



Beyond inspection

PV MODULE MANUFACTURING IN INDIA

TIPS TO PLAN YOUR MODULES FROM INDIA



- Select Suppliers



- Negotiate Contracts

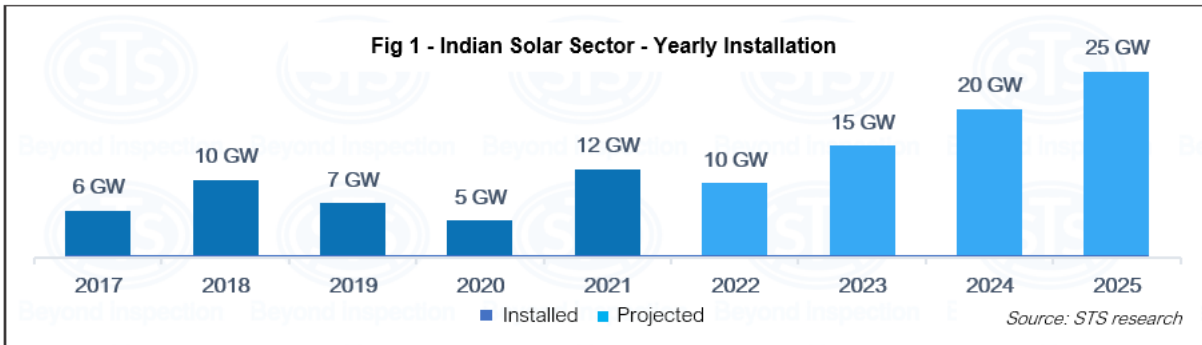


- Execute Orders



PV Module Manufacturing Landscape is experiencing an unprecedented growth

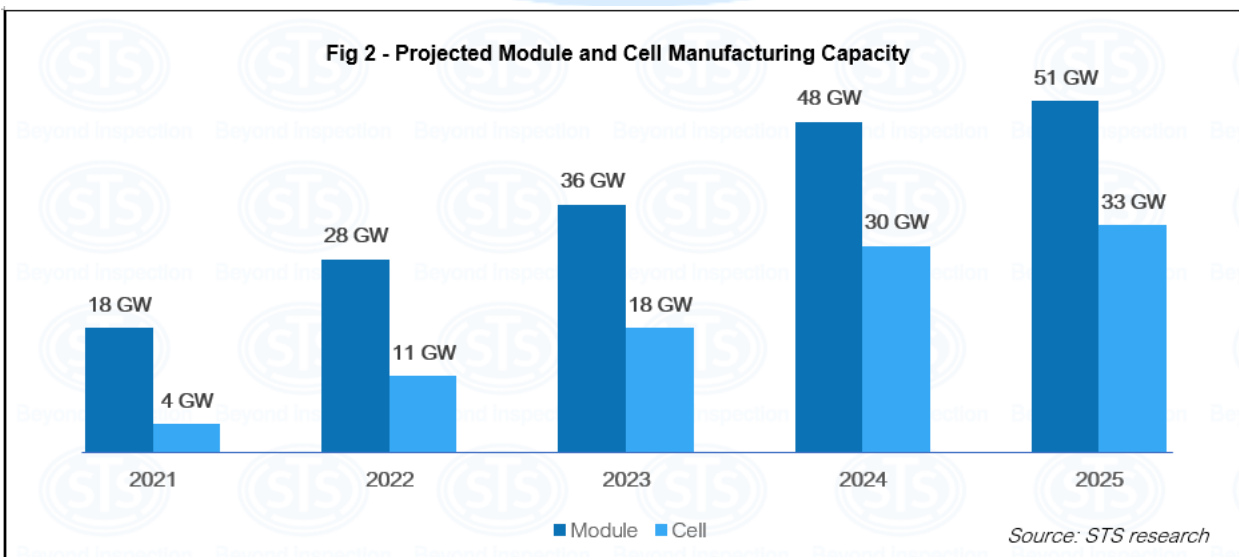
India has made significant improvements in its PV module manufacturing sector in the recent years and has added 42 GW of solar installations in last 5 years at an average of 8 GW/year. However, the country needs some herculean measures to achieve the target of 300 GW of solar installations by 2030, which boils down to an average of 30 GW/year.



Currently India has a manufacturing capacity of 18 GW modules and 4.3 GW cells. With no capabilities in manufacturing polysilicon, ingots and wafers, India is highly dependent on imports for sourcing raw materials. About 90% of solar modules & solar cells in India have been, in recent years, imported from China and Southeast Asia.

To promote domestic manufacturing, the Indian government has officially enforced both “Production-Linked Incentives (PLI)” and Basic Custom Duty (BCD) from April 1st 2022 - 40% on solar modules and 25% on solar cells, clubbed with the Approved List of Models and Manufacturers (ALMM) scheme.

These government-led policies have garnered a huge interest amongst stakeholders (existing and new) to focus on integrated manufacturing and producing high efficiency modules. Since many manufacturers are in free zones, this additional capacity is at least in part available for export, triggering a strong interest amongst developers across the Globe.



STS started its journey in the Indian solar market more than 7 years ago, when the Indian annual market was less than a GW. Since then, STS has maintained its market leadership in module inspection in the region, inspecting, at times, more than half of all modules imported into India in a given quarter. Today, we support more and more international developers interested in exploring whether Indian modules may be right for them.

Leading the PV module pre-shipment inspection service for Indian buyers, we have had the opportunity to see a lot of transactions between Indian and International counterparts. Indian manufacturers have progressed in their manufacturing techniques and business approach.

Here we would like to share some tips that can help global developers with their PV modules procurement in India.

- Tips When Selecting Suppliers

- **Financial Sustainability:** Some manufacturers have been in a difficult financial position for quite a while. They have difficulties financing expansions and can't procure sufficient raw materials in advance. They may rely, for instance, on clients' transferrable letters of credit.
- **Market Position:** Indian manufacturing capacity is not necessarily designed for export. For instance, ReNew Power and ACME Solar are right now building manufacturing facilities with the intent to use modules productions for their own projects, not to commercialize elsewhere. They have limited experience outside India and may not always be aware of customers' requirements outside of India.
- **Logistics:** Many manufacturers are in free-trade zones, which may reduce risks of disruptions (tax, shipping...). Many factories, however, are located in remote areas, which may increase risk of product damage during transportation. **Supervision of container loading is therefore of increased importance.**
- **Technology:** Relying on non-Indian supply chain, Indian manufacturers may play more of a follower role in new technologies. Their technology might be obsolete or not meeting initial PV plant design when switching suppliers. Many plants in India, are still today producing multi-crystalline modules. **A thorough manufacturing process audit, and a manufacturing-line-specific pre-production inspection are therefore strongly advised.** We also recommend evaluating the level of technology, as well as the track-record of the line being allocated for production.
- **Storage Space:** In many instances, Indian manufacturers may not have a large storage space next to the manufacturing lines, which may be an issue for large volumes and may put constraints on pre-shipment inspection (e.g., lot size).

• Supply Chain:

- ✓ **Resilience:** In general, Indian manufacturers may be quite heavily dependent on Chinese cell suppliers, with higher material cost and risk of procurement disruption.
- ✓ **Cost:** Dependence on foreign supplier chains, as well as new tariffs set in April 1st, 2022 may have some impact on manufacturing costs.
- ✓ **Quality:** It is a big challenge for Indian manufacturers to negotiate low cells prices, get decent quality requirements, and get replacements when they face quality issues with their suppliers. Many Indian manufacturers now resort to checking the quality of solar cells at the manufacturing location, in China or Southeast Asia. **We recommend requesting a certificate of conformity issued by an independent ISO17020-accredited inspector.**
- ✓ **Traceability:** Being distant and with limited negotiation power may be challenging for Indian manufacturers. They may not always have easy access to information about wafers or cells suppliers.

Generally speaking, the level of integration of manufacturing and the access to supply chain is to be considered carefully when selecting Indian suppliers.

• People:

- ✓ India has many skilled engineers in the market, especially at higher-level positions. Many people in PV industry have gained experience from the same quality people at the same factories for instance. It's a strong network of knowledgeable people.
- ✓ Suffering from shortage of manpower: with ramp-up of existing & new players in a very dynamic job market, there is a strong competition between newcomers vs. established players to get experienced people. We recommend checking the overall background, seniority, and most importantly, training of factory staffs.

- Tips When Negotiating Contracts

• Decision Making

- ✓ Ultimately, commercial team will drive decisions. If you need to get your request promoted or pushed, get the commercial person to do the job for you.

• Supply Chain & Quality

- ✓ Make your technical and quality requirements clear and detailed in the procurement contract. Indian companies are used to negotiating detailed requirements with other companies and it is best to get everything clarified in advance. They should consult you (or the independent inspection body that you have chosen) if they do not understand your requirements.
- ✓ Indian companies may tend to agree quickly on clients' requirements, without always thinking that clients will enforce the requirements as described in the contracts. Make sure to point out that you will enforce the requirements. If they know you will enforce them, they will be more prepared. Make sure that pre-sales discussions on requirements involve technical people at the factory who can make decisions.
- ✓ Detailed requirements do not mean zero defects. Requirements do not have to be extremely stringent. Because some Indian manufacturers are dependent on their cell suppliers, buyers may have to be prepared to accept more scratches on solar cells, for instance. Small cell defects are sometimes the leverage for Indian manufacturers to get a competitive cost and a stable supply of solar cells.
- ✓ Control the manufacturing origin: some manufacturers produce in China and Southeast Asia, even though the modules may be branded by the Indian brand.
- ✓ Due to the absence of established supply chain in India, Indian manufacturers may need more BOM flexibility than their Chinese counterparts. Strictly enforcing a unique supplier per critical material, although somewhat recommended at Chinese manufacturers, may expose Indian manufacturers to cost increase from its single source supplier, with potential damaging effect on their clients.

• Legal

- ✓ Watch for liquidated damages: Indian manufacturers are familiar with such clauses and will enforce them.

- Tips When Executing Orders

• Schedule

- ✓ Have a clear schedule in place. If the schedule is prepared long in advance, track regularly and require production plans updates, with milestones & tasks checked. Otherwise, be prepared for delayed schedule.

• Quality Inspections

- ✓ Small warehouses cannot accommodate large finished products quantities. We recommend choosing smaller lots sizes due to small inventory capacities
- ✓ Be prepared for quality issues initially, especially with less mature manufacturers. **Increasing the level of quality control in factory is a cost-effective way to reduce quality risks.**

• Laboratory Tests

- ✓ Select a reputable lab for tests according to the manufacturing site location (some can be very distant from labs) but be ready for long lead times. Factory labs are not that well operated (equipment maintenance, etc.). Non-conforming testing conditions may happen and lead to incorrect test results. We recommend making sure that the laboratory is appropriately qualified.

In summary, while some Indian manufacturers may be less experienced than some large and established Chinese manufacturers; they may also lack a local supply chain, which may bring upon a higher production cost; but we believe they have, in general, the tools to keep their production at a similar level of quality.



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