



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.

Solar PV industry – the global scenario

The solar PV industry is the fastest growing area in the energy sector and is expected to grow four-folds by 2011. In 2007, of the US\$ 71 billion invested in new renewable energy capacity globally, 30% was in solar PV. The main factors holding back an even faster rate of growth for this energy source is the high cost of energy production and lack of adequate supply of basic feedstock, particularly polysilicon. The shortage has caused polysilicon prices to go up from an average US\$ 20/kg in 2001 to over US\$ 50/kg in 2006. On the other hand, the shortage has pushed for higher efficiency in production and the introduction of new solar PV technologies, i.e. thin film technology.

In 2007, there was an increase in the supply of polysilicon globally by 30%. However, access to adequate polysilicon supply remained the main bottleneck for growth of the solar PV industry. The global silicon feedstock capacity servicing the solar PV as well as the semiconductor industry was up from 38,000 tonnes per annum in 2006 to 52,000 tonnes in 2007.

Currently, the polysilicon manufacturing is dominated by 7 major players in the USA, Japan and Germany. However, after seeing the huge demand for solar PV, a large number of new players have entered or are set to foray into this space.

Similarly, the global wafer manufacturing capacity grew at 60% in 2006 (over 2005) and 73% during 2007 (over 2006). The market for solar PV crystalline wafers has been dominated by multi-crystalline, which had a share of almost 54% in 2007. One of the key shifts occurring in wafer manufacturing is the emergence of China and Taiwan as major players in the near future. Even today, more than 50% of the installed capacity for wafer manufacture is based in these two countries.

Global PV cell production grew by 55% during 2007 (over 2006), with both mono and multi-crystalline losing ground to thin films. The five largest solar PV cell producing countries were Japan, China, Germany, Taiwan, and the United States. Recently, China has emerged as a major player in cell production, displacing Japan as the second largest producer of solar PV cells in 2007.

Concurrently, thin film technology has evolved with a substantial increase in capacity since 2005 (at almost 80% in 2006 and more than 100% in 2007) due to polysilicon shortage. In the thin films market, significant expansion is expected in the future and some of the main players lining up are First Solar and Sharp, both of which hope to have a thin films capacity of 1 GW by 2012.

In recent times, the geographical focus of solar PV manufacturing has shifted towards developing countries, especially China, India, Malaysia and Taiwan. It is expected that by 2011-12, a sizable chunk of the manufacturing base will be developed by leading manufacturers in these countries, with India and China remaining the main strategic choice.

Presently, in India there are around 90 companies into solar PV, which comprise of 9 manufacturers of solar cells and 19 manufacturers of PV modules. Another 60 companies are engaged in the assembly and supply of solar PV systems. During FY07, nearly 45 MW of solar cells and 80 MW of SPV modules were produced in the country, of which over 60 MW of solar PV products were exported.

In 2007, the Government of India announced the Semiconductor Policy that offers a capital subsidy of 20% for manufacturing plants in SEZs and 25% for manufacturing plants outside SEZs. The subsidy is on the condition that the net present value of the investment is at least Rs 1,000 crore. So far, there have been 12 applications for setting up solar PV plants, which cumulatively could bring an investment of about Rs 66,394 crore (approximately US\$ 16 billion).

Solar PV is a technology-intensive industry. Over the period, technology interventions have changed the shape of the industry in terms of cost economics and system efficiency. At present, crystalline silicon technology dominates the market. It had an overall share of close to 90% of the 2007 production, followed by 10% by thin films. Besides, new and emerging technologies are still at the research stage. Each technology has its pros and cons on cost and efficiency.