The Role of Battery Energy Storage in enhancing Grid Stability and RE Integration

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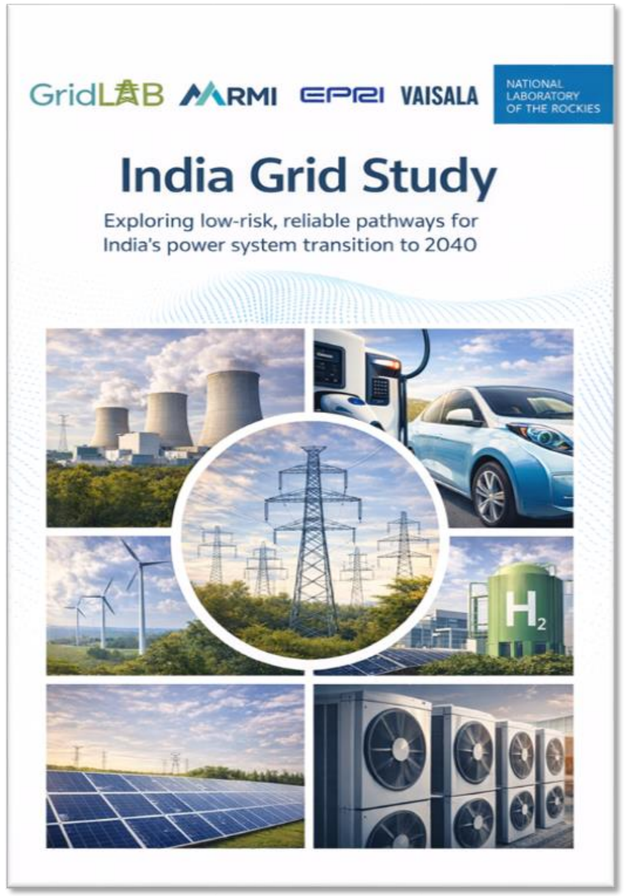
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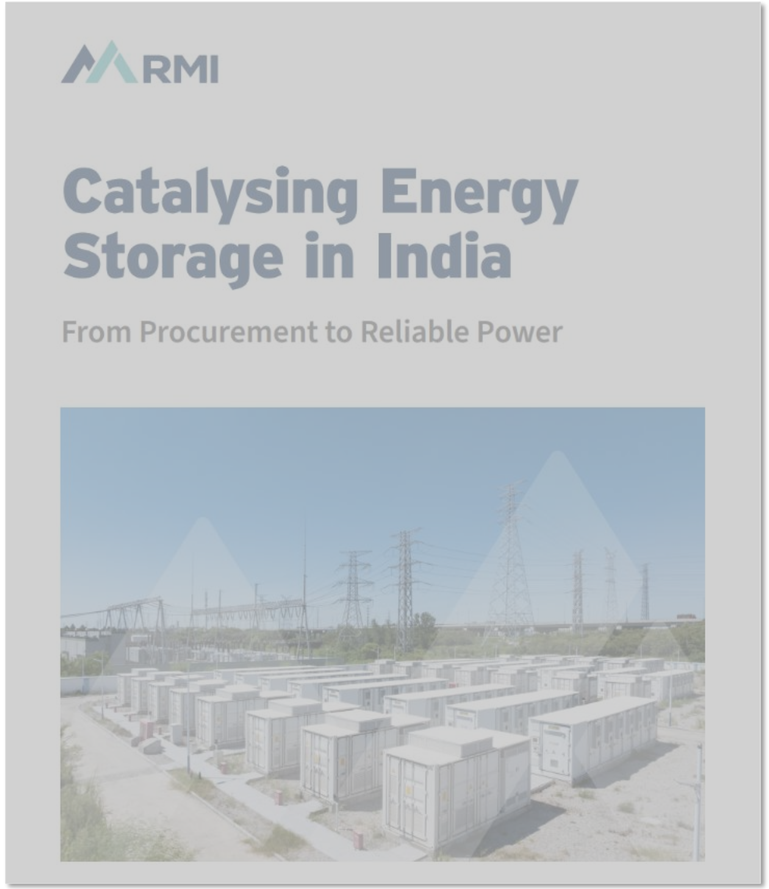
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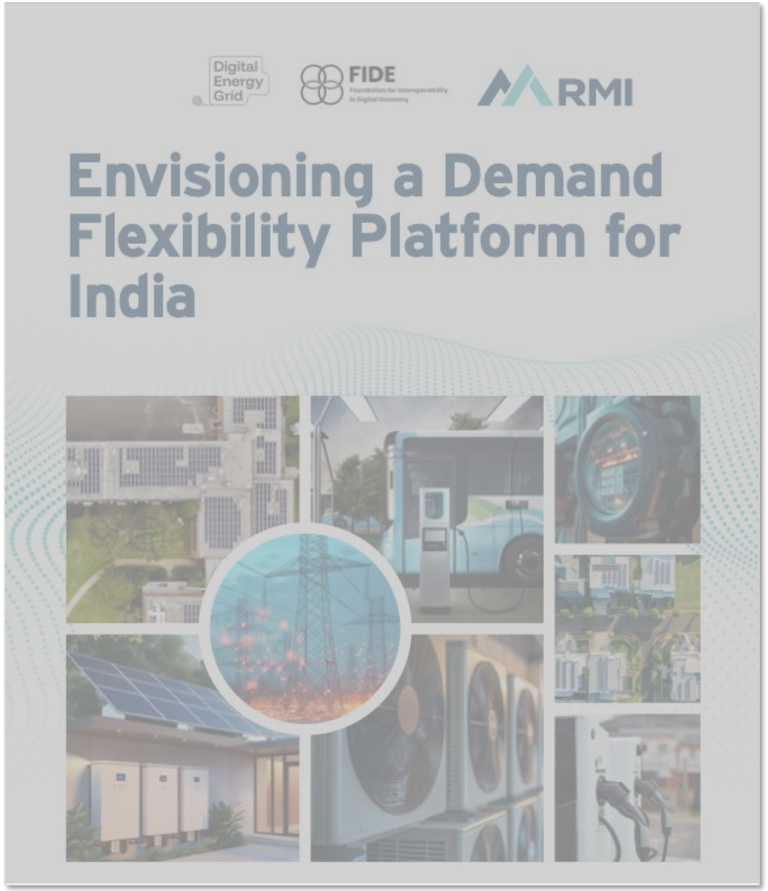
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Planning indicates the need to install significant storage capacity to integrate RE generation

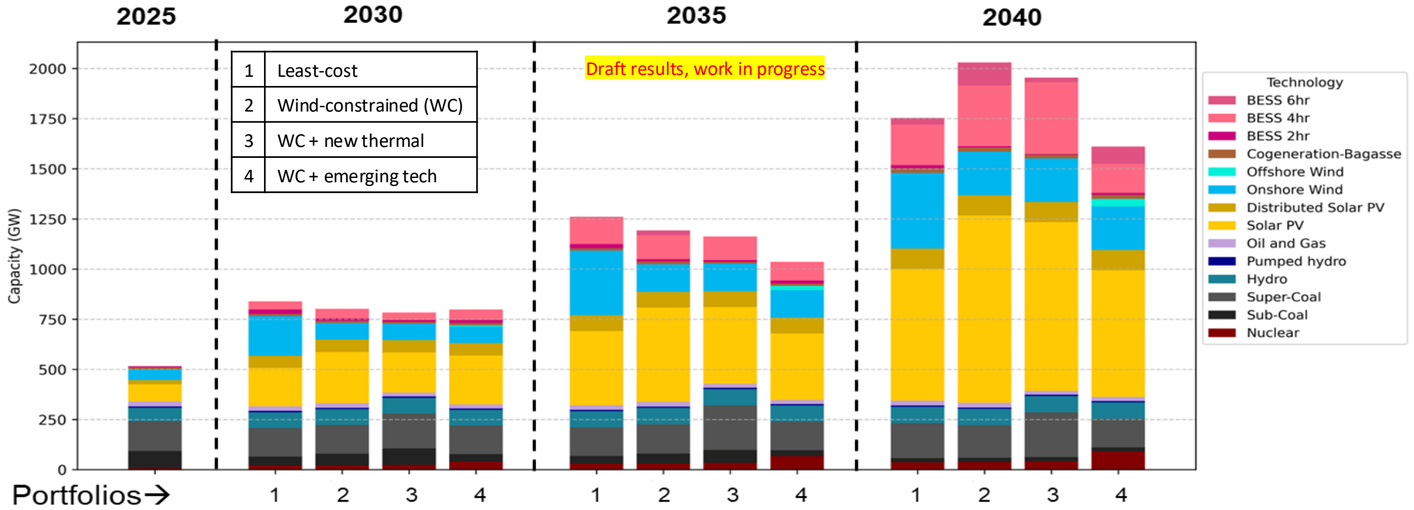
Study aims to identify the feasibility of different paths toward meeting at least 60% clean energy milestone in 2040

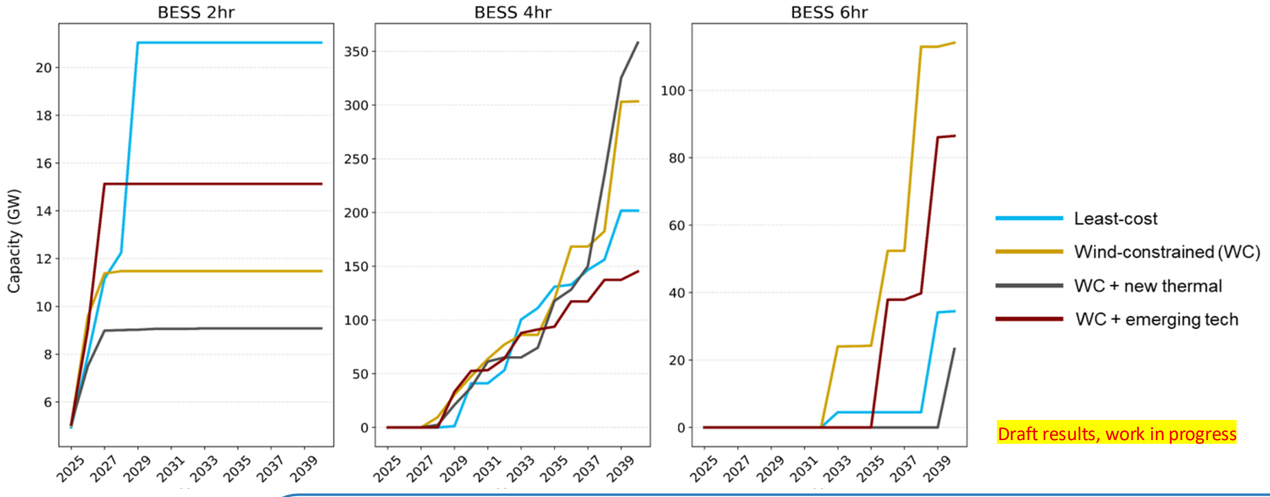
Storage will increasingly play a critical role in establishing delicate balance

SUPPLY
Increasing VRE capacity,
Reducing cost of generation,
Increasing reliability

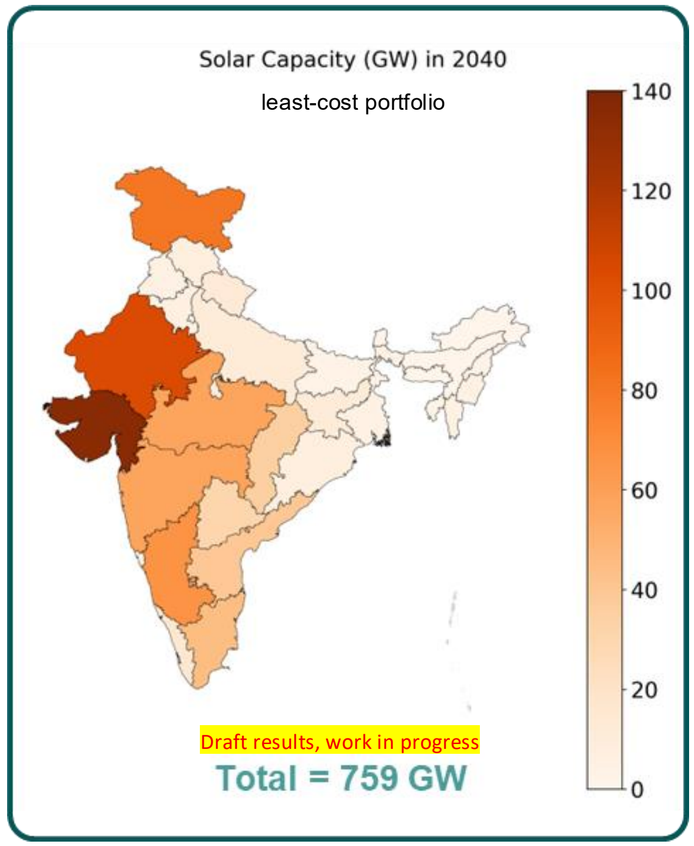
DEMAND
Electric vehicles,
Cooling demand,
Electrolyzer capacity,
Data centers,
Agricultural load shift

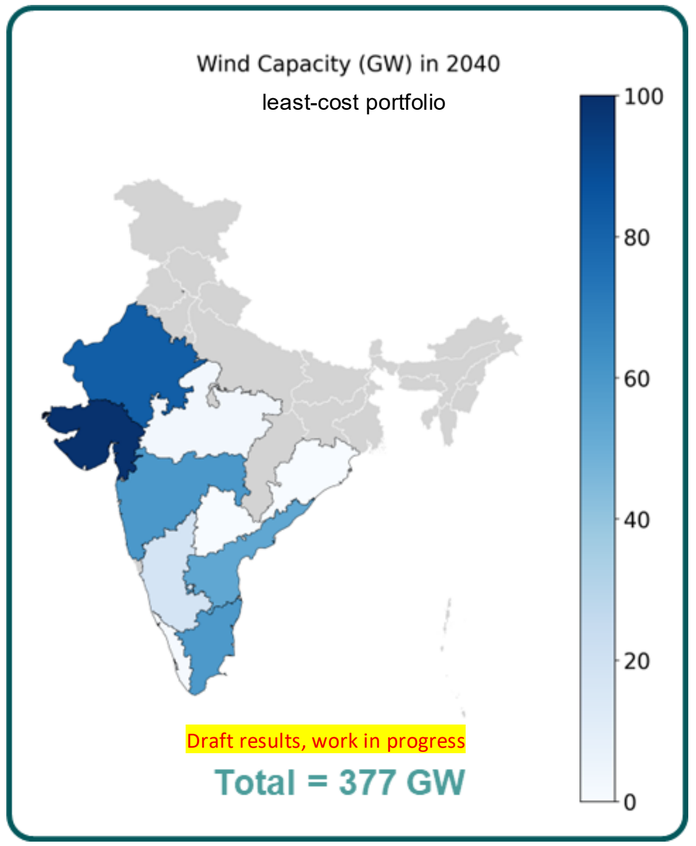
Weather variability affects both demand-supply simultaneously

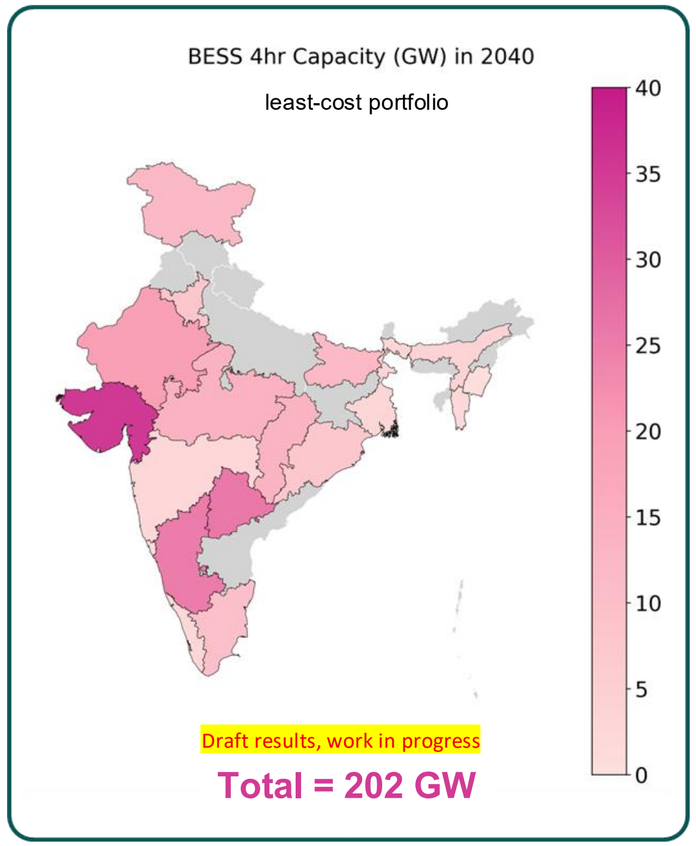




BESS (4-hour) is predominantly collocated with high VRE-capacity-installed states in the western and southern parts of India

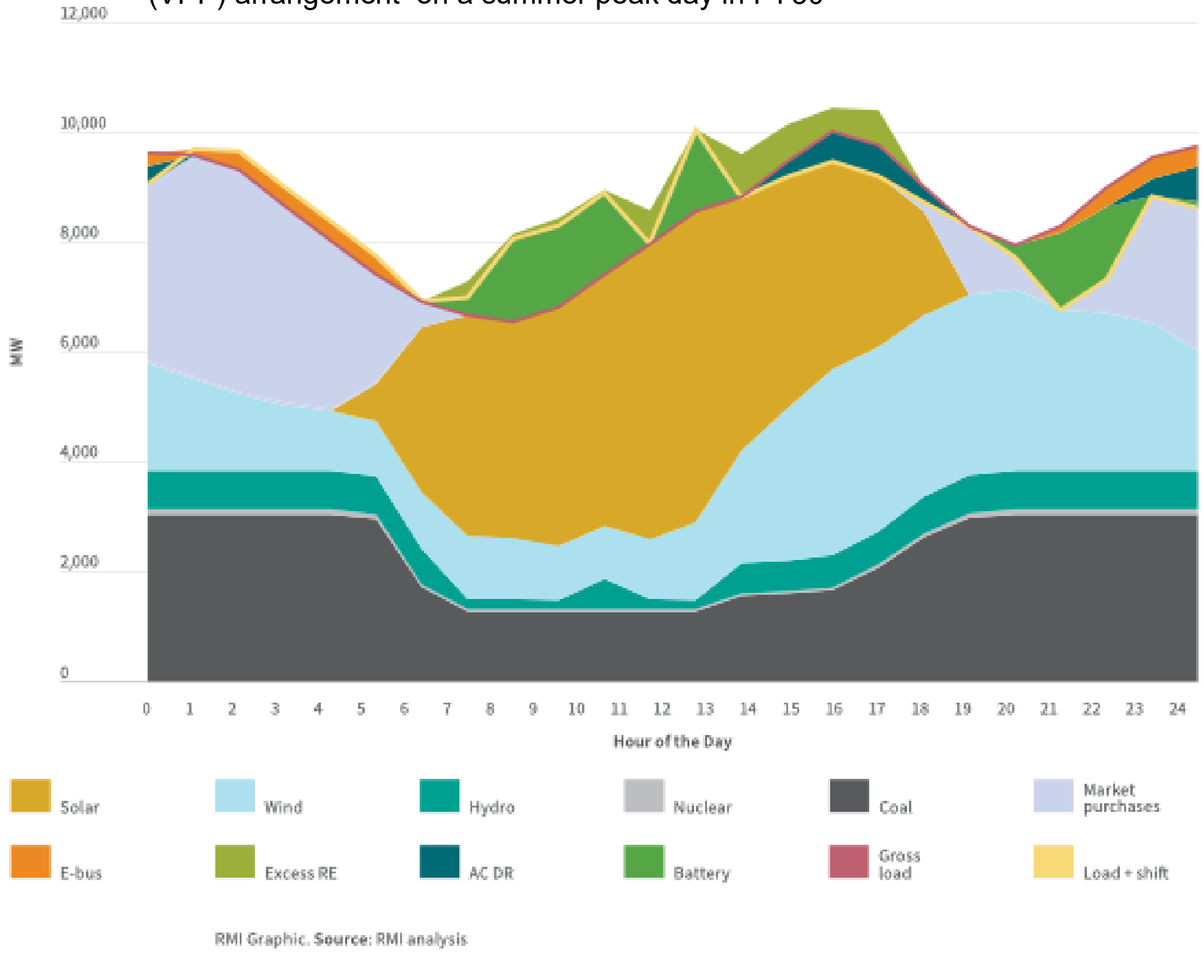






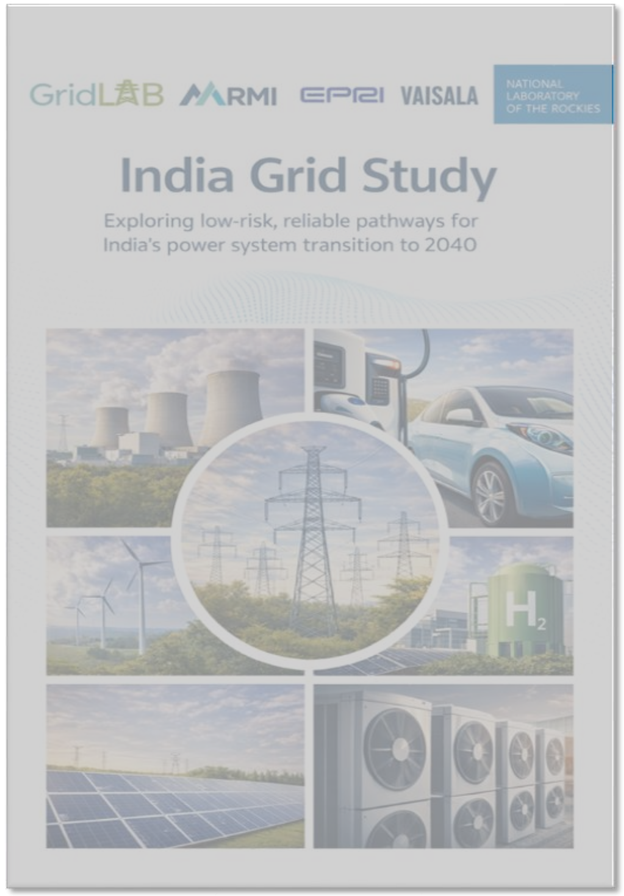
At the Discom level, BESS role evolves to providing not just RE integration but grid stability

Illustrative Delhi hourly generation dispatch and impact of a Virtual Power Plant (VPP) arrangement on a summer peak day in FY30



RMI Graphic. **Source:** RMI analysis

- Considering granular details (state as against regional or country-level) in planning exercises provides more details on inter-state power flows, transmission congestion periods, electricity price fluctuations, and VRE curtailment
- This data informs the storage sizing and siting process for minimizing congestion, delaying transmission build-out, reducing VRE curtailment, and maintaining grid reliability
- For future grids, revenue obtained from BESS energy arbitrage will become one of the revenue streams in addition to revenues obtained from generation and transmission capacity deferral, and providing resource adequacy margins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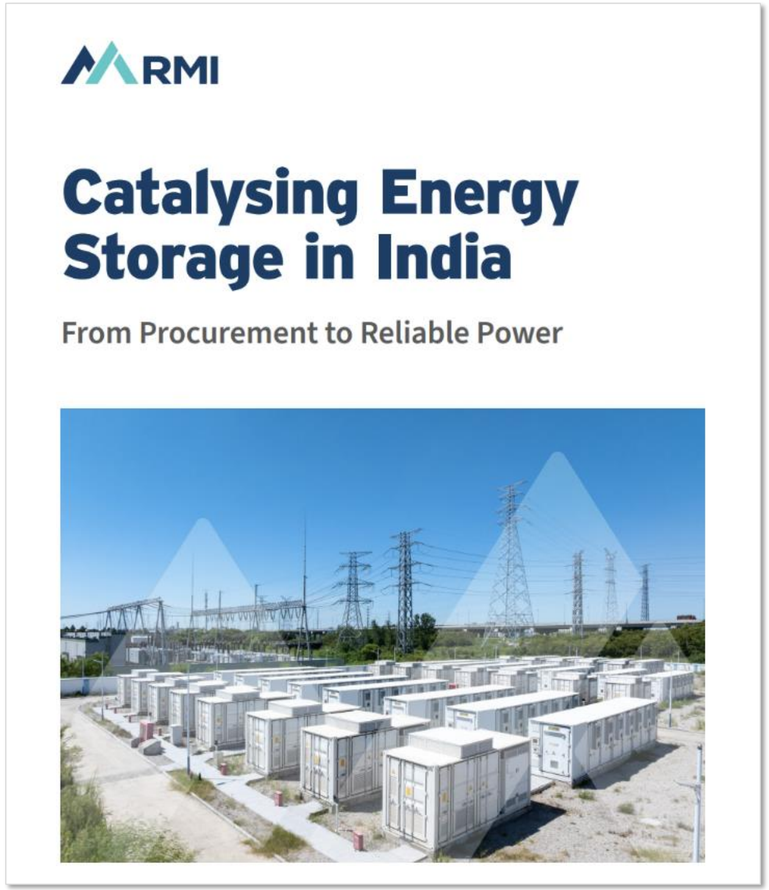
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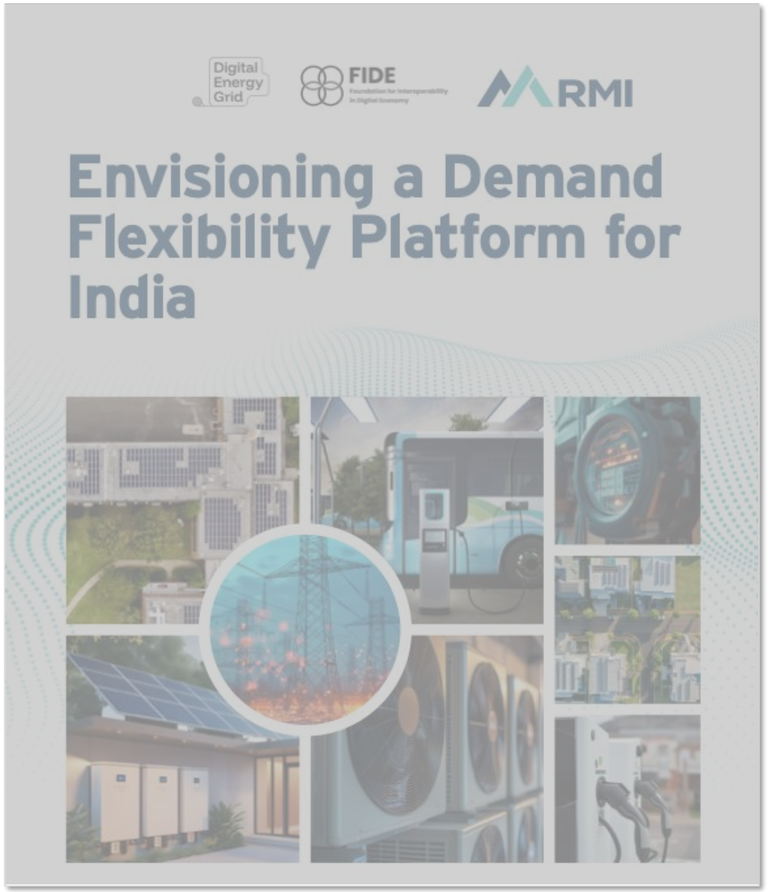
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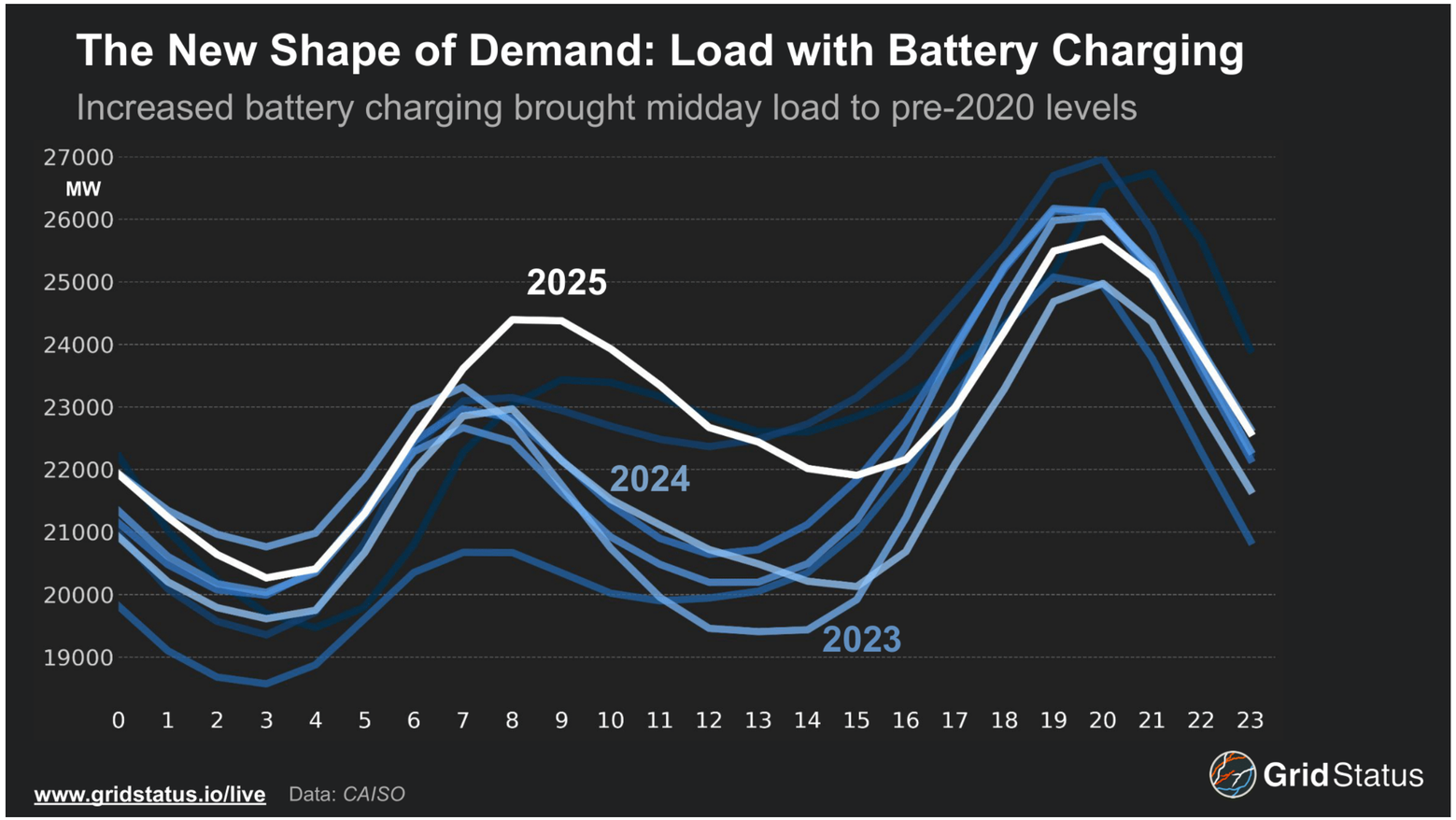
In International Markets, Adoption of BESS Has Been Transformative: A California Case Study



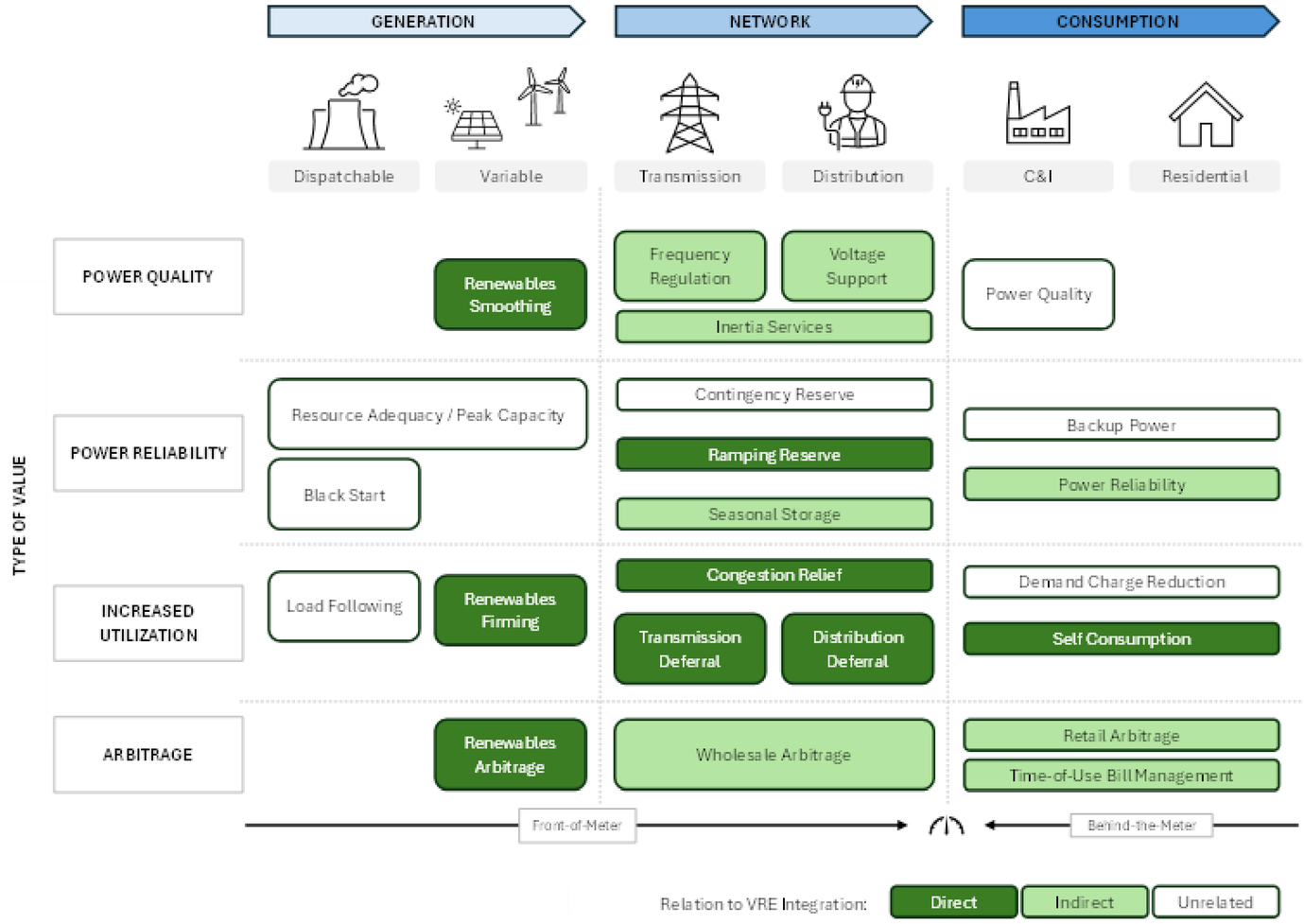
By the end of 2025, nearly 17 GW of BESS projects were operating in California's wholesale electricity market – leading to radical changes:

- Daily load profile has smoothed, as mid-day demand grows due to battery charging
- Electricity discharged from batteries now represents the plurality of supply during daily evening peak hours (6 pm to 9 pm)
- BESS has dominated ancillary service markets

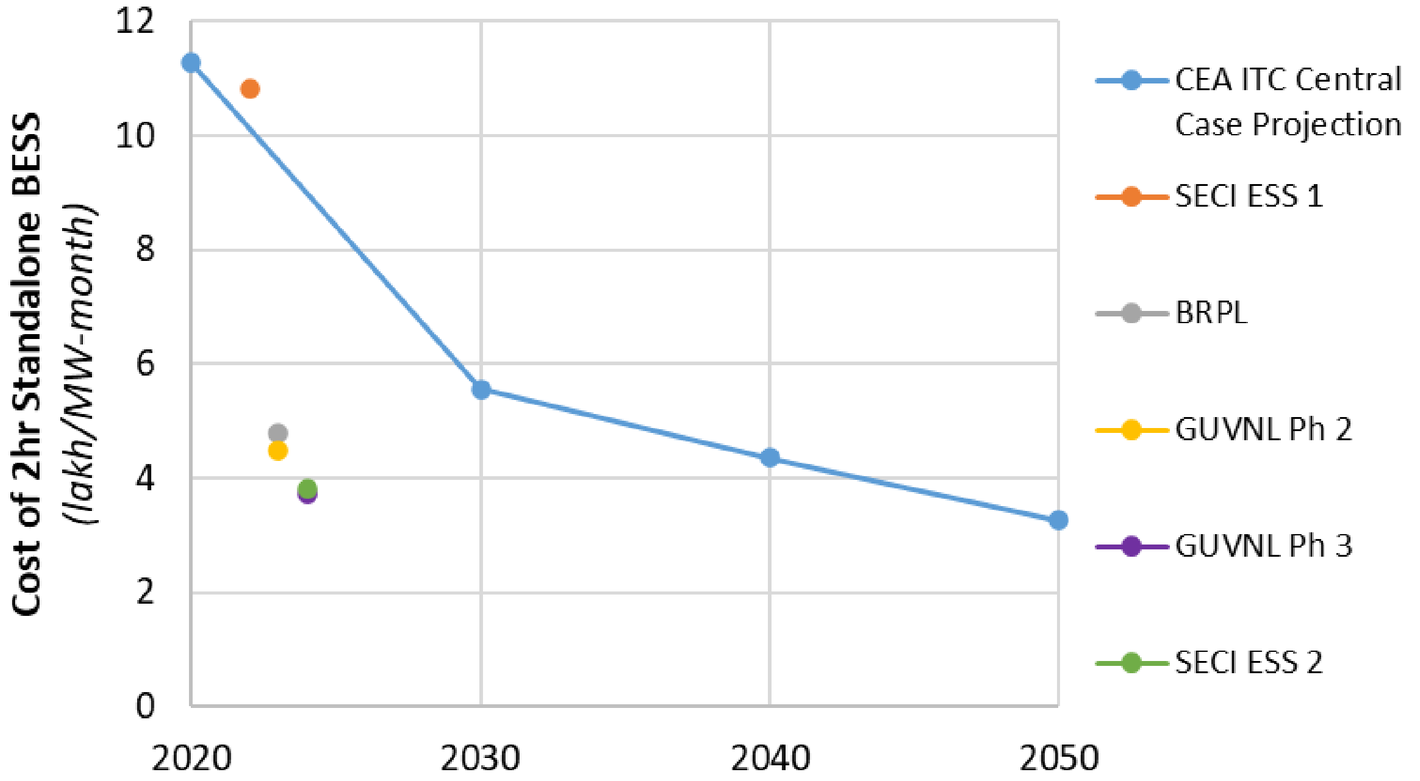
Battery storage system project design is highly flexible, allowing projects to be sized and sited to provide services based on buyer and system needs

As prices decline and India's generation mix becomes more variable, battery storage will become increasingly critical to a reliable power supply.

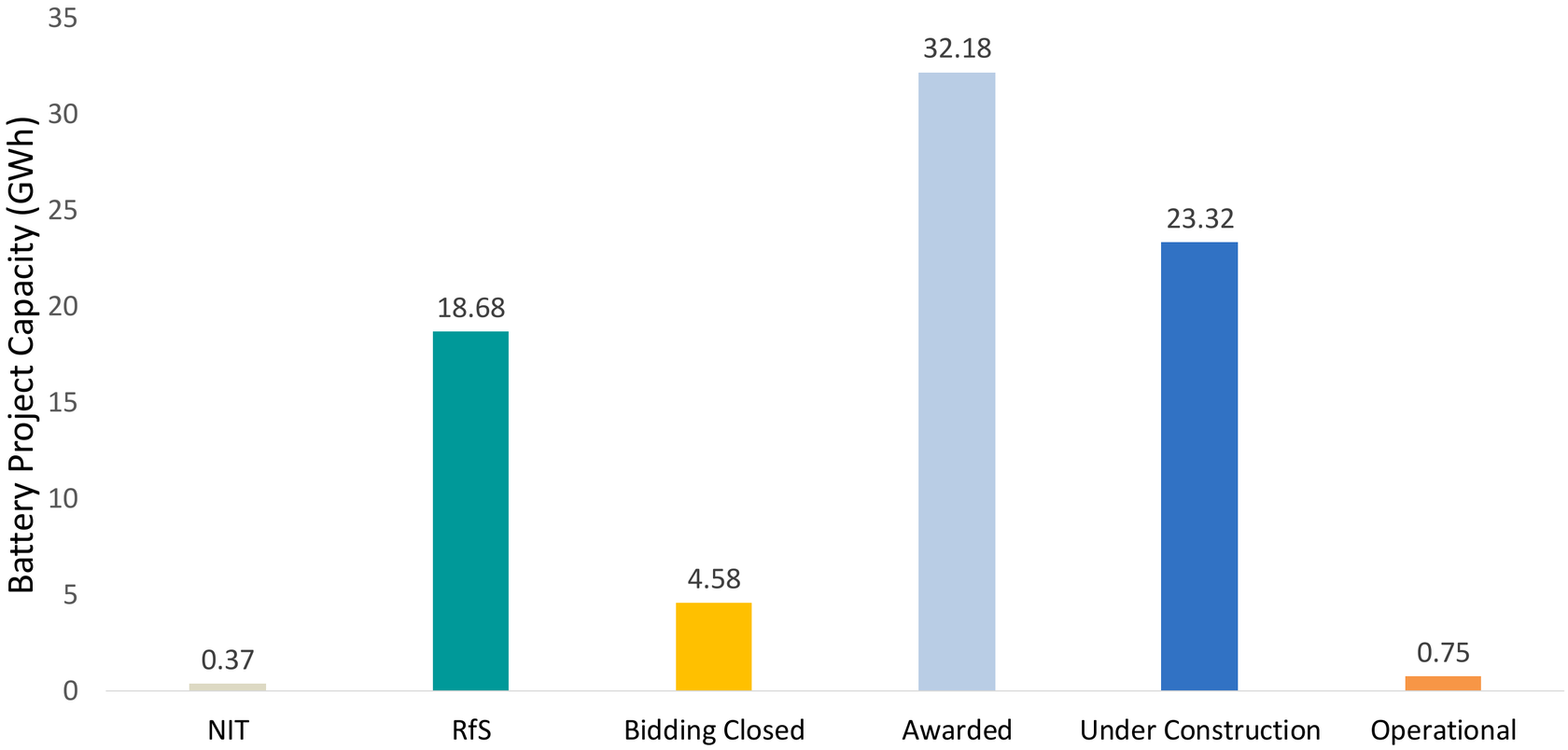
In India, energy arbitrage is the cornerstone value stream for battery storage projects, but realizing the full scope of project value requires additional market development and regulatory unlocks



Discovered tariffs for standalone BESS projects have declined rapidly, far exceeding projected cost declines even before accounting for VGF capital cost subsidies



India currently has a substantial battery project development pipeline, but operating capacity remains limited



As of December 2025
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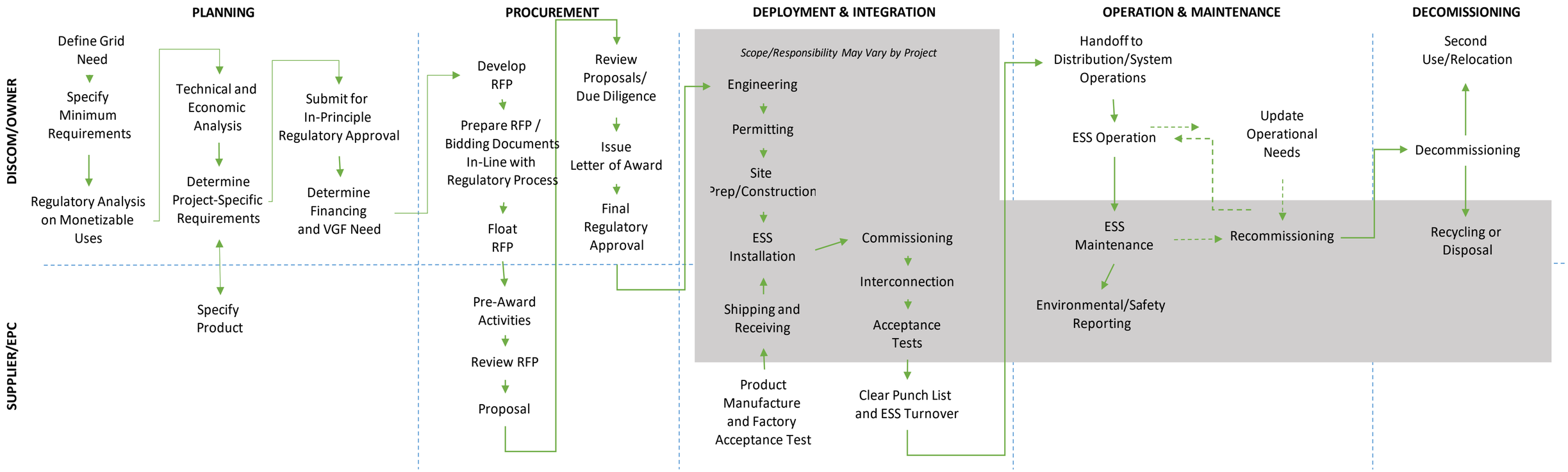
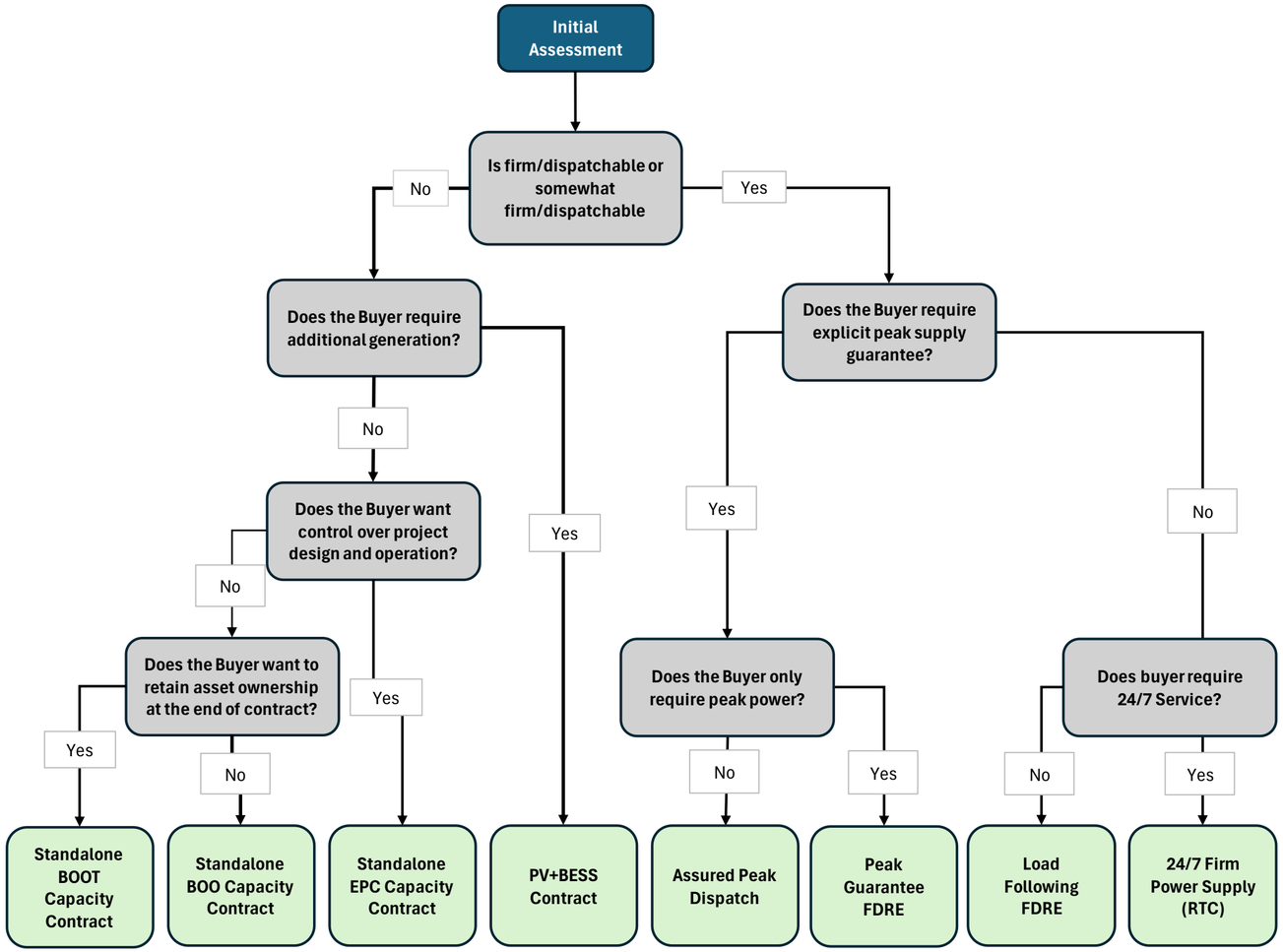
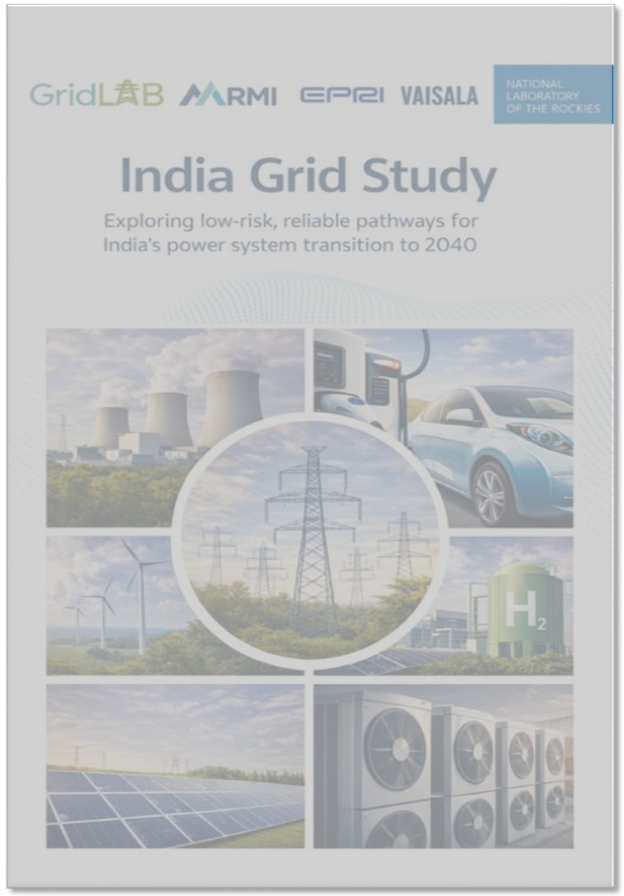
Source: *India Energy Storage Market Report 2025,*

BESS project development is a multi-phase process requiring coordination across Discoms, SERCs, developers, and OEMs



Flexibility of battery system design enables a variety of contracting models, empowering buyers to select a contract that suites their needs

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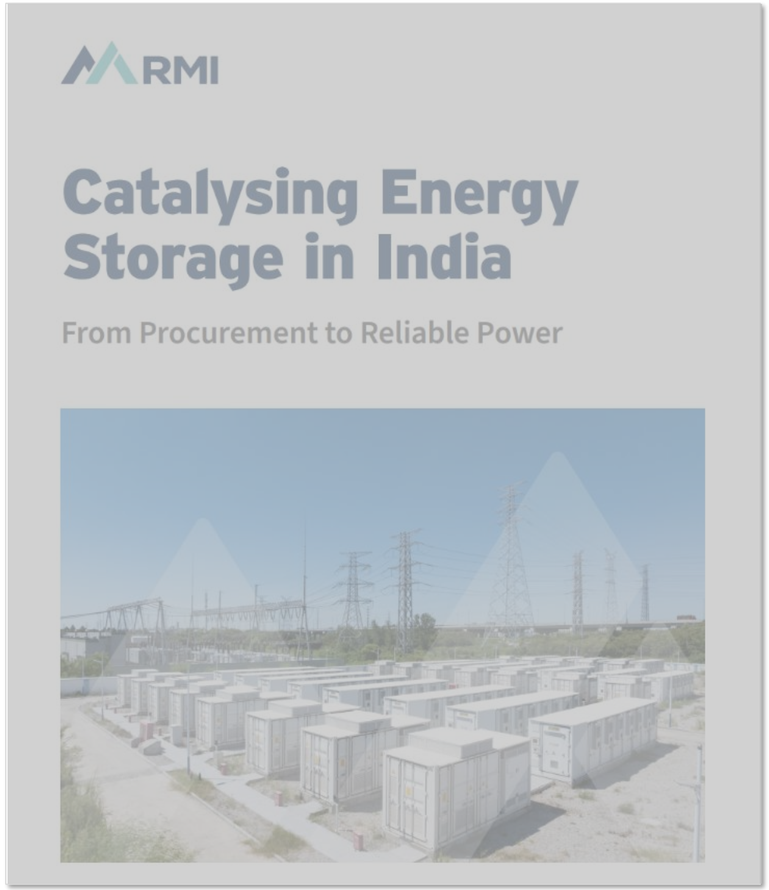
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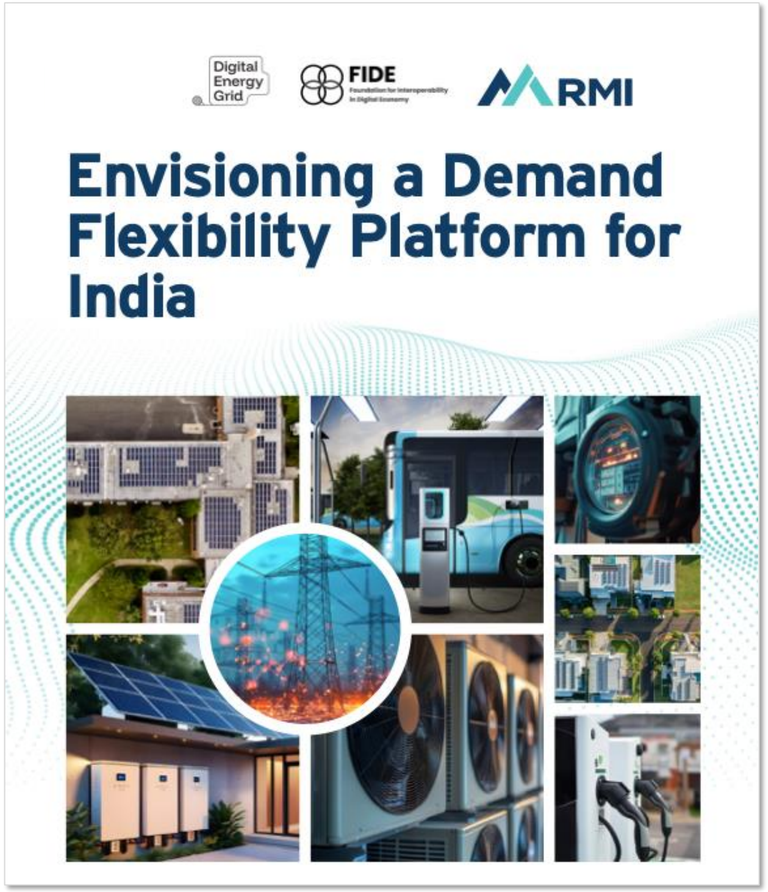
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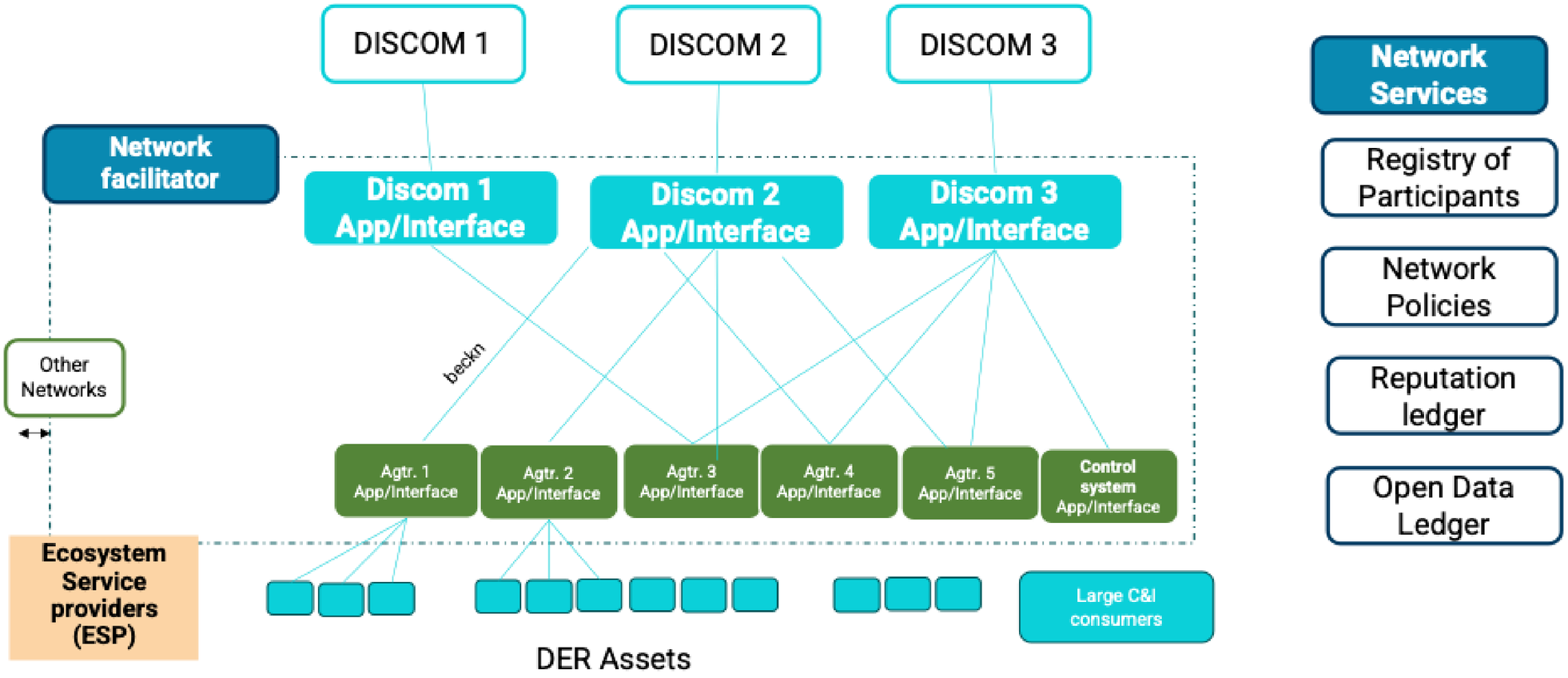
Platform and aggregators as a way to enable a local-energy market to evolve

A Digital Infrastructure Layer that Enables a Marketplace for Discovery and Transactions of DRE and BTM BESS



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