SWOT Analysis of Solar Energy In India

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Abstract -
Solar energy is a clean renewable energy resource available in abundant. The production of Solar energy does not affects the environment. The demand for power is increasing day by day in India and Solar energy could be a solution for deficit power. Most of the developed countries are switching over to solar energy as one of the prime renewable energy source. The current architectural designs make provision for photovoltaic cells and necessary circuitry while making building plans. The National Solar Mission is a major initiative of the Government of India and State Governments to promote ecologically sustainable growth while addressing India’s energy security challenge. The immediate aim of the Mission is to focus on setting up an enabling environment for solar technology penetration in the country both at a centralized and decentralized level.

Keywords: Solar energy, Solar panel, Photovoltaic, Renewable energy.

I. INTRODUCTION

1.1. Solar Power
Solar power is energy from the sun. "Solar" is the Latin word for "sun" and it's a powerful source of energy. The technology used to convert the sun's power into electricity does not produce smoke (carbon dioxide and other air pollutants). Tapping the sun's energy does not usually destroy the environment. Two main types of solar energy systems are in use today: photovoltaic and thermal systems. Photovoltaic systems convert solar radiation to electricity via a variety of methods. The most common approach is to use silicon panels, which generate an electrical current when light shines upon it. Solar Thermal Systems seek to store heat from the sun that can be used for a variety of purposes. Many different approaches can be employed here, including active systems, such as solar hot water heaters, and passive systems, in which careful engineering design results in a building that automatically stores and utilizes solar energy. Greenhouses are a prime candidate for passive solar design, in which they collect solar energy on sunny days in winter and utilize it to keep the house warm at night.

1.2. Solar Cells
Solar cells are devices that convert light energy directly into electrical energy. In these cells, there are semiconductors (silicon alloys and other materials). You may have seen small solar cells on calculators or some mobile phones. Larger arrays of solar cells are used to power road signs, and even larger arrays are used to power satellites in orbit around Earth. Solar cells are also called photovoltaic cells or PV devices.

1.3. Solar Panels
Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating. A photovoltaic (in short PV) module is a packaged, connected assembly of typically 6×10 solar cells. Solar Photovoltaic panels constitute the solar array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions, and typically ranges from 100 to 365 watts. The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 watt module will have twice the area of a 16% efficient 230 watt module. There are a few solar panels available that are exceeding 19% efficiency. A
single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes a panel or an array of solar modules, a solar inverter, and sometimes a battery and/or solar tracker and interconnection wiring.

1.4. Renewable Energy
Renewable energy is energy that is generated from natural processes that are continuously replenished. This includes sunlight, geothermal heat, wind, tides, water, and various forms of biomass. This energy cannot be exhausted and is constantly renewed. The sun is probably the most important source of renewable energy available today. Traditionally, the sun has provided energy for practically all living creatures on earth, through the process of photosynthesis, in which plants absorb solar radiation and convert it into stored energy for growth and development. Scientists and engineers today seek to utilize solar radiation directly by converting it into useful heat or electricity.

1.5. Solar Energy in the globe
Worldwide growth of photovoltaic is extremely dynamic and varies strongly by country. By the end of 2014, cumulative photovoltaic capacity increased by more than 40 GW and reached at least 178 GW, sufficient to supply 1 percent of the world's total electricity consumption of currently 18,400 TW. As in the year before, the top installers of 2014 were China, followed by Japan and the United States, while the United Kingdom emerged as new European leader ahead of Germany and France. Germany remains for one more year the world's largest producer of solar power with an overall installed capacity of 38.2 GW. The newcomers of the year were Chile and South Africa, which entered straight into the world's Top 10 ranking of added capacity. There are now 20 countries around the world with a cumulative PV capacity of more than one GW. Thailand, the Netherlands, and Switzerland, all crossed the one GW mark in 2014. The available solar PV capacity in Italy, Germany and Greece is now sufficient to supply between 7% and 8% of their respective domestic electricity consumption.

1.6. Solar Energy in India
With about 300 clear, sunny days in a year, India's theoretically calculated solar energy incidence on its land area alone, is about 5,000 trillion kilowatt-hours (kWh) per year (or 5 EWh/yr). The solar energy available in a year exceeds the possible energy output of all fossil fuel energy reserves in India. The daily average solar power plant generation capacity over India is 0.25 kWh per m² of used land area, which is equivalent to about 1,500–2,000 peak (rated) capacity operating hours in a year with the available commercially-proven technologies. The Jawaharlal Nehru National Solar Mission was launched on the 11th January, 2010 by our former Prime Minister, Dr. Manmohan Singh. The Mission has set the ambitious target of deploying 20,000 MW of grid connected solar power by 2022 and aims at reducing the cost of solar power generation in the country through (i) long term policy; (ii) large scale deployment goals; (iii) aggressive R&D; and (iv) domestic production of critical raw materials, components and products. It has been envisaged to achieve grid tariff parity by 2022.

1.7. SWOT Analysis
SWOT is an acronym for Strengths, Weaknesses, Opportunities and Threats. By definition, Strengths (S) and Weaknesses (W) are considered to be internal factors over which you have some measure of control. Also, by definition, Opportunities (O) and Threats (T) are considered to be external factors over which you have essentially no control. SWOT Analysis is the most renowned tool for audit and analysis of the overall strategic position of the business and its environment. Its key purpose is to identify the strategies that will create a firm specific business model that will best align an organization’s resources and capabilities to the requirements of the environment in which the firm operates.

In other words, it is the foundation for evaluating the internal potential and limitations and the probable/likely opportunities and threats from the external environment. It views all positive and negative factors inside and outside the firm that affect the success. A consistent study of the environment in which the firm operates helps in
forecasting/predicting the changing trends and also helps in including them in the decision-making process of the organization.

II. SWOT ANALYSIS

2.1. Strengths

- Our India is blessed with almost 300 sunny days in a year. Solar energy will be accessible as long as we have the sun and we would not run out of solar energy like other power sources.
- Since you will be meeting some of your energy needs with the electricity your solar system has generated, your energy bills will drop. How much you save on your bill will be dependent on the size of the solar system and your electricity or heat usage. Savings can further grow if you sell excess electricity at high rates during the day and then buy electricity from the grid during the evening when the rates are lower.
- Solar power is inexhaustible. In an energy deficient country like India, where power generation is costly, solar energy is the best alternate means of power generation. You don’t need a power or gas grid to get solar energy.
- A solar energy system can be installed anywhere. Solar panels can be easily placed in houses and commercial roof tops. A separate land area for installing solar panels is not necessary. Hence, it is quite inexpensive compared to other sources of energy.
- Solar energy is environment friendly. When in use, it does not release CO2 and other gases which pollute the air. Hence it is very suitable for India, India being one of the most polluted countries of the world.
- The geographical locations of the whole India is a most appropriate place for getting solar energy in abundant and there are also vast areas in rural India can be utilized for installing solar panels.
- Ministry of New and Renewable Energy announced 30% Capital Subsidy for all Solar Power Plant Projects in India through Jawaharlal Nehru Mission Scheme. These subsidies and motivations to public reduces the cost of implementation and increases interest in going through solar.
- In our India, it would be suitable for small entrepreneurs to commence solar energy business as only few large corporates are playing role in developing and distributing solar energy.
- Solar energy can give uninterrupted supply of power to households and commercial places.

2.2. Weaknesses

- Solar energy are limited for a geographical point of view - solar panels are not popular in regions where there's snow like Jammu & Kashmir.
- The cost of installation is expensive for a common man. So only rich people chooses solar energy.
- The cost of production range is Rs 15 to Rs 20 per unit for the solar energy, which is very high when compared to, Rs 2 to Rs 5 per unit for other conventional sources in India.
- There is no awareness among people about solar energy and its benefits. It restrains the turnovers and only literate people chooses solar energy.
- We cannot depend solar energy on rainy and cloudy days.
- Maintenance of solar panel is required at frequent intervals with additional costs.
- Lack of technical support for the remote locations.

2.3. Opportunities

- India is depending on the gulf nations for oil and We are running out of oil at some times. The cost of oil soars high for most of the months in a year and it will force our government to depend on solar resource available in our country for generating electricity. It also may force people to purchase electronic cars or vehicles with solar panel on roof.
People are concerned about the environment blocking to install nuclear and coal power plants in their villages will force the government to substantially depend on solar energy. e.g., Kudankulam Nuclear Power Plant is facing protests from the local fishermen community in Tamil Nadu.

As more companies are entering into the production of solar panel may lead to reduction in cost.

Awareness programs about solar energy and subsidies announced by the government of India will make the people feel easy about solar energy.

Our Indian government announced investment over US $20 billion for 30 years in solar energy will give more opportunities to the people in attaining solar energy and would boost the economy.

2.4. Threats
- The quality of solar cells produced from uranium in Indian soil is inferior to the solar cells produced from Australia, Germany and other countries may force to import uranium for producing solar cells.
- Only large investors can get higher operating profit from solar energy distribution since it requires huge investment to install, maintain and distribution.
- India may face competition from Chinese firms due to cost difference as they are going to solar energy intensively.
- The traditional energy production sector is not likely to diminish in the near future and it bars the people to change.

III. CONCLUSION

India’s solar market could be worth billions of dollars over the next decade. The announced projects by the government are well and should be implemented effectively by localizing and financing. We expect that the large corporates is going to benefit more than the small entrepreneurs. The awareness among the people is slowly raising and surely it will the raise the demand in the near future. Government must also concentrate on reducing the cost of solar panels. Skilled people on solar technology must be developed to produce, maintain and distribute to the adequate level. More innovations are required to compensate the difficulties in maintaining of solar panels and arrays.

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