Sunny Side

Floating and canal-top photovoltaic technologies key to achieve solar target

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At the recently-concluded 26th session of the Conference of Parties (COP26) in Glasgow, the prime minister announced that India would aim to increase its renewable energy capacity to 500 GW by 2030. He also said that half of India's energy requirements would be met by renewable energy sources, wherein solar energy would play a major role.

Over the last few years, the use of solar energy has increased considerably in India. While the overall installed solar capacity has increased by 17 times in the last seven years and stood at 47.7 GW as of October 2021, its share in the energy mix is just about 12 per cent, according to Central Energy Authority (CEA) data. This share is likely to increase in the future, considering the steady efforts from the Ministry of New and Renewable Energy (MNRE) towards promoting clean energy technologies. However, India's solar dream needs large amounts of land to flourish, and using such land to set up solar plants involves a conflicting trade-off (that of forgoing alternative land uses, such as for ecological conservation, human habitation, farming, etc.).

The good news is that some technologies on the horizon can help India in attaining its solar targets, without giving rise to any land-related issues. Two such photovoltaic (PV) technologies are floating PV (FPV) and canal top PV (CTPV), which generate power without occupying land.

Currently, India's solar sector is dominated by ground-mounted solar projects with a market share of about 85 per cent. FPV and CTPV are efficient alternatives to ground-mounted solar technologies that are now getting traction globally and are expected to grow manyfold in the coming years. They are more effective in generating energy as the water bodies keep the solar panels cool. At the same time, they decrease the surface evaporation from water bodies due to the shading effect. These technologies help in alleviating the economic hardships resulting from water scarcity in the dry season, especially in the arid and semi-arid zones. An FPV plant specifically, is beneficial for pisciculture in wetlands, as it aids in maintaining a suitable water level by controlling evaporation, while also supplying electricity to the oxygen-recharge pumps for maintaining the required oxygen level in water for fishes. A CTPV project can have an immense advantage for areas/zones that depend on canal irrigation. In particular, a CTPV plant set up on irrigation canals decreases the electricity demands of the grid-tied irrigation pump sets. Lastly, both FPV and CTPV projects can offer employment opportunities in project installation, regular cleaning, and operations and maintenance (O&M) activities.

But there are drawbacks too. The main disadvantages of these technologies are high project cost and fast solar-module degradation due to exposure to moisture and UV radiation. To deal with these challenges, the government should approach international FPV and CTPV project developers and manufacturers to understand global value chains, manufacturing processes of system components, system-design considerations, project-implementation practises, policy regimes, and government

supports around the world. This would enable India to identify major policy barriers, adopt best installation practices (with robust design considerations), incorporate weather-resistant components (with non-hazardous materials to prevent water contamination), perform supply chain analysis, and set up technologically advanced manufacturing facilities. Collectively, these measures can boost the uptake of FPV and CTPV systems, thereby reducing capital cost and improving the design parameters. They can also develop the skill and capacity required for building efficient FPV and CTPV systems, which at present is lacking, given the country's limited experience in FPV and CTPV project implementation.

Thus, a strong focus on reducing the overall cost and improving the installation practice to scale up both FPV and CTPV can enable India to achieve its solar target by 2030.