

Progress of Renewables in India Since 2015

By Saptak Ghosh and Jai Asundi

In February 2015, the Government of India announced the ambitious target of installing 175 GW of renewable energy (RE) by 2021-22. This target comprises 100 GW solar, 60 GW wind, 10 GW biomass and 5 GW small-hydro. Today, the total installed RE capacity is expected to cross 70 GW and account for around 20% of the country's power generation capacity.

Solar Energy in India

India has witnessed unprecedented growth in the solar sector in the past three years. The installed capacity rose from 6 MW in 2009 to 2.3 GW in 2015 and now stands at 22 GW – the initial target of the Jawaharlal Nehru National Solar Mission (JNNSM) for 2021-22. Efforts to meet the revised target of 100 GW are well on track. The leading states are Karnataka, Tamil Nadu, Maharashtra, Gujarat, Telangana, Rajasthan, Andhra Pradesh and Madhya Pradesh.

Large ground-mounted solar photovoltaic (PV) plants and “solar parks” have been leading the way with around 20 GW installed throughout the country. The Ministry of New and Renewable Energy (MNRE) has licensed for installation 35 solar parks across Indian states with a capacity of around 21 GW and these are either operational or under construction. The solar park target is 40 GW by 2021-22. Karnataka's “Shakti Sthala” 2 GW solar park in Pavagada will become the world's largest solar park by October 2018. The primary driver to the impressive growth in this sector is the rapidly declining prices of modules in the global market, followed by the efforts of the Indian government to provide land and evacuation infrastructure to the developers. Tariffs have dropped from \$ 0.10/kWh in 2015 to \$ 0.037/kWh in 2017. This was achieved thanks also to financing from overseas at lower interest rates, showing confidence in the Indian solar market.

A few issues, however, need resolution. State distribution companies (DISCOMs) which had signed purchase agreements at higher rates are demanding that tariffs be reduced to match the current rates or of the contracts to be renegotiated. The MNRE is handling these requests on a case-by-case basis to arrive at swift resolutions.

Rooftop Photovoltaic (RTPV) systems are expected to contribute 40 GW to the 100 GW solar target of 2021-22. These decentralised, distributed generation systems offer advantages such as reduction in system congestion and losses due to localised generation and consumption. However, higher capital costs due to lack of economies of scale, tepid DISCOM participation, unstable policy regimes and lack of awareness amongst prospective consumers have prevented this sector from picking up - only ~1.8 GW installed so far.

The Center for Study of Science, Technology and Policy (CSTEP), the Energy Department of Karnataka, along with Bangalore Electricity Supply Company (BESCOM), are using aerial Light Detection and Ranging (LiDAR) to accurately estimate the PV potential and the business proposition for each rooftop in the city of Bengaluru. This could result in 1 GW RTPV installations by 2021-22. Meanwhile, the Solar Energy Corporation of India is adopting an aggregator model for government buildings and, following, calling for large scale tenders across Indian states. 1.5 GW out of the proposed 5 GW has been sanctioned so far. Concerted efforts from the centre and state along with DISCOMs will make the task of reaching 40 GW by 2021-22 less challenging.

Other decentralised solar energy applications such as off-grid systems with storage, solar water pumps, home

lighting systems, water purification and desalination units are still limited. Solar thermal based process heating and cooling options for industries are also areas where MNRE plans to expand in the near future.

Wind Energy in India

Although the installed capacity of wind power is more than 1.5 times that of solar in India (~34.5 GW), the sector has experienced inconsistent growth over the years. Only 1.766 GW wind power was installed in FY 2017. The target of 4 GW was not achieved. Changing policy regimes in terms of accelerated depreciation and generation-based incentives (or lack thereof), DISCOMs backing out of contracts and perceived unsustainable tariffs were the primary causes behind this slowdown in the wind sector. To match the solar sector, the wind sector also followed the reverse bidding route which led to tariffs falling to \$ 0.036/kWh in December 2017 and then rising marginally to \$ 0.043/kWh in March 2018.

The seasonal intermittency of wind power leads to surplus power being generated during the monsoon when the demand is low. DISCOMs refuse to purchase power during these periods which negatively impacts the finances of wind developers. Industry experts believe that a stronger policy framework addressing these issues of power offtake along with robust plans for annual capacity additions are required for revival in the wind sector.

Other RE in India

Biomass (including waste to energy) and small hydro targets have almost been achieved in India with installed capacities of 8.9 GW and 4.5 GW respectively. MNRE and state governments actively encourage developers because of the higher capacity factors of these RE sources along with firmer power supply compared to intermittent solar/wind-based generation.

According to officials in the MNRE India looks set to achieve the 175 GW target well before 2021-22. The government through its Nationally Determined Contributions (NDCs) to the UNFCCC has also committed to 40% cumulative fossil-free electric power capacity by 2030. This commitment to RE reinforces the vision of India of combating climate change through clean energy pathways. Overall, the progress which the country has achieved in the last three years since the announcement of the 175 GW RE target has been impressive. If the present level of efforts is ramped up and sustained, India might just surpass 175 GW by 2021-22.

This article was edited by Panayiotis (Panos) Moutis.

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