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Energy storage systems: The key to unlocking India's net-zero goals

ET CONTRIBUTORS Last Updated: Jan 24, 2025, 08:27:00 PM IST

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Synopsis

India's goal to reduce carbon intensity by 45% and achieve 50% renewable energy capacity by 2030 necessitates significant energy storage systems (ESS) to stabilize variable renewable energy sources. Government incentives, policy changes, and technology diversification are crucial for large-scale ESS adoption to meet the net zero target.



Sharat Goyal

CEO Impact Infracap

As India embarks on this journey to reduce the carbon intensity of its GDP by 45% and achieve 50% cumulative installed capacity through **Renewable Energy Sources** (RES) by 2030(1), there is a massive need for adequate supporting infrastructure due to the inherent variable nature of RES generation. One of the most important and pressing infrastructure requirement for transitioning from fossil fuels to RES are large utility scale **Energy Storage Systems** (ESS).

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Generation through RES, particularly solar and wind, is variable in nature and can exert tremendous pressure on the already stretched transmission network during its peak generation periods. ESS, through storing and releasing excess energy, can bridge the two-way gap between generation and demand during peak and off-peak hours. This not only helps in improving grid stability and large-scale renewable energy integration but also helps in bringing down peak

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deficits and peak tariffs. Incorporation of large utility scale ESS is thus imperative for our country’s energy security and to ensure clean, economical and reliable power supply for all. ESS is also a key pillar in achieving the goal of adding 500GW of RES by 2030.

ESS systems in India are largely split between Pumped Storage Projects (PSP) and Battery Energy Storage Systems (BESS). GOI recognizes the dire need for ESS in the nation and is projecting large capacity installations for the same.

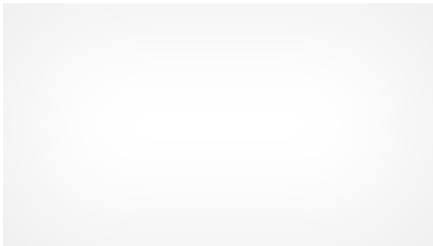


According to the Central Electricity Authority’s (CEA) ‘National Electricity Plan’ released in 2023(1), the energy storage capacity requirement is projected to reach 82 GWh (48 GWh from PSP and 34 GWh from BESS) by 2027. This is further expected to increase by 5 times to reach 411 GWh (175 GWh from PSP and 236 GWh from BESS) by 2032. In order to achieve this, the capex required by 2027 and 2032 is estimated to be INR ~1.1 lakh crore (54k crore for PSP and 57k crore for BESS) and INR ~3.7 lakh crore (75k crore for PSP and 293k crore for BESS) respectively(2). The CEA also anticipates that in order to fulfil India’s net zero strategy by 2070, ESS requirement is estimated to reach 2,380 GWh by 2047.

The government has introduced numerous policy interventions and inducements to create an ecosystem for quick and large-scale adoption of ESS. Some of these favourable policy changes for the ESS sector are as follows(2):

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ESS Legal Status: The Electricity (Amendment) Bill introduced in 2022 provided that ESS developers can lease or sell storage capacities to utility companies and can also themselves buy and store electricity for future sale.

Energy Storage Obligations: This specifies a minimum percentage of electricity consumption to be procured from RES through ESS. As per Ministry of Power's notification, this percentage shall gradually increase by 0.5% annually from 1 % in 2023-24 to reach 4% by 2029-30.

Rules for replacement of Diesel Generator (DG) sets with RE/Storage: Consumers currently using DG as backup power shall be required to shift towards RES with BESS within the prescribed timelines.

Despite the above-mentioned initiatives, the ESS eco-system in India needs further interventions from GOI to make them viable for commercial use on a utility scale. Following are the key challenges faced by the ESS industry in India and what '[Budget 2025](#)' must deliver to address them:

Accelerated Depreciation (AD) for standalone BESS: Tax relief in the form of AD is applicable on solar projects but not on standalone BESS projects. We would like the government to extend the AD tax relief to standalone BESS projects to further enhance their viability.

De-Dieselization incentives: Adoption of batteries to substitute the use of diesel generators for back-up power should be incentivised.

Tax relief: Currently GST on grid-scale BESS is 18% for lithium-ion batteries and 28% for non-lithium-ion batteries. This should be reduced to 5% in order to improve project returns and increase the viability of such projects.

Tenders: While the share of RES tenders which include storage solutions has increased from 5% in FY20 to 23% in FY24(3), GOI must work towards increasing this percentage to keep RES curtailment to a minimum.

Coupling of Transmission and ESS Capex: Government has already allocated significant capex to transmission system enhancement to handle RES power. It is well understood that transmission investment for RES on a stand-alone basis is under-utilised due to the intermittent nature of RES. This investment should be evaluated on a coupled basis with ESS in order to make the

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investment more economically efficient.

Other ESS technologies: Currently in India, due to limited technological adoption, only BESS and PSP are being established on widescale. GOI should promote other ESS technologies such as supercapacitor, molten salt and thermochemical storage through production linked incentive schemes for manufacturers and viability gap funding for developers.

ESS implementation has gained significant momentum in the recent years with 178MWh getting commissioned in 2024 (85% of total installed capacity) and another 30GWh is under execution(4), out of which 2.3GWh is expected to come online in 2025. Budget 2025 should provide the required push in the form of incentives and tax breaks to foster faster implementation of ESS to keep up with the capacity ramp up of RES in order to truly meet the Net Zero target of India.

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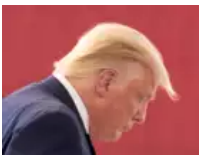
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