuel generating systems is also a major concern. These problems can be overcome by alternative sources that are renewable, cheap, easily available, and sustainable. And the solar energy is best promising source. But unfortunately this source of energy has been get neglected. In this paper researcher has aimed to find out the consumer aware of Solar energy, solar energy systems and its use.

Keywords: SPV, JNNSM

I. INTRODUCTION

Solar energy is the most readily available source of energy. It does not belong to anybody and is, therefore, free. It is also the most important of the non-conventional sources of energy because it is non-polluting and, therefore, helps in lessening the greenhouse effect.

Solar energy has been used since prehistoric times, but in a most primitive manner. Before 1970, some research and development was carried out in a few countries to exploit solar energy more efficiently, but most of this work remained mainly academic. After the dramatic rise in oil prices in the 1970s, several countries began to formulate extensive research and development programs to exploit solar energy.

In the next few years it is expected that millions of households in the world will be using solar energy as the trends in USA and Japan show. In India too, the Indian Renewable Energy Development Agency and the Ministry of Non-Conventional Energy Sources are formulating a programs to have solar energy in more than a million households in the next few years. However, the people's initiative is essential if the program is to be successful.

India is one of the few countries with long days and plenty of sunshine, especially in the Thar desert region. This zone, having abundant solar energy available, is suitable for harnessing solar energy for a number of applications. In areas with similar intensity of solar radiation, solar energy could be easily harnessed. Solar thermal energy is being used in India for heating water for both industrial and domestic purposes. A 140 MW integrated solar power plant is to be set up in Jodhpur but the initial expense incurred is still very high.

When we hang out our clothes to dry in the sun, we use the energy of the sun. In the same way, solar panels absorb the energy of the sun to provide heat for cooking and for heating water. Such systems are available in the market and are being used in homes and factories.

Solar energy can also be used to meet our electricity requirements. Through Solar Photovoltaic (SPV) cells, solar radiation gets converted into DC electricity directly. This electricity can either be used as it is or can be stored in the battery. This stored electrical energy then can be used at night. SPV can be used for a number of applications such as.

1. Domestic-lighting
2. Street-lighting
3. Village-electrification
4. Water-pumping
5. Desalination-of-salty-water
6. Powering of remote telecommunication repeater-station-sand
7. Railway signals.

II. BENEFITS OF SOLAR PANEL ELECTRIC POWER SYSTEMS FOR HOMES

If you like the thought of contributing to the efforts of making the earth a better place to live, or if you like money, you'll love solar energy. There are a myriad of great reasons to install a photovoltaic solar power generation system in your home or commercial building, here are a few.

- A solar energy system adds to your property value without adding any tax liability.
- Home based solar power is a quiet, nearly maintenance free, continuous source of electricity.
- Solar electric systems reduce pollution and CO₂ emissions by generating electrical power using radiant Sun light that can replace electricity that comes from coal fired electrical plants.
- Many states including California, Massachusetts, New Jersey, Maryland, Texas and Arizona offer \$0 down installation plans that immediately lower your electric bill and cost nothing to install or maintain.

III. MODERN SOLAR POWER GENERATION TECHNOLOGY

We are constantly seeing

New breakthrough technology in photovoltaic solar power systems as scientist and manufacturers continue to create cheaper and more efficient panels and supporting components.

However, even with all the research and development in the solar industry, one thing is for certain, solar panels are the best way for home-owners to create electricity simply and efficiently. Regardless of the myriad of technological advances, solar panels will remain the primary component of home solar energy production systems for the foreseeable future. There will always be various different types of photovoltaic cells being developed in an effort to improve efficiency and production costs, but the modern solar panels are amazing. Today's solar photovoltaic systems are light years ahead of the early designs with often haphazard set-ups. Modern solar power systems use a method of sun exposure to generate electricity via semiconductors. Simple, direct exposure to the sun and its heat generates electrons that are then captured into the solar system and transformed into usable electricity. This same basic design is used for tasks as small as charging your mobile phone to as large the system needed to entirely power all of the appliances in your home.

IV. CONSUMER AWARENESS IS THE GREATEST CHALLENGE TO SOLAR ENERGY

Consumers are optimistic about solar energy despite having some serious misconceptions about the solar industry--this according to Applied Materials' international survey carried out by Ketchum Global Research & Analytics and Ipsos, In an attempt to better understand global consumers' outlook on solar power, the survey interviewed 1000 people from countries with high potential growth in solar energy. The chosen nations were China, Japan, India and the United States. The results can be separated into four sections: cost of solar energy, solar job prospects, rate of solar adoption and global solar leaders.

• **Cost of Solar Energy.**

PV Magazine reports that while Applied Materials' 2011 survey showed that solar technology would reach grid-parity at the end of the decade, this year's data indicate that it will be reached by the end of the year. In fact, a recent post on Applied Materials' blog reported that solar power has already reached grid-parity in over 100 countries. The blog notes that "105 countries make up 98% of the world's population, account for 99.7% of the world's GDP and consume 99.2% of the world's energy related to CO₂ emissions" (See image here.). It is clear that solar energy prices are dropping fast. Dr. Charlie Gay, president of the solar branch of Applied Materials, recently explained to Reuters that this trend is "due to the dramatic and accelerated rate of cost reductions in the supply chain." He adds that "a continued focus on technology innovation will further drive down the total cost of solar electric power plants."

Respondents to the survey were overly optimistic in their perception of solar power prices. Overall 55% of those surveyed said that solar power is cheaper than other sources of energy such as natural gas and coal. Indian consumers were most likely to believe that solar electricity was the least expensive at 68%. Meanwhile, Japanese respondents had the most pessimistic outlook on solar energy's cost as 51% believe that it is more expensive than traditional sources of electricity.

• **Solar Job Prospects.**

Applied Materials' survey was also intended to evaluate whether the public thought a growing solar energy sector would generate jobs. Of the one thousand consumers interviewed, slightly less than half (46%) answered that solar energy growth would create jobs while exactly a quarter said that it would decrease employment. Japan and the U.S. ended up on opposite ends of this spectrum. The U.S. had the brightest outlook with 58% agreeing that the solar industry would have a positive effect on employment. On the other hand, 40% of Japanese believe that solar will have no effect. This is surprising considering that Japan just put huge subsidies on solar power, placing prices on solar electricity that are "triple what industrial users pay for conventional power", Bloomberg reports.

• **Rate of Solar Power Adoption**

In both China and India consumers express concerns that the adoption of solar power is "too slow" in their nation. Reuters writes that the Indian Ministry of New and Renewable Energy plans to increase "the contribution of renewable energy to six percent of India's total energy mix by 2022." Meanwhile China aims to raise its solar energy capacity to 15 gigawatt-hours by 2015. 58% of Chinese and 51% of Indian respondents think that their respective country should accelerate the rate of installations of solar technology

• **Global Solar Leadership**

Interestingly, each country's respondents are convinced that their country leads the world in solar panel installations. Applied Materials reports that "Almost six in 10 (57%) Americans say the U.S. has installed the most

solar panels, 43 percent of Chinese think it is China, and half (52%) of India thinks it is their country". Despite each countries conviction, Solar Buzz finds that the current global solar leaders are in descending order: Germany, Italy, Japan, U.S.A., Spain and China. However, in terms of awareness Japan came out on top: 35% of interviewed Japanese correctly placed Germany as the country with the most solar installations.

It is important to note that the majority of Chinese and Indian citizens believe that their country is the world leader in solar energy and that their nation should increase the rate of adoption. This is a sign of very strong support for renewable energy. Furthermore, even in countries such as Japan, where respondents were skeptical about solar energy's ability to create jobs, governments are committed to promoting the solar industry.

Applied Materials survey demonstrates that the public has a high regard for solar power as an alternative energy source, but is not well aware of the current state of the industry. Despite this, consumers clearly believe that solar power has an important role to play in supplying global energy needs. This support is a good sign as we are in a pivotal point for global energy supply. Dr. Gay explained to Reuters that "since the planning horizon for utilities extends over time periods of 30 to 40 years, the opportunity to influence the world's long-term energy supply is now".

V. CHALLENGES FACED BY SOLAR ENERGY SECTOR IN INDIA

The solar industry in India is still in its nascent stage and faces many challenges such as high costs of solar power generation. In India, cost of solar electricity produced on-grid is Rs. 18.44/unit. This high cost is mainly due to dependence on imports for silicon and solar wafers used for the manufacture of solar cells – about 80% of which comes through imports. Solar projects are capital intensive, and the lack of an effective financing infrastructure for these projects is another major factor impeding growth in this sector. Another challenge faced today is the disparity in solar potential across states, which is evident from the irradiance map given in Exhibit 2.

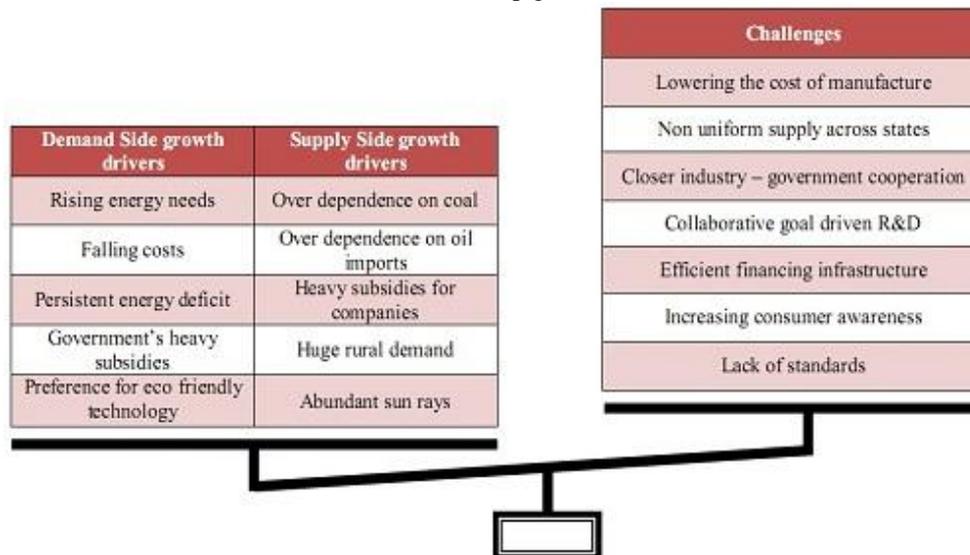


Exhibit 4 Solar Energy: Drivers of demand and supply and major challenges

Active growth of the Indian solar energy industry calls for immediate implementation of the following steps. These measures will not only boost the growth of solar energy sector, but also reduce the usage of non-renewable sources of energy and carbon footprint

Faster and Efficient Implementation of Renewable Energy Certificates (RECs)

RECs are interstate tradable certificates issued for every unit of renewable energy produced. Mechanisms such as these are essential to achieve NAPCC's goal of increasing the mandatory RE usage for states from 5% today to approximately 15% in the next 10 years. Instead of producing RE by their own, states can purchase RECs from each other to increase their RE content in total energy. This mechanism will enable low RE potential states to purchase RECs from high potential states, enabling them to meet NAPCC's increased demands. Moreover, these purchases will incentivize high RE potential states to produce more RE than required currently, enabling overall increase in RE production.

Carbon Trading as a Source of Revenue

Solar power generation emits lesser amount of CO₂ compared to conventional sources of energy such as coal. Trading this reduction in the emissions trading market can be another source of income for the Solar Energy manufacturers. We estimate that on an average – considering the current rate of emissions trading – savings of anywhere between Rs 0.9-1.5 can be achieved per unit of electricity produced. This will partially help in offsetting the high cost of solar production.

Selective Implementation of On-Grid Application

From today's technology standpoint, solar power generation works at 15-20% efficiency. Under this scenario, large-scale on-grid applications are more feasible in areas where there is plenty of barren land and high rate of irradiance

such as Gujarat and Rajasthan. It is very important to concentrate the efforts in these areas to realize solar potential there before moving onto other parts where the irradiance is low or there is scarcity of barren land. The RE produced in these regions can be transferred to other states through RECs, enabling uniform distribution.

Development of Off-Grid Application

More than 80, 000 villages in India suffer major electricity supply shortages throughout the year, which provides tremendous opportunity for off-grid solar applications deployment. Some of the possible applications are lighting and electrification systems, solar powered cellular towers, irrigation pumps and street lighting. Exhibit 5 gives an estimate of the diesel savings and carbon emission reduction possible through deployment of solar cellular towers.

VI. FACTORS DRIVING THE GROWTH OF SOLAR ENERGY IN INDIA

• Demand Side Growth Factors

India suffers persistent energy shortage with average demand-supply gap revolving around 12% of total power supply. This, coupled with rising energy needs, is a major factor driving the growth of this segment. The Power Ministry forecasts electricity consumption to increase to around 1900 kWh by 2032 from the current 660 kWh. Policy measures such as JNNSM, aimed at encouraging investment in the solar energy sector, shall help develop a market for solar energy in India, thereby driving down costs. Increasing public awareness about issues such as energy scarcity and environmental preservation shall also fuel the demand for eco-friendly power, hinting at growth opportunities for solar power.

• Supply Side Growth Factors

The current power generation in India is heavily dependent on non-renewable natural resources such as coal and diesel, whose fast depletion has forced the government and the power generation companies to look into RE sources, especially solar power. The favorable environment created by government through subsidy schemes and policies is encouraging power generation companies to invest in this sector and thus promoting growth. The other major factors driving the growth from the supply side are huge demand for electricity in rural areas lacking grid connectivity, and abundant availability of sunrays in India throughout the year.

VII. CONCLUSION

Solar Energy possesses tremendous potential in bridging India's energy demand-supply gap in the future. There are various challenges for this industry, including lowering cost of production, increasing R&D, consumer awareness and financing infrastructure. It is important to overcome these challenges for fast growth and mass adoption of the technology. Some of the immediate actions to enable growth are efficient implementation of renewable energy certificates, usage of carbon trading as a source of revenue, immediate implementation of grid powered energy in regions of Rajasthan and Gujarat, development of off-grid usage in various applications such as cellular towers and encouraging localized mini grids in areas that lack connectivity today. If these initiative work as planned, it is only a matter before India becomes one of the world leaders in Solar Energy.

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