

# PV Technology Outlook: India 2012

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PV Insider are delighted to provide you with this outlook for PV manufacturing and technology in India, featuring the input of various stake-holders and experts in the industry.

1-2 August, New Delhi, India

This guide has been produced in conjunction with the **PV Manufacturing Summit India 2012**. The conference will bring together the biggest local and international PV players to help realize the incredible opportunity now open in the nation.

It is the only conference this year dedicated exclusively to the manufacturing PV industry in India – with a focused agenda that will show you how to maximize competitiveness, build a PV powerhouse, further the technology and exploit the massive PV potential inherent in India.

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# Introduction

At the launch of the Jawaharlal Nehru National Solar Mission (JNNSM) in June 2008 the Indian Prime Minister Dr. Manmohan Singh stated that India *“must pioneer a graduated shift from economic activity based on fossil fuels to one based on non-fossil fuels and from reliance on non-renewable and depleting sources of energy to renewable sources of energy. We will pool our talents & resources to develop solar energy as a source of abundant energy to power our economy and to transform the lives of our people. **Our success in this endeavour will change the face of India.**”*

While the ambitious ‘20GW by 2022’ directive made the headlines, a radical effort to kick-start the country’s nascent photovoltaic (PV) manufacturing industry commenced behind the scenes. “One of the Mission objectives is to take a global leadership role in solar manufacturing of leading edge solar technologies,” said Dr. Singh.

The opportunity is undeniable. The JNNSM, in conjunction with state-level policies, offer thousands of project megawatts that need supplying by local industry. Words have been turned into actions, as the total Indian market could reach the monumental 1GW milestone of installed power by the end of 2012.

and scaling up operations. However, there are numerous obstacles to conquer before India can consider itself a PV heavyweight. The traditional growing pains that every emerging market suffers from must be overcome - factors like establishing a supply chain

There are added complications for the Indian market. Securing finance is a debilitating challenge for Indian manufacturers, and the spectre of cheap competition has made winning vital orders problematic. The emergence of the Chinese behemoth as an irresistible source of manufacturing has added a new dimension to India's problems, as the industry scrambles for a strategy to drive

down costs and win over sceptical investors and project developers. Indian manufacturers are ready to fulfil the requirements of the investors and project developers in order to secure investment and win project supply deals.

In response to these challenges, PV Insider have released this PV Technology Outlook: India 2012 in conjunction with the PV Manufacturing Summit India 2012 (1-2 August, New Delhi). We have interviewed industry experts and compiled their thoughts on the big questions, along with some technology comparisons and articles for you to take a look at.

Through this document, you will get to grips with the biggest hurdles the industry is faced with in 2012, with a realistic and balanced view of the future. I hope that you will find it a useful tool – and if you want to learn more about the PV industry in India, I urge you to take a look at the PV Manufacturing Summit India (1-2 August, New Delhi). This 2 day conference will answer these questions in unparalleled detail with over 30 experts on hand to tackle the big issues.

You can see full information on this conference at the website: [www.pv-insider.com/manufacturing-india](http://www.pv-insider.com/manufacturing-india)

Kind regards,



**Matt Carr**  
**Global Events Director**  
**PV Insider**

# Part 1: Technology comparisons

## The pros and cons of C-Si and Thin Film in India

Taken from **Will Thin Films win in India?** Madhavan Nampoothiri, RESolve Energy Consultants December 13, 2011

### Advantages

- Temperature coefficient
- Better performance under diffuse light conditions
- Higher Energy Yield
- Faster energy payback
- Module grounding not required for frameless modules

### Disadvantages

- Conversion efficiencies
- Area requirement
- Higher BOS requirement
- Breakage
- Aging behavior not known
- Materials shortage/toxicity

“The verdict on the more suitable technology is still out for India. The overall technical case for the benefit of Thin Film over Crystalline for India is one that will be proved as companies like First Solar can prove performance in India conditions over time. We know from recent reports that they have not done too well in other countries with warm climate. On the commercial side, Crystalline prices are now lower than Thin Film and fast decreasing. This has eliminated the cost advantage that Thin Film claimed over Crystalline as well.

Overall, at the moment, Crystalline is a more suitable technology for India as it has a higher performance (until higher performance of thin film in higher temperatures is proven) and costs less than Thin Film.”

**Mohit Anand, Bridge to India**

“C-Si Technology is matured and has somewhat predictable performance and reliability. As a technology choice, Thin Film technology is too risky for the harsh Indian environment. Personally I have a suspicion that the reason for preferring thin film (low temperature co-efficient) is counterproductive. The long term reliability at high temperature environment itself is an issue. In the Thin Film technology domain, single junction a-Si would probably be a better

choice as some amount of field reliability data is available. The physics and environmental effects on performance are somewhat simpler and well understood. Others (Tandem a-Si, CdTe, etc.) are too risky as a technology choice in India in my mind at this stage.

The cost difference between Thin Film and C-Si has come down significantly. This gets almost nullified if BOS cost is also considered.

Therefore - I don't see any reason for preferring Thin Film over c-Si for India.”

**Jatin Roy, Solar Semiconductor**

“The selection of technology for any PV project should ideally be based on criterion which minimizes overall LCOE, some of the factors which have to be weighed in while determining any particular choice includes:

1. Corporate strength, guarantees and reputation (bankability).
2. MW scale deployment experiences of particular brand of technology (third party references)
3. Climate (Wide spectrum response of Thin Film is a widely debated topic. It's still an issue to be thoroughly understood before making reliable claims. The Temperature coefficient definitely provides bias towards thin film technology)
4. Effect on overall cost dynamics of project should also be weighted for best LCOE (including optimization of land, BoS requirements)
5. All above things being equal, upfront cost of technology.

“In the normal course of things, the aforementioned 1 to 4 form the core steps of decision making to arrive at short-listing of technology and its supplier for final selection as in 5. However, in most of the cases where attitude of the investor is on taking short term profits, it is observed that concept of LCOE takes backseat and determination of technology is made on basis of only point '5'. If we talk about the banker's perspective, point no 1 to 3 should always form important points, which go a long way in mitigating lifetime risk.”

**Anudeep Yadav, IREDA**

“Both Crystalline and Thin-Film technologies have gained significant traction in the last few years and have come out as proven technologies. In India, projects have come on both the technologies fairly equal. Particularly in the Indian environment, the effect of dust, soiling, hot climate and degradation would be crucial and this data needs to be measured.”

**Parag Shah, Mahindra Partners**

## C-Si in detail

“Almost every c-Si manufacturer in India lacks three major strengths that will make them competitive. They are:

- a. **Vertical Integration** - Most Indian companies are either standalone module companies or standalone cell companies (eg. Jupiter, Indosolar, Euro Multivision). There are a few companies that are into both cell and module production (eg. Tata BP Solar, Moser Baer, Websol). There is no Indian company that has a presence in the upstream wafer manufacturing or polysilicon production. Due to the lack of integration, these companies do not have the leverage to keep their costs down. Typically, a PV module produced in a vertically integrated plant is \$0.10-\$0.15 cheaper than a PV module produced in standalone units of the same scale.
- b. **Scale** - The total module production capacity in India is about 1.5 GW and cell capacity is about 500 MW. In comparison, the top Chinese manufacturing companies like Suntech alone have more module and cell production capacity. Because of the scale, these big companies are able to reduce their unit costs significantly. In contrast, the biggest module manufacturers in India have a nameplate production capacity of less than 200 MW.
- c. **Governmental financing and policy support** - Chinese development banks and some of the provinces provide soft loans (as low as 2%) for financing the production of the PV modules. These loans are also typically long term with repayment starting only after 4-5 years. This frees the manufacturers from any cash flow problem and they are able to offer modules at lower prices. In addition, many of the development banks offer financing support for the sales of these modules, cells and upstream products.

In India, no such support is available.

All these factors above make it very difficult to compete with bigger and well-funded Chinese companies.”

**Madhavan Nampoothiri, RESolve Energy Consultants**

“Indian C-Si manufacturers will have to compete with their international counterparts either on technology or on price.

On technology, it seems unlikely that they are in a position to make any significant breakthroughs that could make them significantly competitive globally, or therefore, in India.

On price, they need to be able to drastically increase scale to match that of the Chinese manufacturers. This is something that European manufacturers have to deal with as well, with varying degrees of success. Indian manufactur-

ers are in dire straits at the moment – running their plants well below capacity due to dwindling orders. They are as a result cash strapped. It is unlikely that they will manage to increase their scale of production. Further, in general, globally, module prices are too squeezed to provide a margin to manufacturers. Leading, or I would say ‘surviving’, manufacturers are those that are integrated across the value chain and are able to shift margins. Indian companies do not have the technical know-how or the infrastructure to integrate vertically, keeping them uncompetitive.”

**Mohit Anand, Bridge to India**

“In my mind there are few good C-Si module manufacturers in India. However, I think cell manufacturing is still in a nascent stage in India. They are nowhere near the international standards. The efficiency levels are low; quality is suspect and also the printed performance sometimes does not match with the measured values. On top of it there is a minimal level of engineering support. I have personal experience on these issues. The price levels are also high.”

**Jatin Roy, Solar Semiconductor**

“The majority of PV cells produced today use Crystalline Silicon (C-Si) as it is a light absorbing semiconductor. The C-Si technology was originally developed for the semiconductor industry to produce PV cells for integrated circuits and microchips. These PV cells have energy conversion efficiencies between 11% and 16%. The energy conversion efficiency of a solar cell is the percentage of incident sunlight converted into electricity. While the efficiency of



c-Si is high, it absorbs light poorly and requires many layers to perform efficiently in solar applications.

Today, Crystalline Silicon technology leads the Solar PV module production, followed by Thin Film. There are also other technologies being developed, but Crystalline Silicon technology and Thin Film technology will continue to dominate the solar PV module space for the foreseeable future, unless some technology breakthrough happens.”

Biggest challenge - “Conventional Crystalline Silicon solar fabrication is time consuming, energy intensive. Silicon-rich gas is heated to 1,400°C to make large crystals or ingots that are then cut into thin wafers in a process that takes several days and turns roughly half of the raw silicon material into unusable sawdust. Thus Crystalline Silicon turns out to be expensive in the process.”

**Shaibal Ghosh, Vikram Solar**

“Being a nascent industry, the Indian manufactures need additional incentives for investments. This would help to build up scale and that would lead to competitive pricing with global players. Additionally, the cost of financing for investments in manufacturing is quite high and needs to have additional support.”

**Parag Shah, Mahindra Partners**

## Industry Insight: Thin Film in India

### What is behind India’s love affair with thin film?

Article by Jason Deign (PV Insider), Feb 2012

**There are at least three good reasons why thin film is doing well in the Indian market. The question for the beleaguered sector is how long these factors will continue to hold sway.**

In what could be thin film’s most challenging year to date it was good to see at least one manufacturer has been reporting good news.

US cadmium telluride (CdTe) panel maker Abound Solar inked a deal with Solar Integration Systems India Private Limited to build a 1 MW plant in Kadiri, in the Indian state of Andhra Pradesh, with support from the Jawaharlal Nehru National Solar Mission (JNNSM).

This was not the Loveland, Colorado, company’s first foray in India. Last July it bagged a US\$9.2 million long-term loan from the Export-Import Bank of the United States (Ex-Im Bank) to ship modules to Punj Lloyd Solar Power for a 5 MW project in Bap, Rajasthan.

Other thin film companies, and most notably First Solar,

have had similar success in the Indian market. In fact, India is probably the only major PV market in the world where thin film is the dominant technology.

Dr Tobias Engelmeier, managing director of Bridge to India, a renewable energy consultancy, says: “At the end of last year it was 80% of installed modules on the ground.”

That is a significant share, particularly at a time when thin film is being edged out of practically all its other markets by cheaper crystalline-silicon panels. So what makes India different?

Observers point to three factors: thin film has a better performance than crystalline silicon in India’s sweltering climate; it is not subject to a local content requirement under the JNNSM; and US panel makers have benefited from Ex-Im Bank’s help in exporting to India.

While everyone agrees that these three features of the market have contributed to thin film’s success, there is less of a consensus over which is the most important factor. MJ Shiao, a solar analyst for GTM Research, believes performance is the strongest card.

### More kilowatt-hours

“A lot of thin film manufacturers have been able to communicate to the Indian solar market that thin film does produce better in the India climate than crystalline silicon technologies,” he says.

“With hot, muggy Indian weather the thin film panels will produce more kilowatt-hours per kilowatt than a crystalline silicon module. You’re getting a little more bang for your buck.”

In contrast, Stefan de Haan, principal photovoltaic analyst at IHS iSuppli, says: “The underlying reason is that they can get around the local content criteria using thin film. That’s why the American CdTe producers First Solar and Abound Solar are very successful there.”

Engelmeier does not buy either argument, though. “If we look at the higher temperature coefficient, I think the verdict is out on that,” he says. “It’s not the module but the whole system you need to look at, and in terms of the system I’m not sure it’s so much of an advantage.”

Regarding the domestic content requirement, he adds, it only applies to the JNNSM. And in Gujarat, where there is no local manufacturing stipulation, thin film still dominates. “That tells me that probably that argument isn’t valid,” Engelmeier says.

Instead, he theorises: “I think that what we see is a very strong push by First Solar based on US Ex-Im Bank loans. Because the market is so small in India, one individual

player can completely distort the picture, and that's what's happened.

"I would say a large part of the thin film success in India is the sales success of one company, named First Solar."

#### **Local content**

If he is right then it has important implications for thin film's fortunes in India, since the Ex-Im Bank cannot continue to prop up exports forever. For that matter, the local content requirement is unlikely to be of much help to thin film in the long term, either.

"If they decided to implement some form of local content criteria for thin film, then this would change the case completely," says de Haan. Similarly, there is no guarantee that home grown manufacturing will be required in future editions of the JNNSM.

That leaves only thin film's hypothetical superior perform-

ance as a unique selling point in the Indian market. As Engelmeier points out, this claim is open to question.

Unsurprisingly, then, most analysts predict thin film will not be able to maintain its current stranglehold on the Indian market for much longer.

Says Shiao: "With such over-supply in the module production market, if Chinese crystalline players are able to sell into India, it is going to be one of the bigger markets this year and then going forward. Thin film's not going to dominate the landscape."

De Haan agrees. "If the local crystalline industry grows in parallel with the market and brings their cost down, which they have the potential to, then they will more and more penetrate into the domestic market," he says.

"In the end this artificial thin film bubble that we see there now will decrease to some extent."

## Part 2: Manufacturing PV in India

### **What needs to happen in the Indian manufacturing market to make PV a success?**

"Specifically for manufacturing, we need the industry and policy makers to realize the inability of the Indian manufacturing industry to become competitive with their current business model. They need to see the Indian manufacturing industry in a global context, and if needed, come up with specific policy initiatives that support manufacturing keeping in mind the global challenge. There is no India specific solution to this, and a domestic content requirement is certainly nowhere close to a useful solution to make Indian manufacturing successful."

**Mohit Anand, Bridge to India**

"The Indian PV manufacturing sector is tightly linked to the global markets and like European and US manufacturers, Indian manufacturers are also victims of huge production overcapacities (mainly in China). I think one way to make PV a success will be to restrict imports. However, that is not a sustainable long term solution, particularly in an era of global free trade. The other way will be address the industry challenges."

**Madhavan Nampootheri, RESolve Energy Consultants**

For Crystalline Silicon, "C-Si manufactures have a fantastic opportunity to capitalise on the current Indian market conditions. Cheap competition has made it difficult for C-Si panel production to stay profitable, so get to grips

with the manufacturing techniques that will slash costs and drive up your volumes. Manufacturers can create a competitive industry in India, and work towards turning the country into a future manufacturing hub."

**Shaibal Ghosh, Vikram Solar**

### **Why do investors perceive high risk in PV manufacturing in India?**

"PV manufacturing, like any manufacturing requires a very strong foundation support for start-up, and equally robust upgradation to keep up with the best in the world. With such strong fluctuations in PV semiconductor industry when many established giants are cracking up, the business model of Indian PV manufacturing leaves very much to be desired in terms of steps taken to counter the competition. If we look, barring a few most of Indian manufactures have nil share in MW scale deployments outside India - this is despite the fact that most of PV market existed outside India before the launch of JNNSM and other schemes.

So the key business of majority of Indian PV manufacturers consisted of small KW size and off grid applications. This underlines the uncertainty in terms of business model forecasting, which is a major decision making factor for investors. Apart from this uncertainty in the business model, the extent of support available to the industry in comparison to other countries like China is almost negligible, so in the face of all such challenges, decision making for an investor is not easy one.

However, in case of foreign established players with market presence, setting up vertically integrated manufacturing units may be a more attractive idea.”

**Anudeep Yadav, IREDA**

“In the last 3 years, the cost of PV has decreased significantly by over 75%. This has resulted in a very cost-competitive global market including China. The Indian manufactures are not having scale advantage like other Chinese players. This requires significant investments which remains a challenge.”

**Parag Shah, Mahindra Partners**

### How do you see the Indian PV market evolving in the next 5 years?

“I think we will see international manufacturers testing the Indian waters through contract manufacturing with Indian players. This will keep some of the Indian players afloat for another few years. In the meantime, if the Indian players are able to lobby well enough, the government might wake up and come out with a comprehensive PV manufacturing specific policy that might actually help very few local manufacturers (the ones that survive the current slump). Also, in the meantime, we will see large Indian business conglomerates like Lanco making significant investments to develop manufacturing capabilities across the value chain.

In three years’ time, such large players will be established (if they are successful) and we will have first foreign players setting up manufacturing in India. Given the large size of the Indian market, and conditional to its successful growth, such large and integrated players will be looking to meet Indian demand by manufacturing locally in another 5-6 years’ time. I see no place for small manufacturers in the future.”

**Mohit Anand, Bridge to India**

“It is very difficult to predict, but my guess is that there will be several module makers, but further upstream - cells, wafers, polysilicon, will not see much growth (already almost nil) unless there is a strong drive from the government through policy and regulatory support.

Overall, my view is that Indian PV manufacturing industry is in a very dangerous situation of extinction and the government needs to step in with some innovative support in order to develop a PV manufacturing ecosystem in India. I wish I could be more positive on that front!!”

**Madhavan Nampoothiri, RESolve Energy Consultants**

“For the next year, the cell and module manufacturers in India will have hard times. I am expecting this to improve after that and continue to grow at least in the medium term. It will be

an interesting market particularly for PV installation.”

**Jatin Roy, Solar Semiconductor**

“Given the trend, I expect the Indian PV market to develop mainly focusing on MW scale deployments and capacity addition will be fast in this field. Roof-top, BIPV will make efforts to take off, but their ability to translate into success will depend upon the utility response. Also, I believe it cannot translate into full scale success with the effort of developers only. Off grid is also seeing some activity driven by interest/capital subsidy provisions of JNNSM, but given vast history of off grid solar PV developments in India the durability of off grid solutions would be interesting to watch.”

**Anudeep Yadav, IREDA**

“India is an emerging market and is growing rapidly without a doubt. With the implementation of the National Solar Mission, as well as a number of local government support programs, and thanks to the abundance of sunshine here, it’s a perfect market for PV development. India will be one of the top solar markets in the world in the near future, with 1GW of new installed PV projects in 2012.”

**Shaibal Ghosh, Vikram Solar**

### Will there ever be a PV manufacturing hub in India?

“I want to say yes to this question, but there are so many ‘ifs’ for that to happen. It all depends on how the global excess production capacity, trade wars (slapping of import duties by US on Chinese manufacturers, for example) and governmental support play out.”

**Madhavan Nampoothiri, RESolve Energy Consultants**

“This could be the case if India becomes an overall PV market leader globally. However, this would be led by foreign module manufacturers setting up manufacturing in India and not by current Indian manufacturers becoming large, success stories.”

**Mohit Anand, Bridge to India**

“Given the shakeout happening in the global PV manufacturing industry, I do not see any major activity in terms of India developing into PV manufacturing hub unless some promotion scheme is launched by Government. However, given the increased tendency to use indigenous PV modules by projects in India, there may be increased capacity utilization of existing players. I expect most of the small Indian PV module manufacturers will make their mark in terms of MW size deployment in Indian projects only. This is in stark contrast to Chinese module manufacturers who have global MW scale deployments apart from home exposure.”

**Anudeep Yadav, IREDA**

# Industry Insight: Funding opportunities

## Thin film in prime position as India's PV manufacturers grapple for cash

Article by Jason Deign (PV Insider), Apr 2012

The Indian PV market got off the ground largely thanks to cash injections from foreign funding organisations. But where can the industry turn to for money as that support starts to wane?

If you are in the PV business then right now India seems to offer it all... almost. It has got the need, in terms of a rapidly growing demand for grid-connected and off-grid power, and the regulatory framework, in the form of the Jawaharlal Nehru National Solar Mission (JNNSM) programme.

What it has not got, however, is ready cash. Even though the US\$19bn JNNSM has been hailed as the most expensive solar energy plan on the globe, the fact remains that most projects also need other sources of finance.

And that is not necessarily easy to find, since the returns from individual projects are far from assured. "Everybody's looking to get something going, but the benefits are not very attractive," says Dr Henning Wicht, senior director and principal analyst of photovoltaics at IHS iSuppli.

So far, funding has largely come from international organisations such as the Export-Import Bank of the United States (Ex-Im Bank), Overseas Private Investment Corporation, Asian Development Bank and World Bank.

These either have a stated mission to support PV as part of emerging market development programmes, or are keen to open up export channels into India.

The Ex-Im Bank has been spectacularly successful in the latter regard; its support for US manufacturers such as First Solar and Abound Solar are widely credited with helping thin film gain a competitive advantage over crystalline-silicon modules in the Indian market.

These sources of funding cannot be expected to go on forever, though. And in any case "the volume you can get out of them is not going to match the expectations of the Indian market," says Shayle Kann, managing director of GTM Research's solar practice.

"Ultimately, it needs to be self sustaining, and Indian banks have not jumped into the market yet. It'll start changing when the large infrastructure companies start getting into projects."

There are signs that this is beginning to happen. There are signs this is beginning to happen.

### Infrastructure companies

The New Delhi construction-to-power conglomerate Lanco Infratech, for example, has been slammed by the Indian Centre for Science and Environment after allegedly breaching JNNSM one-project-per-bidder rules and cornering 40% of phase 1 capacity through shadow affiliates.

Such major players might not have too much difficulty in getting Indian banks to cough up project finance, but to date the country's banking sector has been loathe to bet on renewable energy.

"The problem is not equity, the problem is debt," states Bridge to India managing director Dr Tobias Engelmeier. "Equity there is plenty of. The challenge is how do you get the debt. You can go for a fully equity-financed project, which most people don't want to do, of course.

"But the leverage for debt isn't that high; our expectation would be 15%, say, or 20%, and the interest rate would be 30% or something."

Nevertheless, he says, some companies have gone down this route, particularly on smaller projects. A second option is to fund a project using debt, but based on recourse finance. This can attract an interest rate of just 11% or 12%, Engelmeier says.

The final option is non-recourse financing, which is very difficult for two reasons. One is that Indian banks are wary of the value of power-purchase agreements because they know the state electricity boards are usually short of cash.

And the other is that a lack of good irradiation data in India means solar projects might not provide the yields originally envisaged by their owners. The upshot is that non-recourse financing probably only accounts for funding in 10% of projects, Engelmeier estimates.

### Equity deals

This is about the same as the level financed through pure equity deals but way below the 30% level for development bank funding or the 50% level for recourse financing.

And if getting funding for a single project is complex, the challenges are multiplied in the case of companies looking to become established as part of the nascent Indian PV supply chain.

As a project developer and operator, Azure Power has

been able to get off the ground with backing from the Indian fund Helion Venture Partners and Foundation Capital of Silicon Valley.

It is not clear whether would-be manufacturers would attract the same level of interest from potential backers, however.

### **Facing up to facts?**

“It’s very hard to justify any manufacturing in PV right now,” cautions Kann. “You are fighting an uphill battle in convincing any investor to set up a manufacturing facility anywhere in the world, because there is so much over-supply of PV.”

This does not bode well for the JNNSM’s stated aim to

help India take a leading role in solar manufacturing, even given a local content requirement for crystalline-silicon modules.

The funding challenge is something the market will have to face up to, however, if it is to meet installation rates required by its green power policies. It is time for the industry to start talking about solutions.

Indian Renewable Energy Ministry Secretary, Tarun Kapoor, said in a Bloomberg report back in December 2011 that the government has ruled out the imposition of a customs duty on imported solar modules. He adds that the government would “find some [alternative] way” to protect the local manufacturers.

## Next steps

I hope you found this Outlook useful. If so, then the **PV Manufacturing Summit India 2012** (1-2 August, New Delhi) is the definitive conference aimed at solving your photovoltaic technology and manufacturing challenges.

The **PV Manufacturing Summit India** is India’s first and only conference dedicated exclusively to solving the specific industry challenges and enabling you to maximize

your PV manufacturing potential - to exploit India’s great opportunity and get competitive internationally.

As well as a focused, comprehensive agenda, attendees will also be given the perfect forum for meaningful networking opportunities. If you want to meet and do business with the biggest and brightest in the PV community in India, then this conference is unmissable.

You can see the full agenda, topics up for discussion, conference features and the 30+ speakers that make attendance compulsory on the website: [www.pv-insider.com/manufacturing-india](http://www.pv-insider.com/manufacturing-india)

