

Financing Solar Projects in India

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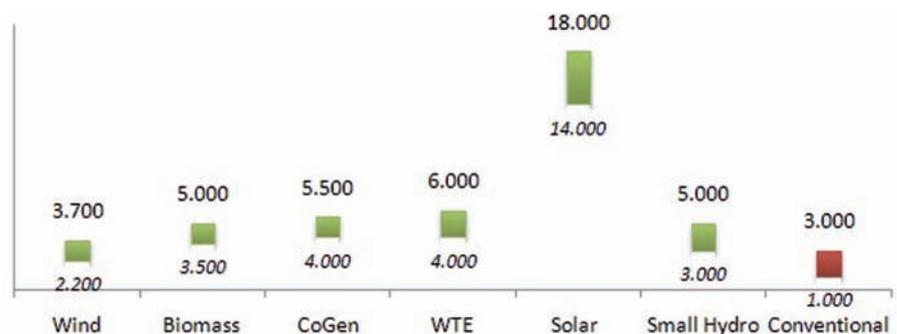
India, with its high annual solar yield and large number of sites ranks # 4 in solar power destinations*. The annual solar energy yield ranges between 1700-1900 kWh per m² per year which ranks India amongst the highest solar radiation receiving countries of the world*. Furthermore, favourable policy support from the government is making India a hot-spot for solar generation.

Policy Support

The recently announced Jawaharlal Nehru National Solar Mission (JNNSM)** is a major initiative of the Government of India to address India's energy security challenge using solar energy. The mission seeks to kick-start solar generation capacities, drive down costs through local manufacturing and R&D in order to accelerate the transition to clean and secure energy. It promises to provide the much-required impetus for the development of solar power in India by providing for feed-in tariffs as well as support for indigenous manufacturing of components for solar projects (PV cells and modules, parabolic mirrors, etc). The Mission will adopt a 3-phase approach, Phase 1 ends in 2012 with a 1000 MW target; Phase 2 ends in 2017 with a 3000 MW target, and Phase 3 ends in 2022 with a 20,000 MW target. The proposed tariff for Phase 1 Solar PV is INR 17.91 per unit.

Under RPO stipulations, State Distribution companies (discoms) must purchase a certain percentage of power from renewable energy sources within their jurisdictions; some regulators have already placed power purchase orders to meet these obligations. In addition, the central government has mandated the creation of Renewable Energy Certificates (REC), which is a market based instrument intended to facilitate compliance towards renewable purchase obligations (RPO). RECs are designed to address the mismatch between availability of RE resources in various states and their concomitant obligation. The CERC has mandated*** a floor and ceiling price for solar RECs at INR 12,280 and INR 17,230 respectively.

In addition to the above measures, various states like Gujarat, Rajasthan and



Andhra Pradesh have announced solar policies, providing for feed-in tariff and other support (like development of infrastructure and provision of waste-land for development) for the projects. **Figure 1: Levelised Cost per Unit of Generation (INR) ****.**

as manufacturers generally guarantee the products for 20+ years. However newer technologies like thin-film and concentrated PV, may provide lower up-front costs, but are unproven and therefore considered more risky.

Challenges for Financing

Power Purchase Agreements – the current draft of the JNNSM provides for a “trader PPA” with NVVN (NTPC Vidyut Vyapar Nigam Ltd. – a wholly owned subsidiary of NTPC Ltd incorporated for the purpose of trading power), which passes on the risk of default by state discoms to the developer. Given that many state discoms are notorious about delaying payments and even defaulting, financial institutions refuse to consider these PPAs bankable.

Despite the favourable policies and support being provided by the centre and state governments, solar power remains a risky and expensive option for power generation. It is expected that solar projects may reach grid parity in the coming years, however, that is a distant dream and currently the cost of generation (levelised) far exceeds conventional as well as other renewable power. The graph below (4) shows the levelised cost of generation of electricity using different sources of power.

Estimation of Solar Radiation – The returns of a solar project are highly sensitive to radiation levels. High quality solar radiation data is a pre-requisite for proper market assessment and project development. Hence, solar radiation assessment is a very important activity and typically requires several months for ground measurement of solar radiations. Any error in solar resource estimation adds an uncertainty to expected

In addition to the above, particular risks to solar projects that make financial institutions uncomfortable are: Technology- Solar technologies are at a nascent stage in India and there are considerable risks in execution of the projects. Crystalline cells and modules are comparatively easier to execute and less risky

future returns. As of now, on-ground solar radiation data is sketchy and the simulation models are at a preliminary stage.

Evacuation Infrastructure – Evacuation of the electricity generated from power plants located in isolated areas is a potential challenge. It may require development of new transmission lines which are often controversial, both because of their expense and the potential of damage to property and environment.

Options for Debt Financing

That said, solar power is only beginning in India. It has indeed been financed in many countries overseas, and it's not as if there is no experience whatsoever. Solar PV projects can be financed through the following two routes:

- Balance-sheet based financing – this option is available for large conglomerates with a healthy balance sheet that can support large projects. This may be a good option as it may allow large industrial houses to get lower rates of finance using their existing relations with the banks. However this would put the company balance sheets at risk and the entire burden of the project failing or under-performing falls on the developers.
- Non-recourse project financing – This is the preferred financing structure, wherein the lending institutions would provide debt to a special purpose vehicle set-up for the project and would have a lien on the project's cash-flows. However as this structure does not provide recourse to the developer's balance sheet, lending institutions require rock-solid agreements for revenues from the projects.

The above structure gives an option for obtaining non-recourse Project Financing. However the developer needs to ensure that the following are in place to make the lending institutions comfortable:

PERFORMANCE – Contractual guarantees from technology providers for the long-term performance of the plant

REVENUES – Long-term power purchase agreements with credible consumers, i.e. direct power sale to the consumer. As discussed above, the current structure of the JNNSM PPA may not be bankable due to the credibility of many states. The government has been contemplating a tri-partite agreement between the developer, state

NON-RECOURSE PROJECT FINANCING

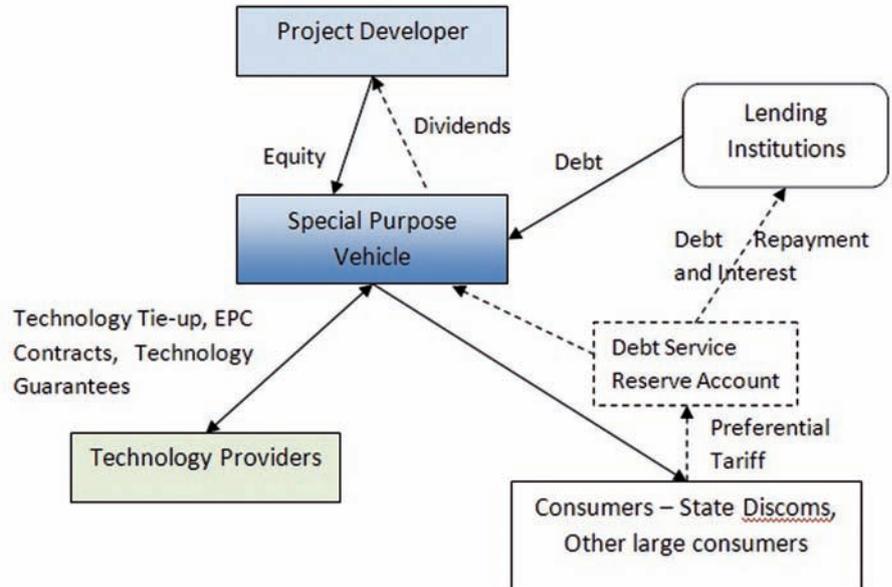


Figure 2: Generic Structure for Non-Recourse Project Finance ****.

discom and the Reserve Bank of India to ensure the PPAs bankability, however this is not confirmed yet. Another source of revenue for the projects can be the Renewable Energy Certificate – developers can forego the preferential tariff and trade the RECs on the energy exchange. However the market is in its nascent stage and depends on the state's renewable purchase obligations.

PROJECT VIABILITY – In addition to the above, developers must convince lenders that projects are viable and have the capability of repaying debt without outside assistance. This could mean that the project has to fund a Debt-Service-Reserve-Account in addition to having healthy Debt-Service-Coverage-Ratios.

Other options for financing

Other non-conventional options for financing include:

EXIM financing – the United States export-import bank provides financing for projects which import a substantial part of the project components from US. This is a good option in case the main technology provider is from the US and has relations with the EXIM bank.

Foreign funding – Large project developers can tap international banks to get lower rates of finance. However, hedging can put a substantial dent in the rate differential and only someone ready to take the currency risk should resort to this option

Green Energy funds – there are many

green energy funds currently in the market and these can provide equity, quasi-equity and mezzanine financing.

Conclusion

In view of the policy support and the abundant solar radiation available in India, solar projects are an attractive investment option and can provide equity returns in the 15%-20% range. However until the banks get comfortable with the proposed solar PPA, developers rely on non-conventional sources of financing; and support from the government, in terms of finalizing the PPA, REC and RPO structures, can go a long way in getting the projects financed in a non-recourse manner.

Emergent Ventures is currently supporting many Indian and international clients in setting up solar PV and CSP projects in different states. We have extensive experience in providing the entire gamut of services for solar project development ranging from origination and technology selection to financial closure and project implementation.

Works Cited

*. McKinsey Research. Report on Global Solar Industry (Quoted in Mint Newspaper).
 **. Ministry of New and Renewable Energy. Jawaharlal Nehru National Solar Mission. [Online] <http://mnes.nic.in>.
 ***. Central Electricity Regulatory Commission. Determination of Forbearance and Floor Price for the REC framework. Order No - 99/2010.
 ****. Emergent Ventures India Pvt Ltd. EVI Internal Research.