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A Growing Market

Changing market dynamics boost solar rooftop installations

By Meera Bhalla

From a negligible level in 2012, the total installed solar rooftop capacity in the country reached 300 MW by end-2014. The segment is expected to expand at an even faster rate with both the government and industry players keen on developing this market. Driven by the decline in the cost of solar panels and the operational success of the projects set up so far, the government is planning to promote solar rooftop power generation on a large scale across the country. At the central level, the Solar Energy Corporation of India (SECI) is executing a pan-Indian grid-connected rooftop photovoltaic (PV) programme and at the state level, several states have announced rooftop and net metering policies. Further, the government's recently announced roadmap to achieve 100 GW of solar power capacity by 2022 involves the installation of 40 GW on rooftops.

The changing dynamics of the power market make solar rooftop adoption economical for investors. With the rising cost of conventional energy and land, generating power from solar rooftop projects in many states has become cost competitive, especially for industrial and commercial consumers who pay high power tariffs and have large roofs to set up panels. Reportedly, the solar rooftop segment for commercial consumers has reached grid parity in 26 per cent of the states while in 17 per cent, consumers require accelerated depreciation (AD) benefits to achieve grid parity. In addition, power generation from solar rooftop projects has become cost competitive for industrial consumers in the segment in Maharashtra, Odisha and Delhi.

This provides a significant opportunity to

regulators to transform the market from being incentive driven to being market driven. The government has started taking steps in this direction. One of its key measures has been the reduction of subsidy for solar rooftop projects from 30 per cent to 15 per cent. The subsidy amount is likely to be available only to certain sectors such as educational institutions, residential buildings, old age homes, orphanages, and state and central government buildings. The government has de-prioritised the commercial and industrial consumer segments to offer this incentive.

Several industry experts have welcomed this step as delays in the disbursement of the subsidy amount in the past few years has been one of the key deterrents to the

development of the solar rooftop market.

According to Arul Shanmugasundram, executive vice-president, projects, and chief technology officer, Tata Power Solar, "In many states, no subsidy is required to make the solar rooftop segment attractive to commercial and industrial consumers, but the presence of subsidy makes consumers wait for this benefit, which delays project commissioning." However, he adds that for small and medium enterprises (SMEs) and residential consumers, investment in the solar rooftop segment is a difficult value proposition and thus additional benefits are required from the government to attract these consumer segments.

To improve the economic viability of



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rooftop systems for SMEs, the segment needs more innovative financial solutions, a robust feed-in tariff (FiT) mechanism, standardisation of power purchase agreements (PPAs), and clear rules for grid access. In addition, creating awareness regarding the various technologies available in the market and the cost structure of these projects is required.

Journey so far

As per an analysis by BRIDGE TO INDIA, during 2010-13, the Indian solar rooftop market recorded a compound annual growth rate of 85 per cent. Prior to 2011, the majority of the solar rooftop installations were showcase projects. The announcement of various subsidies and AD benefits under the Jawaharlal Nehru National Solar Mission (JNNSM) resulted in a significant increase in the number of solar rooftop projects during 2011 and 2012. But in 2013, the market witnessed a downward trend due to issues related to subsidy disbursement and approvals. The slowdown in the telecom industry also affected the small-scale rooftop segment during the year. However, the market has started picking up of late, with the announcement of various state-level initiatives.

As of October 2014, the total installed solar rooftop capacity in India stood at 285 MW, the majority of which was installed without the Ministry of New and Renewable Energy (MNRE) subsidy. Of this, 175 MW has been installed by commercial and industrial consumers, and the remaining by residential consumers. The larger share of industrial consumers is due to the fact that installing rooftop projects on their premises acts as a hedge against the unpredictability of grid supply.

At present, the large- and small-scale rooftop segments have equal shares in the total installed capacity; however, the key drivers for these two consumer groups are very different. The large-scale solar rooftop market is driven by parity, whereas the small-scale market is driven largely by the need for reliable power.

Installed solar rooftop capacity, by state and consumer segment
(as of October 2014) (MW)

State/Union territory	Commercial	Industrial	Residential	Total
Tamil Nadu	20.6	11.0	18.2	49.8
Gujarat	12.0	9.8	15.1	36.9
Delhi	4.5	8.5	4.5	17.5
Karnataka	6.9	3.7	5.7	16.3
Rajasthan	5.2	6.4	3.5	15.1
Jammu & Kashmir	3.6	1.0	5.7	10.3
Maharashtra	3.7	7.4	2.4	13.5
Kerala	3.7	6.6	3.0	13.3
Uttar Pradesh	4.2	3.9	4.8	12.9
Andhra Pradesh	6.6	2.2	3.6	12.4
Manipur, Assam, Meghalaya, Tripura, Mizoram, Nagaland, Sikkim and Arunachal Pradesh	1.0	2.1	7.2	10.3
Chandigarh	3.1	1.0	6.1	10.2
Others*	15.1	11.3	25.2	51.6
Total	90.2	74.9	105.0	270.1

* Includes Uttarakhand, Chhattisgarh, Punjab, Haryana, Odisha, Jharkhand, West Bengal, Telangana, Bihar and Madhya Pradesh

Source: BRIDGE TO INDIA

Tamil Nadu has the highest installed capacity, accounting for 18 per cent of the total installed solar rooftop capacity in the country as of October 2014, followed by Gujarat (13 per cent), and Delhi and Karnataka (6 per cent each).

In the industrial and commercial segments, the engineering, procurement and construction market is dominated by Tata Power Solar, which had 15 per cent share in the total installed industrial and commercial capacity, as of October 2014. The remaining share is fragmented with domestic players like Larsen & Toubro, SunEdison, Moser Baer, Lanco and Thermax having a major share. The domestic solar inverter market is served by foreign players such as Delta, SMA, Bonfiglioli, Advanced Energy, KACO and FRONIUS, which account for about 81.6 per cent share of this market. Among them, Delta is the largest with a 25.4 per cent share in the domestic market.

During the past two to three years, several central- and state-level policies have been announced to support this segment. At the

central level, the MNRE has launched two schemes for rooftop projects, the Rooftop PV and Small Solar Power Generation Programme (RPSSPGP) and the Pilot Scheme for Large-Scale Grid-Connected Rooftop Solar Power Generation. The former was launched under Phase I of the JNNSM and the latter under Phase II. Under the RPSSPGP, a total of 250 MW was allotted, but only 90.8 MW was commissioned, spread across 71 projects, as of February 2014. Of this, none of the projects was commissioned in the past year.

Under the second scheme, SECI, the nodal agency, targets to set up large-scale rooftop projects of 100-500 kW. So far, SECI has floated tenders for about 81.3 MW of solar rooftop projects in four phases. Of this, 57 MW of capacity had been allocated as of January 2015 and about 13.1 MW had been commissioned.

In January 2015, SECI also signed an MoU with the Central Public Works Department (CPWD) to install solar projects on the roofs of CPWD buildings and offices. The project developers will be

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selected by SECI through a competitive bidding process and will sell power to CPWD at negotiated prices.

The strict enforcement of renewable purchase obligations (RPOs) is pushing the obligated entities to source power from all possible sources of renewable energy. While the southern states have high wind and solar energy potential, the northern states are looking at solar to fulfil their RPO targets. Further, owing to the limited availability of land for setting up ground-mounted solar projects, the focus is progressively shifting to harnessing the solar rooftop potential. As a result, many states, including Andhra Pradesh, Tamil Nadu, West Bengal, Chhattisgarh, Delhi, Haryana, Himachal Pradesh, Uttarakhand and Punjab, have come up with their final or draft net metering guidelines or policies.

Emerging models

In India, the solar rooftop market was initially capex based, driven mainly by consumers availing of tax benefits. However, later, with the growing uptake of solar rooftop systems among residential consumers and SMEs, the opex-based model started gaining traction, which reduces the upfront financial burden on the consumer.

In addition, the public-private partnership (PPP) model is gaining traction among developers. Under this, developers lease rooftop space for the installation of solar projects and sell the power generated to the state utility at a fixed FIT, while paying rent to the rooftop owner. So far, the most successful example of this model in the country has been the Gandhinagar solar rooftop project, under which panels have been installed on residential buildings, schools and hospitals. These panels generate about 5 MW of electricity, providing better access to power for around 10,000 people. The pilot PPP project attracted private financing of around \$12 million. However, during the implementation of this project, regulators and developers had to face various challenges, including lack of grid connectivity, and issues in designing of the lease agree-

Rising conventional power tariffs, declining solar power generation costs and net metering will encourage the adoption of solar rooftop systems.

ment and PPAs as per the existing regulations and business conditions.

The success of this project, also referred to as the "rent-a-roof project", has paved the way for a wider roll-out of this model. On similar lines, a concession for 25 years has been awarded to Madhav Solar Private Limited to set up a 5 MW solar rooftop project in Vadodara city. The project is expected to receive private investment of \$8 million.

The International Finance Corporation is helping four other cities in Gujarat – Bhavnagar, Mehsana, Rajkot and Surat – set up solar rooftop projects based on a similar model. Other states are also exploring this option. The Gujarat Energy Research and Management Institute is supporting the Odisha government to develop a similar project. Karnataka too has launched a multi-city solar rooftop programme to install 0.5 kW and 1 kW solar rooftop systems on around 1,943 houses in Bengaluru, Mysore, Mangalore, Hubli and Gulbarga. In addition, Bihar, Delhi and Madhya Pradesh are working on this model. At the central level, SECI, under Phase IV of its Large-Scale Grid-Connected Rooftop Solar Power Generation Scheme, has allotted 9 MW of projects based on the RESCO model.

Issues and the way ahead

Despite achieving grid parity for industrial and commercial consumers in many states, solar rooftop projects have not seen widespread adoption so far. The key reasons for this are the high upfront cost of these projects, and the lack of a uniform net metering policy and discom support.

Due to the high upfront capital cost, power generation through solar rooftop projects is still an economically unviable option for SMEs and residential consumers. Thus, a greater financial and regulatory push is required for the widespread installation of solar rooftop projects in the country. For instance, Haryana has made it mandatory for all buildings on plot sizes of 500 square yards or more to install rooftop solar power systems by September 2015.

Wheeling charges and cross-subsidy surcharge make solar rooftop power generation expensive. In light of this, the central government, in its proposed amendment to the Electricity Act, 2003, has suggested removing the cross-subsidy surcharge for power procured from renewable energy sources under the open access regime. The amendment seeks to impose a higher penalty – of Rs 10 million to Rs 100 million – for non-compliance of any provision of the act (including RPO and renewable generation obligation targets) for all stakeholders except renewable energy generators. For the latter, a reduced penalty of Rs 1 million-Rs 10 million has been proposed.

Further, given the long regulatory approval process, solar rooftop project installation is a challenge for developers. In this regard, Shanmugasundaram recommends that the requirement of a no-objection certificate from state discoms should be removed to reduce the time taken for commissioning solar rooftop projects.

Despite these issues and challenges, the solar rooftop market is poised to grow. Rising conventional power tariffs coupled with declining solar power generation costs as well as the introduction of the net metering policy will encourage customers, particularly commercial and industrial, to adopt solar rooftop PV systems. Overall, there is a significant demand for solar PV rooftop systems across the country, which can be met only through supportive government policies, rapid disbursal of subsidies and regulatory clarity. ■