PRESS RELEASE
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Storage adoption critical for grid integration of renewable energy projects: ICRA

- Viability of utility scale battery storage projects has improved, supported by declining capital cost

Rating agency ICRA estimates the share of generation from the renewable energy (RE) capacity, including large hydro, to cross 35% by FY2030 from 22.1% in FY2025, with expected incremental capacity addition of ~200 GW between FY2025 till FY2030. This in turn also hinges on the extent of implementation of the ongoing project pipeline where the projects are bid out and the PPAs are signed, the development of adequate transmission connectivity infrastructure as well as timely bidding for new RE projects, along with the power purchase agreements (PPAs) signing by Central nodal agencies. After a sizeable RE capacity of 47.3 GW awarded in FY2024, which is followed by 40.6 GW in FY2025, the bidding activity has slowed sharply in the current year with only 5.8 GW awarded in 8M FY2026. Further, the unsigned PPA capacity remains sizeable at about 40-45 GW as on date, based on industry channel check.

Commenting on these bidding trends and grid adequacy, **Girishkumar Kadam, Senior Vice President & Group Head - Corporate Ratings, ICRA**, said: *"The decline in new project bids & delays in signing PPAs for large RE capacity by Central nodal agencies clearly reflects the concerns on the execution related to available transmission connectivity for the RE sector. Further, reported grid curtailments in Rajasthan for renewable assets, particularly solar assets during the solar hours in a few time blocks, due to grid stability requirement, is also a concern, given the absence of grid compensation clause in the PPAs for such cases. Hence, a focus on the enhancement of both the storage capacity and grid strengthening within the state as well as at inter-state level in a timebound manner remains extremely critical, as share of renewables increases in the generation mix."*

As India grapples with variability in renewable generation, Battery Energy Storage Systems (BESS) have emerged as the important enabler for grid stability. The Government has introduced viability gap funding for BESS capacity along with extended transmission charge waivers for storage projects until 2028. The Central nodal agencies and state discoms have awarded standalone BESS projects aggregating to over 20 GWh since April 2024 to October 2025. Also, the share of round-the-clock (RTC), firm and dispatchable renewable energy (FDRE) and solar plus storage projects remained high at ~90% of the total RE capacity awarded in 8M FY2026.

Further, the significant decline in battery costs over the past decade has helped reduce the cost of energy storage and adoption of BESS projects globally. Based on prevailing battery costs, ICRA estimates that the levelized cost of storage using BESS for 2-4 hours of storage is relatively high, in the range of Rs. 4.0-7.0 per unit, compared to Rs. 5.0 per unit for Pumped Storage Hydropower (PSP) projects. This has seen a significant improvement from the level of over Rs. 8.0-9.0 per unit seen in 2022. While BESS costs for 4-hour storage remain higher than that of the PSP, the execution risks and gestation period for the BESS projects are relatively lower.

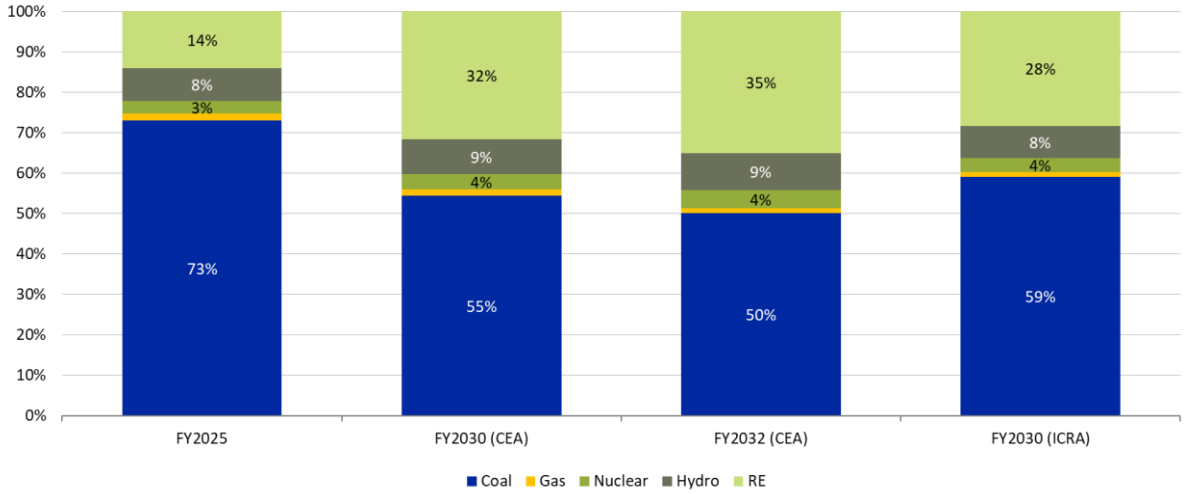
Commenting further on the competitiveness of standalone BESS projects, **Kadam** said: *"Although BESS projects have shorter lifespans and require replacement capex, sustained reduction in battery prices is expected to drive greater adoption, going forward. The viability of these projects remains pegged to the capital cost. Based on the average battery cost of ~USD 70/kwh seen in 2025, along with associated taxes/duties and cost of the balance of plant, the capital cost is estimated in the range of USD 120-150/kwh. At these capital cost levels and prevailing interest rates,*

the cumulative debt service coverage ratio for standalone BESS projects lands in the 1.15-1.25x range. Nonetheless, the ability of BESS projects to adhere to the performance parameters like availability, round trip efficiency, depth of discharge, degradation, etc remains a key monitorable, given the limited track record."

ICRA's outlook for the RE sector remains **Stable**, led by strong policy support, superior tariff competitiveness and sustainability initiatives by large commercial and industrial (C&I) customers. However, challenges remain on the execution front, including land and transmission infrastructure, delays in signing PPAs, exposure to equipment prices and distribution utility finances.

The ratio of upgrades to downgrades remains high in the RE sector, led by solar power producers. In FY2025, the sector witnessed 29 upgrades and six downgrades and in H1 FY2026, the sector saw 49 upgrades and 13 downgrades. The upgrades were primarily led by successful project commissioning along with demonstration of satisfactory generation performance, favourable change in ownership / improvement in the parent credit profile and demonstration of healthy generation performance. The downgrades were due to weaker-than-expected generation performance, delays in project commissioning and increase in leverage level including for a holding company to fund equity leading to adverse impact on its rating and consequently its subsidiaries.

Exhibit 1: Projected power generation mix as per the Central Electricity Authority (CEA) and ICRA's estimate



Source: ICRA Research, Central Electricity Authority (CEA); estimate by CEA for March-2032 is as per the National Electricity Plan; CEA's estimate for Mar-2030 is as per the optimal generation mix report (Version 2.0). Demand growth considered as 5.0%-6.0% between FY2026 and FY2030 for ICRA's estimate

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