

Securing the Supply Chain for Solar in India; a FICCI Report

SUMMARIZED BY ENERGETICA INDIA

The summary analyses key elements of India's Solar Supply Chain

Secure, timely and cost effective supply of raw materials is the backbone of any industry, it not only increases the efficiency of the production process but rationalizes raw material inventory and finally overall product cost.

The current solar energy manufacturing base in India comprises primarily PV cell and module manufacturing with 1100 MW of cells and 1800 MW of solar modules with very limited and disparate fabrication and assembly capacities for solar thermal products and accessories. By and large, Indian solar industry has been dependent on imports of critical raw materials such as EVA, back-sheet, reflective glass, balance of system (BOS) for Solar Thermal and PV as also core machinery. With regard to PV industry, till recently, by and large it has exported major part of its finished products to developed western markets.

There is clearly tremendous scope for development of domestic production base for some of the key inputs to secure and strengthen the supply chain to reduce the foreign exchange outflow and create direct and indirect long term employment in the solar industry.

The key elements in the solar energy supply chain framework consists of raw material/component suppliers to solar photovoltaic module and solar thermal system manufacturing, balance of system which includes inverters, connecting wires, trackers etc. and the integration of the different components.

Supply of Raw Material / Components-Solar PV Module BOM

Presently, in module manufacturing, 90% value of materials is imported.

The goal of the National Solar Mission for local component will be truly achieved only when the materials like EVA, Back-sheet, Junction Box, Low Iron tempered Glass, Aluminum Frame are available indigenously with competitive quality and cost advantage. Import of these materials is an impediment for the growth of the module manufacturing industry in India as this makes local module costing highly unattractive compared to that from other Chinese and other Asian countries.

To ensure material offered from Asian countries meets pre-defined standards and specifications which will ensure that

user/developer does not land up with non-performing or low-performing assets, it is crucial that plan for standards to enable control on quality is established.

Cell Manufacturing

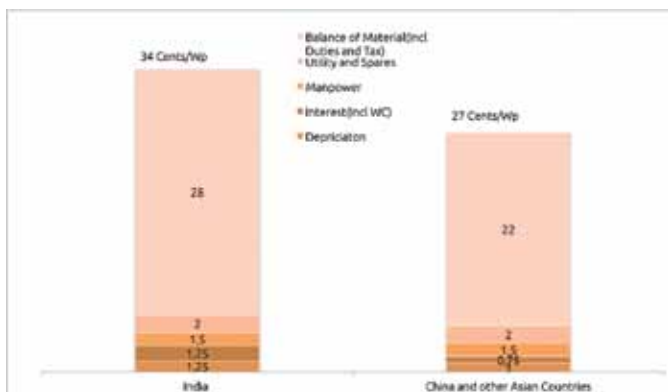
Similar to module manufacturing, PV cell manufacturing is also dependent on nearly 100% imports of all the raw materials and gases. There is also the need to substitute costly raw materials with alternate raw materials.

Dependence on imports has resulted in a significantly high cost at cell level for Indian manufacturers as compared to the competition from Chinese and other Asian countries.

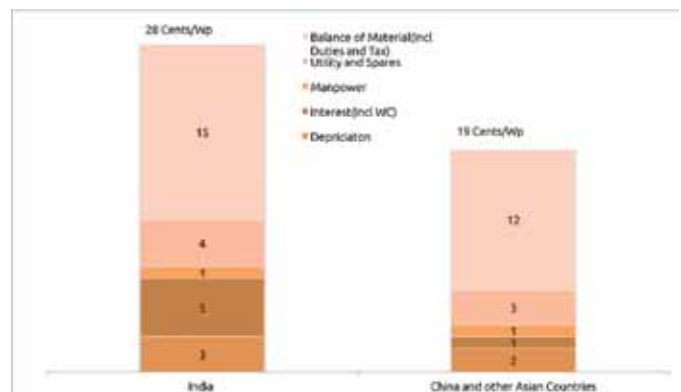
As is evident from the above mentioned statistics, capacity addition in India has been stagnant over past few years, with China and Taiwan accounting for 59% of the cell manufacturing capacity in 2010.

Wafer Manufacturing

The challenge here is the processing of waste slurries. The government can look at encouraging technology transfer to install common facilities.



Estimated module manufacturing cost.



Estimated cell manufacturing cost.



Solar Equipment Fabrication / Assembly

Tracking System

Presently the tracking systems being developed are done using universally available components.

To ensure efficient solar based systems are developed at competitive costs, development of efficient tracking systems is the need of the hour. There should be a focus on developing dedicated tracking systems and related components for solar applications which will help in driving the costs down.

Solar Manufacturing Hubs

There is a need for creating solar manufacturing hubs in India.

Promotion of solar manufacturing hubs for solar thermal and PV is an effective mechanism to ensure high grade ecosystem with all necessary infrastructure and utilities essential for such solar manufacturing being made available. Such investments could be encouraged with attractive fiscal benefits to investors. There is sufficient number of case studies in other industries such as auto-ancillary, pharmaceuticals and leather which can be suitably adopted. Locally existing fabrication ca-

capacity should be leveraged to ensure quick capacity buildup. Special zones for solar would help India to service global requirements.

Equipment & Machinery

The challenge here remains the absence of manufacturers for high capital intensive equipment and machinery in India.

While solar manufacturing is highly capital intensive, major portion of the investment is towards equipment and machinery. There has been a huge capacity built in European countries in the past for solar. The idle capacity of this installed base could be assessed to analyze if there could be a possibility of using capital equipment presently unused in these countries.

Balance of System–Solar Thermal and Solar Photovoltaic System

Solar Turbines

Presently there are only few international vendors for solar turbines.

If the CSP proliferation plans of the government have to be made effective, there have to be other alternatives including possibility of supporting indigenous developments and manufacturing over a period of time without compromising quality and performance standards.

Inverters

The Inverter manufacturers in India have huge manufacturing capacities. One estimate is that there is an average of 4 million inverters sold per year. With an average capacity of 800 W, this amounts to 3200 MW of non-solar inverters being manufactured every year in India.

Though traditional inverters cannot be directly compared with more sophisticated solar PV inverters, with right technology backing, the Indian manufacturers will be able to easily augment their capacity to meet the PV inverter requirement under the JNNSM.

There is also a need to customize the PV inverter for Indian conditions.

Batteries

The challenge here has been the sustainable and consistent availability of quality inverters and deep discharge needs to be ensured. There is high dependence on imports.

Rationalization of existing duty structure for near term on both these components when used for solar applications could be considered.

Feasibility of local manufacturing and sourcing for these items should be evalu-

ated and necessary incentive package to promote expansion of capacity by existing players and setting up of new projects by international as well local players should be ensured.

Capability Development

Small and Medium Enterprises will require capacity and capability enhancements in the areas like fabrication, section bending, glass bending, surface coating, selective coating and mirror bending tending toward higher degree of automation.

There is a reasonable cost arbitrage benefit estimated for manufacturing in India which can be leveraged effectively. The country has a potential base for meeting global requirements in addition to meeting domestic demand, however, to ensure the same, appropriate incentives should be provided to these enterprises to encourage them towards building capabilities pertaining to solar.

System Integration

Network of System Integrators

As industry matures, different parts of the value chain and the system integration will also evolve. There should be a focus on developing a network of system integrators to meet the local demand.

India must ensure that appropriate quality checks are in place to qualify such integrators. There can be regular audits of such entities from time to time to ensure that they maintain the required quality standards. To strengthen system integration, schemes similar to Channel Partner scheme should also be initiated for system integrators.

Supply of Raw Material / Components – Solar Thermal

Reflector

Presently most of the thermal systems use primarily mirror and coated aluminium based reflector in certain cases. While availability is not a major issue as of now, costs are very high since requirement is presently being met through imports. Further, Indian projects do not have economies of scale which are seen in other mature solar markets.

Waiver of duties and taxes on such imports is one of the near term requirements to rationalize input costs for users, how-



ever, immediate steps need to be taken by the government to encourage a couple of already established mirror manufacturers in the country (Indian & MNCs) to set up solar mirror line to service the growing local demand in the country.

Such investments will need to be backed by a strong incentive package since project viability is not expected to be achieved in the two to three years time frame expected out of such capex investments by most companies.

Reflector Coating

The challenge has been the availability of effective reflector coating.

There is a need to develop appropriate reflector coating by which there would be a possibility of using the substrate itself as a reflector. This needs to be done indigenously to ensure capability building as well as ensure lower costs. Research institutions and industry collaboration initiative for such developments is an imperative and this needs to be aggressively encouraged.

Receiver Tubes

Mirror finish receiver tubes used in line focusing concentrators are required to be imported presently in the absence of suitable alternatives available in the country.

India should look at having indigenous manufacturing based on technology collaboration.

Second approach could be to have focused research between Indian academia and interested companies leading to creation of commercially viable products and their manufacturing value chain.

Absorber Coating

Presently appropriate facilities for developing absorber coating are not available in the country.

The same has to be promoted and developed to meet the growing demand expected in the coming years, while doing so specific focus should be given on handling increased lengths of absorber tubes. Absence of critical mass in the initial period requires government facilitation or encouragement to an existing PSU to take up this manufacturing.

Vacuum tube availability

Availability of vacuum tubes which is a key component of solar thermal installations is a major issue presently.

There are a limited number of international suppliers for these products presently. R&D funding from government for development of a comparable product is crucial and this will necessarily entail engagement with international experts and institutions with domain expertise in relevant areas.

Cost reduction and availability would be the key targets for such development. Indigenous manufacturing option will be necessary post the above.

Glass to Mirror

The challenge is the lack of domestic mirroring and mirror cutting facilities for solar grade mirrors.

Mirroring and mirror cutting facilities should be developed within the country to reduce dependence on external suppliers. This needs to be addressed on a priority basis as availability of solar grade mirrors could become a major hindrance in proliferation of solar installations in the country.

Heat Transfer Fluid / Heat Storage System

Lack of domestic heat transfer fluid suppliers is a worry in this space.

The heat transfer fluid forms a major cost in the capex and is an important component for the performance of the plant. The present market is controlled by few players. It would be of importance to develop domestic manufacturers who have petrochemical facilities in India to produce such fluids at affordable prices through R&D and technology transfer routes.