Emerging bidding trends in renewable energy sector FDRE, Peak Supply & Energy Storage Projects

The National Electricity Plan (NEP) approved by the Government of India (Gol) expects the share of renewable (RE) plus large hydro in the all-India electricity generation to increase to 35% by FY2027 and further to 44% by FY2032, compared to 21% in FY2024. The optimal generation mix report by the Central Electricity Authority (CEA) estimates the RE plus large hydro share at 41% by 2030. ICRA estimates the share of RE generation (including large hydro) to increase to close to 40% by FY2030.

Given the intermittent nature of wind and solar power generation, achieving such a high level of RE share in the generation mix requires the use of storage capacities. A solar project starts generating power from about 6-7 AM in the morning, which peaks around the afternoon and thereafter dips in the evening. On the other hand, the wind power generation peaks during the evening hours and remains relatively high during the night hours compared to the generation during the day hours.

This makes it challenging for the grid operators to match the supply with the demand as the share of RE rises in the overall generation mix. While one way to handle the intermittency is through adequate storage capacities at a grid level managed by the load dispatch centers / discoms, the other way is to manage the supply at the generator level through a combination of hybrid RE projects complemented with storage systems to provide round-the-clock (RTC) and firm & dispatchable RE (FDRE) supply to the grid. The second approach could however bring in inefficiencies for the grid, considering the RE capacity oversizing required in these projects to meet the supply conditions and consequent surplus power generated during periods of low demand.

Since April 2023, the tendering activity for RTC and FDRE projects has picked up with the central nodal agencies completing reverse auction for 8.2 GW capacity. The discovered average tariffs in these bids vary from Rs. 4.10 per unit to Rs. 5.60 per unit depending on the bid conditions related to supply commitment, annual availability, and capacity utilization factor (CUF) to be maintained.

Exhibit: Trends in capacity auctioned and average tariff discovered in RTC / FDRE tenders



Source: ICRA Research

The tariffs discovered in the RTC tenders by Railways are relatively low with availability requirement of 75%-85% across the contract period. On the other hand, the tariffs discovered in the FDRE tenders by SECI remain the highest, given that the winning developers are required to supply based on the load curve provided in the tender document with a demand fulfillment ratio (DFR) of at least 90% on a monthly basis. Moreover, the load curve varies across a 24-hour period as well as varies across the various months of the year, thereby making it challenging for the developers to design the project. The developers

would have to sell excess power in the merchant market during periods of low demand and may have to source power from the merchant market as allowed under the tender conditions during periods of peak demand. This exposes the projects to prices in the merchant market and increases the risk profile of the project.

Exhibit: Quarter wise 15-minute load curve requirement for the SECI – FDRE VI tender (1260 MW)*



Source: ICRA Research, SECI; *Capacity bid out was reduced to 630 MW subsequently; Supply curve is based on Rfs document issued by SECI with middle month of the quarter chosen for illustrating the supply requirement

While the first FDRE tender by SECI is unlikely to be taken up in view of the relatively high tariff, the second FDRE tender witnessed a decline in tariffs to below Rs. 5.0 per unit following a reduction in monthly DFR to 80%. Moreover, the recent decline in battery prices may have enabled a reduction in tariffs. Given that the tariffs would remain constant for the entire PPA tenure, this remains highly competitive against the tariff from new thermal power projects, which is expected to remain above Rs. 5.5 per unit and escalating with the rise in fuel costs. The tariffs discovered in the other FDRE bids during this period largely remain in the range of Rs. 4.4 - 4.7 per unit, with the requirement of 40% CUF on an annual basis and 90% availability of contracted capacity during peak demand hours of the day (4 hours). Herein, the risk profile is relatively lower compared to FDRE projects with load curve requirements.

The viability of these projects is closely linked with the PV module and wind-turbine generator (WTG) prices, CUF for the wind & solar component at the selected location, and the cost of storage, which in turn is linked with battery prices for projects using BESS as a storage source. For projects intending to use pumped hydro (PSP) as a storage source, they should be in advanced stage of development considering the 24-month timeline provided in these tenders for commissioning the FDRE projects and the long gestation period associated with PSP projects. Overall, the sector is moving towards a greater role for RTC / FDRE tenders to manage the intermittency risk. This would increase the risk profile for the developers and their ability to generate commensurate returns remains to be seen.

