Decentralised Growth

Case studies of small-scale rooftop solar EPC projects

By Sarthak Takyar

In a bid to reduce electricity bills and meet climate commitments, commercial and industrial customers have increasingly been implementing rooftop solar projects. Many of these customers are setting up small-scale hybrid rooftop solar projects under the engineering, procurement and construction (EPC) mode of project development, wherein the customer who owns the asset bears the entire investment. These hybrid solar systems include either storage or bioenergy to provide solutions to various challenges faced by customers. In this article, *Renewable Watch* covers case studies of two kW-scale hybrid rooftop solar EPC projects across Bihar and Maharashtra…

DESI Power's 3.6 kWp solar PV system with battery bank at Mosamat Budhiya Shiksha Nirman Sangathan, Araria, Bihar

Aklavya Sharan, director, Decentralised Energy Systems India (DESI Power), has shared key details of this case study. He says that quality education is a must for every child and distributed renewable energy (DRE) technology can ensure reliable energy access for schools so that modern technologies and techniques can be utilised without any disruption. Rooftop solar PV installations are particularly advantageous for schools since power generation and consumption occur mostly during the daytime. Access to clean energy, water and education is key to achieving sustainable development goals and DRE plays an important role in meeting these goals.

Mosamat Budhiya Shiksha Nirman Sangathan, a registered trust in Araria, Bihar, runs a school for children who lack the means to access basic education. This is a residential school that provides free education and food to students from economically disadvantaged backgrounds. The school has a grid connection for electricity and relies on wood/liquefied petroleum gas (LPG) for cooking fuel.

DESI Power has designed and installed a 3.6 kWp solar PV system with a battery bank in the school to meet most of its power requirements. The system is designed in such a manner that most of the school's critical power requirements during the daytime, such as water pump, computers, fans, TV and bulbs, are met directly by the solar plant. The battery bank is designed to meet critical loads during non-sunshine hours. Furthermore, the use of energy-efficient fans enhances battery backup.

The aim of the project is to supply reliable and cost-effective energy with a reduced energy bill. In addition to the solar PV plant, biomass pellets will now be used as a replacement for LPG/wood for cooking. Biomass pellets serve as a clean and cost-effective fuel alternative as compared to LPG or wood, without smoke. The school premises will therefore become carbon neutral by relying on energy-based renewables. This solution will not only help the school in maintaining computer operations as required and reducing their energy bills but will also enable the teachers to elaborate on various aspects of the environment, sustainability and climate change.

The cost of the project is Rs 250,000. This is a one-time investment by the DESI Power Foundation. The project has been designed and built by DESI Power's local team, incorporating a supporting structure for solar panels suitable for the existing thatched roof without disrupting their existing set-up. Biomass pellets are produced in a DESI Power hybrid power plant in a nearby village, and the local chullah has undergone modifications to ensure the efficient burning of these pellets. The teachers and local staff have been trained on the operation of the plant and DESI Power will provide regular maintenance services.

The levellised cost of electricity during the project's 25-year lifespan is expected to remain below Rs 5 per kWh. Thus, the school will save not only on regular electricity bills but also a portion of the expenses related to LPG and wood.

Picture courtesy: Bikee Solar

Such a system holds immense potential in helping thousands of schools across India, where power and fuel requirements can be met with renewable sources at affordable costs and ensuring that students get full access to digital education. Additionally, implementing hybrid renewable energy solutions in schools will help mitigate the carbon footprint of the country. Biomass pellets can be promoted as a clean cooking fuel to the local communities in and around school areas, and students and teachers can help in educating the community.

Bijlee Solar's 8 kW rooftop solar systems across 34 public health centres in Nagpur district, Maharashtra

Shiv Sial, director, Bijlee Solar, has shared key details of this case study. The company highlights that several public health centres (PHCs) in Maharashtra face the issue of power cuts, affecting their operations, including the storage of vaccines. The vaccines have to be preserved in sub-zero temperatures, necessitating a continuous power supply for deep freezers. Additionally, power cuts during unconventional hours could result in childbirths under candlelight or torchlight. Thus, a solution was imperative to strengthen healthcare centres. The state's health departments, in conjunction with the district planning committee, assigned the nodal agency – Maharashtra Energy Development Agency (MEDA) – to come up with a solution using solar power and energy storage for emergency loads. This solution enables hospitals to lower their power bills by 70 per cent while simultaneously providing backup for emergency loads through high voltage lithium iron phosphate batteries, which require no maintenance and boast longer lifespans. All of this is powered by 100 per cent green energy. MEDA had previously demonstrated the successful implementation of a similar project in remote areas across Maharashtra.

Bijlee Solar's project has been implemented in 34 PHCs across Nagpur district, Maharashtra, wherein at each PHC, an 8kW rooftop solar smart hybrid plant with a battery backup of 10-12 kWh was installed. The project was awarded to Bijlee LED Lighting Private Limited through a competitive bidding process, with the company securing the project for Rs 36.4 million. These projects have been successfully implemented at all locations and have led to considerable cost savings in electricity bills for the PHCs. For instance, the PHC at Sawargaon, Narkhed, has experienced monthly savings of Rs 15,000-20,000 in power costs.

Picture courtesy: ZED Power

The projects have been established under the net metering scheme. However, this policy posed several roadblocks for renewable energy projects being implemented across the state. A significant portion of the PHCs/consumers lacked the required load capacity to obtain permission for the installation of solar capacity. Therefore, the following process had to be followed:

- Apply for a load increase and raise the connected load to 8 kW.
- Feasibility assessments by Maharashtra State Electricity Distribution Company Limited (MSECDL) and issue a demand for load increase.
- Fulfil payment of load increase demand.
- Reflect the connected load increase in the bill to apply for net metering.
- Payment of pending bills by consumers to qualify for net metering.
- Application for net metering permission.
- Undertake net metering feasibility assessments and obtain approval.
- Conduct new net meter and generation meter testing.
- Installation of a new meter.
- Update the new meter number on the bill.

A major delay in project implementation was due to this process, as dedicated by the MERC policy. The measures highlighted above consumed the maximum time and caused delays in commissioning. This situation was beyond the control of any governing authority and was applicable across Maharashtra. Additionally, Covid lockdowns and lack of funds within concerned departments exacerbated the delays.

Going forward, to ensure the prolonged lifespan of the plants and the consistent supply of uninterrupted power, certain measures need to be followed. One, tree branches that fall across solar panels should be cut. Two, there should be regular cleaning of the solar modules. Three, there should be regular maintenance by the contractor. Four, internet should be available at all sites. Five, correct meter readings should be done by MSEDCL.

Net, net, these case studies present how small-scale hybrid rooftop solar EPC projects are benefiting small schools and health centres in achieving a reduction in power bills and enhancing operational efficiencies. As highlighted by the case studies, EPC players encounter several challenges that should be addressed to further increase the uptake of solar energy, especially at the grassroots level. ■