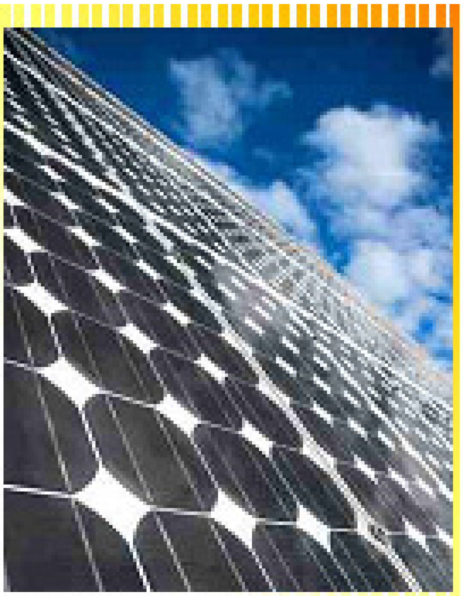

Executive Summary

Solar PV Industry: Global and Indian Scenario

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The Renewable Energy (RE) sector around the world, including India, is developing rapidly. Within RE, solar is one of the major growth segments globally with almost 30% of all investments in the sector going into solar. The Indian solar industry, which is in the nascent stage, holds huge potential. But the pace at which it is growing does not compare to global standards. One of the main reasons for this is the lack of adequate investment in solar PV manufacturing and R&D in India. There is an urgent need to facilitate and enhance investment in solar PV manufacturing in India. This would enable the domestic solar PV industry to provide cost-effective and sustainable solutions to the domestic market and compete with the rest of the world. This study has been carried out with the intent to provide the requisite background for investment in this sector.

The study provides a broad overview of the solar PV market globally and in India. It provides the current status and future trends in solar PV manufacturing, technology, R&D, market dynamics, commercial and financial aspects, and government policies and market drivers in leading countries in this space, namely, Germany, Japan and the USA. The study also identifies key market segments where solar PV can be implemented and evaluates the market viability and the size of these market segments. Based on these analyses, a set of recommendations has been made to enhance the growth and competitiveness of the Indian solar PV industry.

Market segments for solar

Power deficits continue to plague the Indian power sector and impede the country's economic progress. Today, the country experiences an average energy (electricity) shortage of 9.6% and a peak shortage of about 13.8%. To meet the growing demand and shortages, the generation capacity needs to be doubled in 10 years from the current level of approximately 142,000 MW. In addition, the Government of India in 2007 mandated that electricity utilities purchase power from renewable sources. The target for electricity generation through this route is fixed at 10% by 2010 and 20% by 2020.

The approach has shifted towards alternate power sources with the introduction of state-level Renewable Purchase Obligations (RPOs), increasing demand-supply mismatch and an increase in short-term trading prices. State Electricity Regulatory Commissions (SERCs) have been looking at indigenous and Renewable Energy (RE) sources, such as wind and solar. Presently, solar PV is not an attractive option primarily due to high generation costs. However, in the coming years with increase in fossil fuel prices, rising environmental concerns and a reduction in the cost of solar PV technology, it is likely to become a major source of energy.

Based on the market size and its attractiveness, four market segments appear to have the maximum potential in the coming years. These are:

- Rural electrification – Decentralised Distributed Generation (DDG)
- Grid interactive solar PV power plants
- Backup Power for Telecom (Base Transceiver Station))
- Roof based solar PV systems

Rural India is home to more than 70% of India's population and energy is crucial for raising the standard of living in rural India and encouraging employment generation. The Government of India has kept a target of providing electricity for all by 2012 with a minimum consumption of 1 kW per day per household. But even grid connected villages today experience large power outages. Under the 'Power for All' programme, the Government of India has targeted electrification of all villages by 2012 in which 18,000 remote villages would be electrified using non-conventional power sources. This would provide an ideal situation for the large-scale introduction of DDG technologies, especially solar PV. An analysis of the DDG-based model shows that solar PV at present solar PV panel costs (i.e. Rs 145/Wp) is a more attractive electrification option for a village than extending the grid by around 12 km or more.

In order to provide an impetus to grid interactive solar power generation, the Ministry of New and Renewable Energy (MNRE) has decided to support grid interactive solar power generation projects. At present, this support in the form of a subsidy is limited to only 50 MW capacity. However, after the announcement of the Generation Based Incentives (GBI) by MNRE, the latter has received Expression of Interest for more than 1000 MW of grid interactive solar PV based power generation projects. MNRE is now targeting a capacity of 500 MW through solar by the end of the 11th Five Year Plan, i.e. 2012.

Telecom towers are another potential segment with considerable market size. As per the guidelines of the Telecom Regulatory Authority of India (TRAI), telecom connectivity has to be maintained at nearly 100% of the times. This means that in case of a power outage there has to be a seamless transition to a backup power supply for all telecom towers. Presently, most BTS's in India use Diesel Generation (DG) sets as a backup power source. A lifecycle cost assessment between DG-based backup power and solar PV based backup power was undertaken with diesel prices assumed to be Rs 35, 40 & 55 per litre. The analysis highlighted that the lifecycle cost of solar PV is lower for all scenarios (requirements for 4, 6, 8 and 12 hours) of power backup if diesel price is assumed to be Rs 55 per litre and higher for all scenarios when the diesel price is assumed to be Rs 35 and Rs. 40 per litre. Solar PV becomes a viable option for telecom (based on today's prices) if the retail price of diesel touches or exceeds Rs 45.9 per litre. The telecom sector has the potential to provide a large and viable market for solar PV in the future with retail prices of diesel likely to move up and prices of solar PV panels likely to come down. If solar becomes a viable solution in this sector, it has the potential to cater to a market in excess of 1,000 MW in the next 7-8 years (i.e. till 2015).

In the past few years, due to a huge increase in the demand for power from commercial buildings, the utilities are facing an overall deficit of electricity. In such a scenario, most commercial buildings rely on DG sets, which is an expensive fuel source. Solar PV based applications cannot meet the load requirements as it involves space and cost constraints. But a part of the load can be met with roof based solar PV applications. Roof based solar PV applications are viable options where long hours of backup power is needed. Based on the analysis undertaken under this assignment, solar PV can assist commercial building operators in saving as much as 22% in per unit cost. This segment has the potential of adding up to 1,000 MW of capacity in the coming 5-6 years.