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## Feature

## Solar Mission - Powering India

By Ameet Shah, Co-Chairman of Astonfield Renewable Resources

- Domestic solar power is bound to become a major energy source for India.
- The potential to scale-up solar power generation is huge, although a number of financial barriers dampen this optimism.
- The key market for solar energy in India will be the installation and maintenance of solar power generation.

India's private sector has a growing interest in low-carbon technology and is pushing for ambitious solar programmes. In this article Ameet Shah, a leading proponent of solar energy in India, sets out his vision for the sector.

#### Introduction

With the Prime Minister's announcement in November 2009 of a ten-year, 20,000-MW vision for solar power in India, the nation has officially embarked on one of the most ambitious solar initiatives in the world.

No solar program among the dozens globally is more important to successfully execute than India's. While developed countries are increasing their solar power deployments and other mediums of renewable energy in an effort to combat climate change and reduce their carbon footprint, solar power has a completely different meaning for India – it must become a significant contributor to the country's domestic energy security, and a key means of providing power to the approximately 400 million citizens living without access to electricity today.

#### Rationale for a Solar Program

From a developer's perspective, India already has three very critical elements in place for a world-leading solar program to be realised.

First and foremost, the natural resources (i.e. sunshine) necessary to support a sustainable solar market are more than enough to power the entire country. After the Sahara Desert, India is the sunniest location in the world – only one percent of the country's land would be required to electrify the nation.

Second, the technology for solar power is more accessible than ever and efficient, commercially proven solutions are even now being tailored to the Indian market. In fact, one of Astonfield's technology partners is now re-centering key parts of its global solar

engineering and design operation to India, given the innovation required to deliver solutions at the aggressive cost points demanded by Indian feed-in tariffs. They will now be exporting this innovation to all of their global markets as well.

Third, private sector interest and enthusiasm for promoting solar infrastructure has gained tremendous momentum. Commissioning the full 20,000 MW of solar power by 2022 (as outlined in the Jawaharlal Nehru National Solar Mission (JNNSM)) will require an inflow of approximately \$40-50 billion of capital, which the investment community is ready and willing to provide.

This market opportunity for developers is also driving technology suppliers to consider serious investments in manufacturing and employment in India – one of our suppliers, after realizing the size of the market opportunity in India, made a commitment to build domestic manufacturing facilities in India by the end of 2011 rather than provide long-term supply from Europe.

#### Scaling-up the Solar Market

The JNNSM has provided the framework for serious developers such as Astonfield to make the goal of 20,000 MW of solar power by 2022 a reality. But with less than 20 MW of gridconnected solar installed in India today, we have our work cut out.

For the JNNSM to be successful, confidence in long-term scale and government support to grow a sustainable solar market must be there.

Achieving the proper scale in India is no problem. Between the growing power requirements of industrialized India and the drive to provide electricity to the part of the populace that is currently without, the demand for an unprecedented solar program is there. Solar is well-suited to India's needs — given the versatility of the technology we can deploy solar technology in large centralized utility scale power plants or small off-grid decentralized installations.

Getting the sustainability equation right presents a greater challenge; we define sustainability as the ability for entrepreneurs to enter the solar market, innovate, invest and create a long-term business that earns a reasonable profit. There are many contributing factors to achieving healthy sustainability in the solar market, but this article will touch on a few that we consider the most important.

#### Financing Solar Power Plants in India

Investors need a way to source global pools of capital at low cost. In a small–scale market such as India, where vast implementation is required to yield a reasonable profit, the capital expenditures are huge. To this end India's leadership would be well advised to create umbrella financing frameworks with multilaterals and commercial banks that the private sector can take advantage of.

Because of the time and cost of due diligence, most banks shy away from project financing for deals of less than US\$30 million, which far exceeds the capital requirements of a typical project created under the JNNSM, approximately 5–10 MW in size. Hence, an umbrella framework would be a great facilitator of growth in the solar sector by overcoming this barrier to investment.

It's possible to achieve low cost financing through long-term Power Purchase Agreements (PPAs) with credit-worthy customers, working with strong engineering and construction partners with long and successful track records installing solar plants in other markets, and ensuring that realistic assumptions are made regarding the power generation potential of a chosen site.

Besides keeping financing costs low, the tariffs and financial framework supporting the JNNSM must be adequate enough to generate an attractive profit, which may be higher than alternative technologies. Indeed, the JNNSM has come under criticism due to the "high" cost of solar, and the cost to the government to sufficiently incentivize the mission. But when one considers the opportunity cost of non-supply of power to industry, the rising cost of fossil fuels, and the existing subsidies for conventional energy, these criticisms do not hold much water. Furthermore, the cost of installing solar plants is rapidly reducing each year, meaning that the cost of installing gigawatts of solar capacity starting in 3-4 years during Phase II of JNNSM will be relatively less per unit of installed capacity than the initial 100-200 MW installed at current costs over the next 12-18 months.

### **Building a Domestic Solar Industry**

It would be remiss not to share our thoughts on local content requirements for solar projects in India. Very simply, the solar industry is nascent and local content requirements risk maintaining an unnecessarily high tariff level for solar power given that Indian manufacturing options are not yet cost-competitive with global supply options available to developers. Hence, local content requirements will likely be more of a hurdle than an asset.

It is precisely this global competition that will stimulate Indian manufacturers to invest in R&D and innovate on solar technology and/or establish technology transfers with global partners in order to indigenize the most proven, efficient, and cost effective solutions for India. This is all the more important given that solar panels account for approximately 50-60% of the total system cost of a power plant, so panel pricing and performance are the most important element in building a commercially viable project.

Developers must have the freedom to choose the best technology, regardless of where it is manufactured. Meanwhile, the Indian government can achieve significant local manufacturing opportunity along with employment creation in the near term by focusing on building local expertise in solar power plant installation and balance of system manufacturing.

#### Conclusion

If India can maintain a proactive stance on solar power and continue to incubate and scale up the sector, the benefits to the country are tremendous – both skilled and unskilled job creation, increased energy security, growth in R&D and manufacturing, augmenting our current national energy portfolio, and providing power to the 400 million citizens without, not to mention cashing in on Foreign Direct Investment and venture capital opportunities.

While the initial "era" of solar power was dominated by the Europeans and Japanese, it is not too late for India to achieve a global leadership position in solar power generation. The JNNSM provides an excellent framework to achieve this, but the challenge is to successfully translate the mission from strong policy into seamless execution.

The first step is to get initial capacity pumping power to the grid, most likely from the projects permitted under the "migration" phase of the program. For the sake of energy security, economic development, and citizens' welfare, it is imperative that India makes the solar mission a success. Electrification is the cornerstone of civilization, and for India to grow, it must become a completely electrified country.

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