

Discussion Papers

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Amitendu Palit

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Financing Solar Energy: Lessons from Indian Experience

Amitendu Palit*

The goal of making clean energy the main source of energy consumption for countries, societies and economies cannot be achieved unless the challenge of mobilizing finance for clean projects is effectively addressed. The issue of financing renewable energy has achieved great salience after the coming into force of the Paris Agreement on climate change from 4 November 2016. It is pertinent to note the commitment of the Paris Agreement to: ‘Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development’¹.

With 174 parties (i.e. countries) ratifying the Paris Agreement, the objective of mobilising climate finance consistent with the goals of sustainable economic development have become parts of national development agendas of all parties. Indeed, the imperative for organizing adequate finance for renewables is high for emerging markets, since these are the countries on the cusp of climate adaptation and trying to achieve the right mix of technology and environment policies for addressing both mitigation and adaptation.

From an emerging market and developing country perspective, the criticality of the financing challenge is evident from the fact that initial investments in renewable energy projects take considerable time to mature and generate returns. As a result of the long gestation lags involved before these projects start yielding returns, bank loans to renewable energy projects are usually priced at higher rates than those to fossil-fuel based projects like coal-fired thermal electricity plants. Loans are also pricey on account of the higher capital costs for these projects.

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High interest rates are specifically a hindrance to development of renewable energy projects in emerging market developing economies, where these interest rates substantially impact the cost of renewable energy leading to high prices of such energy for consumers. A prolonged cost-benefit scenario horizon and asset-liability mismatches make it difficult for private investors to step into renewable projects. On the other hand, state support to development of renewables, while essential, cannot be assumed perpetual.

The challenge for policymakers therefore is to ensure that adequate alternative mechanisms and options exist for financing renewables. These alternatives need to be attractive for private sector since state subsidies for building renewables can at best be specific to early lives of the projects. At the same time, an active role of the state in drawing up a constructive policy framework for encouraging clean energy investments is imperative.

The Indian example in moving forward on the objective of generating more renewable energy by tackling the impediments of finance provides interesting lessons. While India is still in the process of experimenting with regulations, modes of finance and pricing mechanisms, its rapid addition to renewable energy capacity underscores the success that has begun acquiring. These lessons are important for achieving the greater global objective of pushing ahead on clean energy, particularly through initiatives like the International Solar Alliance of more than 100 solar power resource rich countries located between the Tropic of Cancer and Tropic of Capricorn², which India is spearheading along with France.

The Indian experience

India has taken long strides in restructuring its domestic pattern of energy consumption towards energy obtained from renewable sources. In this respect, it has an ambitious target of expanding its current renewable energy capacity of 58GW to 175 GW by 2022. The expansion is expected from new capacities of 100GW solar energy and 60GW of wind energy. These ambitious targets by India have made a significant impact on the

global outlook for addition to new capacities for renewable energy. The International Atomic Energy (IEA) estimates global renewable energy capacity to increase by 1000 MW by 2022 and expects China and India to be the leaders in expansion of global renewable capacity with India more than doubling its reserves of renewable energy over the next five years³.

Among various sources of renewable energy – hydro, wind, solar, biomass – the most rapid growth in India has been that of solar energy. Aggregate solar power capacity has experienced more than 300 per cent growth over the last five years. Two structural segments have driven the rapid growth. The first of these are the relatively larger utility-scale projects that are more than 1MW in capacity. The second is the smaller roof-top projects that have capacities between 1KW-1MW. Both these categories are experiencing rapid expansion from burgeoning commercial and industrial demand. Household demand for renewable energy is also increasing.

India's quest for increasing capacity of solar energy began from the Jawaharlal Nehru National Solar Mission (JNNSM) launched in 2010, which envisaged capacity expansion to 100,000 MW by 2022. The objective brought to light the importance of mobilizing finance for solar energy developers as well as the support that the government needed to provide to the initiative.

Since then, over the last seven years, India's quest for mobilizing finance for renewable energy development has passed through several phases. Beginning from an initial situation of providing active state support to development of the solar power industry, India is now endowed with a domestic solar industry whose prospects for mobilizing finance have improved considerably. Indeed, from being an industry burdened by high consumer tariffs brought on by high development costs, India's solar industry has transitioned to one with astonishingly low tariffs. In the process, however, the industry has experienced new regulatory and development challenges with respect to its financial prospects. Some of these major developments in the Indian renewable and solar energy industry are discussed below.

State Support

The Indian experience draws attention to the importance of the state playing an active role in accelerating the first-generation of investments for developing solar power. This began from an initial introduction of state subsidies for supporting solar power development. The subsidies, provided under a viability gap arrangement, aimed to cover a third of the developer's project costs with an eye on covering capital costs that could not be recovered from tariffs⁴. This viability gap funding mechanism has been followed up by more elaborate subsidy provision through the Payment Security Fund (PSF). The PSF – administered by the Solar Energy Corporation of India Ltd – is worth US\$220 million and aims to protect and safeguard developer interests. The focus of the scheme is on ensuring developers do not suffer from delays or defaults with respect to their arrangements with grid and distribution companies and includes bank guarantees.

The importance of the PSF in an Indian context can hardly be overemphasized. The PSF symbolizes the Government of India's efforts to underwrite or guarantee solar power investments in the country. Much of the emphasis arises from the fact that infrastructure projects in India have suffered from delays as developers have not been able to honour their commitments to financiers. The PSF aims to make sure that such impediments do not inhibit solar power development, particularly if distribution companies are unable to pay on time for the power they buy from solar developers.

Reducing Cost of Finance

The price of renewable energy, particularly solar energy, is normally expected to be higher than fossil-fuel energy due to the issues of asset-liability mismatch and high interest rate for clean energy finance. This often becomes a disincentive for developers as they are unsure about returns on their investment. Distribution companies are also reluctant to buy expensive power.

For India, this has been a major challenge. It has been imperative to identify alternative sources of mobilising finance to reduce the reliance

of developers on traditional bank lending. The latter, for new energy projects in India, has become expensive due to the large exposures of Indian banks outstanding exposures to coal-fired thermal plants, many of which have failed to take-off leading to build-up of non-performing loans.

Renewable energy developers in India, particularly the solar power developers, have been able to reduce their reliance on bank loans by shifting to raising resources through bonds, particularly from international markets⁵. The cost of mobilising finance through ‘green bonds’ is much cheaper compared with bank loans. Even at fixed rates of 5% or a little more, the cost of debt financing from international markets remains lower than similar debt costs in the Indian domestic market as well as interest rates being charged by Indian banks. The ability to raise finances from overseas investors through green bonds points to the possibility of India being able to meet its stated target of generating 175 GW of power from renewable sources by 2022.

Mainstreaming Green Bonds

Globally, the drive for clean energy finance has picked up considerable momentum through ‘green bonds’. India has been one of the leading countries in this respect.

Green bonds are fixed-income debt instruments for mobilising financial resources that are to be utilised exclusively for climate change mitigation and adaptation projects. It is the exclusive character of the utilisation of their proceeds that make green bonds different from other general bonds issued by various entities as debt instruments.

From the developers perspective, green bonds are long-term low cost financing alternatives with exclusive focus on end-use. These are productive alternatives for attracting foreign investors looking for assured fixed returns in the medium and long-term horizons. Apart from assured returns, investors in these bonds are encouraged by the prospects of higher return on their investments in such bonds in future given the greater use and competitiveness of renewable energy vis-à-vis fossil fuel energy⁶.

Green bond issuance has caught up fast in emerging markets. The Moody's investor service expect global green bonds issuance to surge to US\$250 billion in 2018 underscoring a growth of 60 per cent over US\$155 billion in 2017. Along with developed markets, emerging market economies, led by China and India are expected to contribute heavily to the global growth in green bonds issuance.

The green bond statistics for China and India are worth noting. The combined bond issuance by both countries, till now, are US\$53 billion in the total global green bonds market⁷. In both countries, green bond issues have accelerated since the announcement of specific regulatory guidelines, such as by the Securities and Exchange Board of India (SEBI) in May 2017.

Competitive prices

Prices of renewable energy in India have become remarkably competitive over time. According to latest estimates, the latest minimum bid prices for wind and solar energy have been This is largely due to India's success in determining prices through competitive auctions. India's national and state level auctions in renewable energy have been Rs. 2.64/unit and Rs 2.44/unit respectively⁸. These are among the most competitive in the world.

Two factors have contributed to the rapid decline in renewable energy prices. The first is the introduction of competitive national and state auctions for bidding energy prices. The auctions have been bringing down prices energy producers charging lower and lower for long-term power purchase agreements⁹. Along with auctions, as discussed earlier, access to cheaper options for finance such as green bonds, have helped in reducing capital costs and led to lower bid prices. The combined effect of these two factors has been to push solar power prices in India from around Rs 11/unit in FY2010 to Rs 2.44/unit in FY2017.

Maintain investment momentum

While lower costs of finance and consequent lower tariffs are good news for consumers, from an investors' perspective, low prices raise concerns

over long-term profitability and return on investments from these projects. In the solar power industry, such concerns are now becoming prominent for both larger utility-scale projects and smaller roof-top projects.

The immediate implication of investors developing doubts over long-term returns is growth of anxieties over the fates of power purchase agreements they have entered into. Progressive drop in power tariffs would encourage consumers to switch between competing energy service providers by reviewing purchase agreements with existing providers and exploring exit clauses. In India, this is increasingly becoming noticeable in the smaller roof-top category of projects being developed for commercial and industrial purposes by renewable energy companies and financed by third-party investors.

The situation is somewhat different for larger utility-scale projects. These projects are supplying power to grids that are, in turn, providing power to distribution companies for selling to consumers at tariffs fixed by power tariff regulators. Tariffs fixed by the latter are not based entirely on developments in solar power or renewables alone. These are determined on the basis of energy obtained from all sources including fossil-fuel based sources.

With 192 GW share in a total capacity of 327 GW, coal-based electricity comprises almost 60 per cent of the total grid-connected capacity in India. Thus thermal power prices continue to influence overall grid power tariffs. This means while solar power and renewable prices might be much lower than thermal power prices, the benefits might not get completely passed on to consumers, as prices at which grids sell power to distribution companies would remain relatively higher given the energy-mix. The end-result for solar power developers indicates a somewhat complicated assessment of long-term prospects.

Future Areas of Study

The challenge for shifting to a 'clean' world depends substantively on the abilities of national economies to shift to renewable sources of energy consumption. The role of solar energy is particularly critical in this regard.

Indeed, the International Solar Alliance would be a major initiative in taking the world forward on a clean energy path.

Not only as the key proponent of the International Solar Alliance, but also a country focusing hard on making renewable energy the core source of energy needs for more than a billion people, India has come a reasonably long way in developing a robust domestic solar power industry. Its experiences are important pointers towards the challenges that other developing countries and emerging markets can face in pursuing their clean energy goal. These are also areas where greater study and policy research is necessary.

As highlighted in the beginning, state support is essential for the development of fledgling renewable energy industries. At the same time, however, such support cannot be forever. In India's case, the support has helped in improving investor confidence. But such support cannot be traded off for efforts to bring down cost of finance for developing solar power.

The Indian experience of financing clean energy points to the importance of bringing down cost of finance for making renewable energy an affordable option for mass consumption. India suffers from high bank interest rates due to large non-performing loans that its banks have accumulated over time leading inflexibility of interest rates and insistence on high collaterals. In countries where interest rates are lower, cost of bank finance might be much less. But notwithstanding availability of bank loans at competitive rates, options of going 'global' through overseas debt issue like green bonds enables emerging markets to involve the global community and private investors in a more meaningful and effective way in solar power development.

The remarkable success in bringing down solar prices in India points to the necessity of identifying cheap sources of finance as well as competitive mechanisms for determining prices. But low prices have the downside of influencing investor sentiments too. They also bring for consumers more choices along with legal complications for revisiting

power purchase agreements. Whether all these would lead to alterations in financing models with developers shifting to experimental templates with more risks is yet unknown. At the same time, price movements, like the ones noted are also likely to reflect in new consumer-producer relations through revised contractual obligations.

The current global public policy challenges in the arena of solar power development present fascinating opportunities for deeper study and research. The issues are diverse including the role of state subsidies, cheaper cost of development finance, mainstreaming green bonds and maintaining investment momentum. India is well poised to offer emerging markets and developing countries several prospective ideas and solutions in this regard.

Endnotes

- ¹ Article 2c, Paris Agreement, UN 2015; http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf
- ² <http://isolaralliance.org/AboutISA.aspx>
- ³ <https://www.hindustantimes.com/environment/india-s-renewable-energy-capacity-to-double-by-2022-report-says/story-9YFGwdg1PdHmQTFKLGgDTJ.html>
- ⁴ <https://www.csis.org/analysis/payment-security-mechanism-solar-power-india-can-india-secure-its-future-and-future-solar>
- ⁵ <http://cleantechies.com/2017/07/31/india-based-solar-ipp-azure-power-raises-500-million-through-bond-sales/>
- ⁶ Issue Paper: Green Bonds in India; USAID, Department of State, United States of America; Ministry of Power, Government of India; Ministry of New and Renewable Energy, Government of India; February 2015.
- ⁷ <http://www.thehindubusinessline.com/markets/global-green-bonds-set-to-hit-record-levels-india-to-lead-emerging-markets-moodys/article22677873.ece>
- ⁸ <http://mnre.gov.in>
- ⁹ <https://www.theguardian.com/environment/2017/may/10/indian-solar-power-prices-hit-record-low-undercutting-fossil-fuels>

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