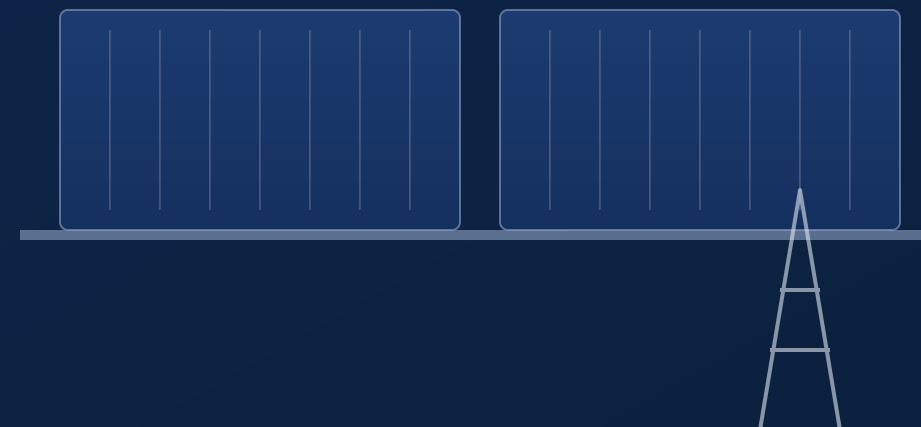


SECTOR: POWER · ENERGY STORAGE

Battery Energy Storage Systems

From GWh tendered to GWh that earn

India's BESS market is no longer about whether storage is needed. The question is who can convert policy-backed demand into qualified equipment, commissioned projects, utilisation and cash returns.



Contents: from tender to cash

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Sources & disclosures

~102 GWh

Tendered across ~69 tenders in 2025

~758 MWh

Commissioned at end-2025

~411 GWh

CEA storage requirement by FY32

1% → 4%

Energy Storage Obligation, FY24 → FY30

01 EXECUTIVE SUMMARY

Demand is proven — value capture is still emerging

India's BESS market is no longer a question of whether storage is required. The more important question is who can convert policy-backed demand into qualified equipment, commissioned projects, utilisation and cash returns.

Exhibit 1 Three market signals and what they tell us

Market signal	What it tells us
~102 GWh tendered across ~69 tenders in 2025	Demand is moving beyond pilots into industrial-scale procurement
~758 MWh commissioned at end-2025	Execution remains far behind the tender pipeline
~411 GWh storage requirement by FY32	Long-duration structural demand remains significant

Source: Energy-Storage.News, IEEFA, CEA

~102 GWh

Tendered in 2025

~0.76 GWh

Commissioned, end-2025

~411 GWh

Required by FY32

~0.7%

Commissioned vs 2025 tenders (Alpha Room calc.)

Key finding: the opportunity is structurally attractive, but sustainable value capture is still emerging across the chain.

Evaluate through execution milestones, qualification, utilisation, cash conversion and capital efficiency — not headline GWh.



02 STORY IN CHARTS

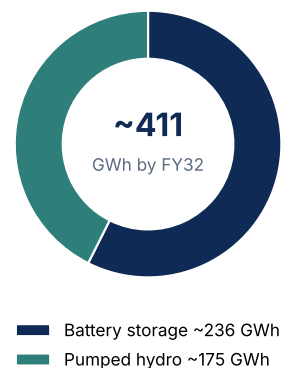
Tenders are racing ahead of commissioning

Ex 2 2025 tenders vs commissioned base



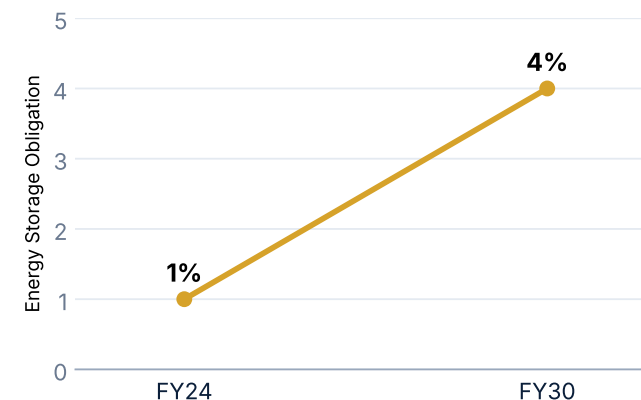
Ratio: Alpha Room calc.; stock vs annual flow, illustrative. Source: Energy-Storage.News, IEEFA

Ex 3 FY32 storage requirement (CEA)



Source: CEA National Electricity Plan

Ex 4 Energy Storage Obligation



Source: Ministry of Power

Procurement at scale

~102 GWh tendered in a single year — storage has moved beyond pilots.

Execution far behind

~758 MWh commissioned by end-2025 — under 1% of one year's tenders.

Long runway

~411 GWh needed by FY32, with policy obligations rising every year.

03 SECTOR OVERVIEW

Storage is becoming an integral power-system resource

The Central Electricity Authority's long-term requirement is ~411 GWh by FY32 — about 236 GWh of battery storage and 175 GWh of pumped hydro. Procurement is increasingly centred on these formats:

Standalone BESS
Storage capacity procured on its own for grid services.

Solar-plus-storage
Co-located storage shifts solar output to evening peaks.

FDRE
Firm and Dispatchable Renewable Energy — round-the-clock supply.

Hybrid with storage
Hybrid projects with mandatory storage components.

THE CRITICAL GAP

Tendered

Awarded

Under construction

Commissioned

Revenue-generating

A tender demonstrates potential demand. On its own, it does not establish near-term revenue or shareholder returns.

~236 GWh
Battery storage needed by FY32 (CEA)

~175 GWh
Pumped hydro needed by FY32 (CEA)

~69
BESS tenders in 2025

~758 MWh
Commissioned base, end-2025

04 BESS VALUE CHAIN

Four layers, four different risk profiles

Each layer carries a different mix of commodity risk, capital intensity, execution risk and cash-conversion risk.

LAYER 1

Upstream — raw materials
Mining and refining lithium, nickel, cobalt, lead and other chemistry-specific inputs.
Monitor: commodity pass-through

LAYER 2

Midstream — cell manufacturing
Gigafactories make cathodes, anodes, electrodes and standardised cells.
Track: qualified, contracted, utilised GWh

LAYER 3

Downstream — integration, EPC & grid
System integration, EPC, asset ownership, transformers and power-control systems.
Track: order-to-cash

LAYER 4

End offtakers
SECI, POWERGRID, NTPC and state DISCOMs procuring storage or storage-enabled power.
Track: commissioned, utilised assets

HOW VALUE FLOWS THROUGH THE CHAIN



Ex 4b What drives returns in each layer

Layer	Main return driver	Main way it goes wrong
Upstream	Commodity prices	Price swings squeeze fixed-price projects
Cell manufacturing	Qualified, utilised capacity	Capex sits idle during long qualification
Integration / EPC / grid	Procurement scale and execution	Working capital and falling tariffs
End offtakers / owners	Utilisation of commissioned assets	Delays and leverage

Source: Alpha Room Research

05 LAYERS 1-2 · RAW MATERIALS & CELL MANUFACTURING

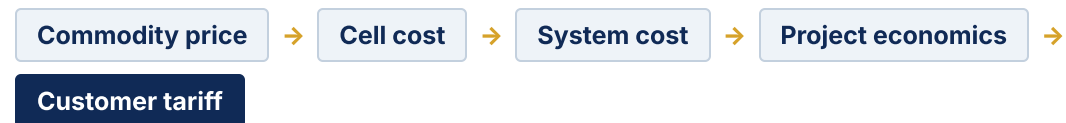
Commodities set costs; qualification decides who earns

Upstream — raw materials

What it is: mining and refining battery-related materials — lithium, nickel, cobalt, lead and other chemistry-specific inputs.

Why it matters: cell makers generally do not control commodity prices. Volatility flows into cell costs and ultimately into fixed-price BESS project economics.

ECONOMIC CHAIN



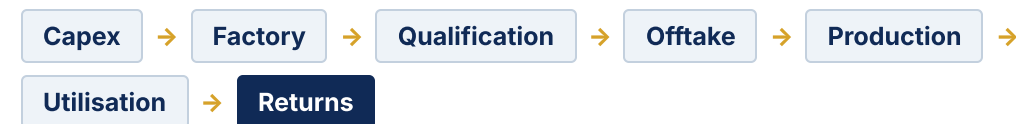
Monitor: commodity prices and how they pass through into cell and system pricing.

Midstream — cell manufacturing

What it is: gigafactories convert processed materials into cathodes, anodes, electrodes and standardised cells.

The dynamic: extremely capital-heavy. Large investment precedes revenue, and customer qualification can take materially longer before binding purchase agreements. Exide and Waaree are illustrative domestic cell examples.

ECONOMIC CHAIN



Key metric: qualified, contracted and utilised capacity — not announced GWh.

Company examples are illustrative and do not constitute investment advice.

06 LAYERS 3-4 · INTEGRATION, EPC & GRID · END OFFTAKERS

Where execution meets the contract

Downstream — integration, EPC & enabling infrastructure

What it is: system integration, EPC, project execution, ownership of operating assets and critical grid hardware such as transformers and power-control systems. ACME Solar illustrates the owner-operator end; Waaree the enabling-infrastructure adjacency.

The dynamic: lower manufacturing capex than cells, but high working-capital needs, bank credit lines and execution demands. Economics shift toward procurement scale, execution quality and cash conversion.



Key metric: order-to-cash conversion — not order-book size alone.

End offtakers — where demand becomes a contract

What it is: SECI, POWERGRID, NTPC and state DISCOMs increasingly procure storage capacity or storage-enabled power.

The shift: the policy architecture is moving BESS from a pilot technology toward an integral power-system resource.



Key distinction: a tender creates potential demand; a commissioned and utilised asset creates economic value.

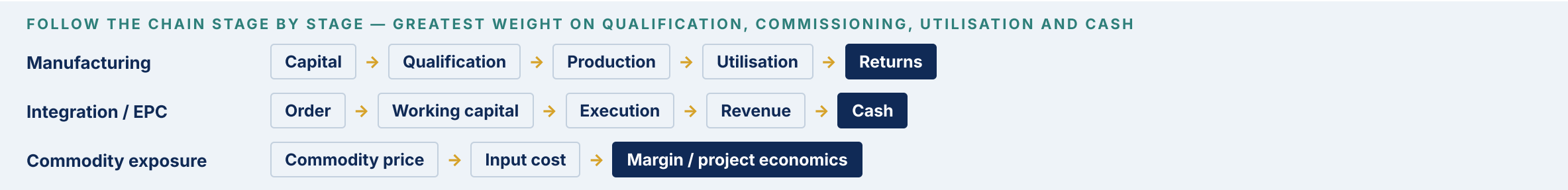
07 VALUE-CHAIN ECONOMICS

10 GWh at the factory gate is not 10 GWh of commissioned storage

Ex 5 Capital intensity, primary risk and what to track — by layer

Layer	Capital intensity	Primary risk	What to track
Upstream	Commodity-cycle driven	Raw-material prices	Input-cost movement
Cell manufacturing	Very high	Qualification + utilisation	Cost/kWh, yield, offtake
Integration / EPC	Moderate fixed capex; high working capital	Execution + cash conversion	Order-to-cash
Grid infrastructure	Asset / manufacturing capex	Transmission readiness	Transformer / cable / grid capacity
IPP / BESS owner	High project capex + debt	Utilisation + leverage	CUF, BESS EBITDA, cash flow

Source: Alpha Room Research



Highest capital at risk

Cell manufacturing — very high capex before qualification and offtake.

Most cash-sensitive

Integration / EPC — high working capital; profits must convert to cash.

Most leverage-sensitive

IPP / BESS owners — debt-funded projects depend on utilisation.

08 CROSS-COMPANY VIEW · VALUE-CHAIN LENS

Same value chain, three different capital models

The companies illustrate how different positions carry different capital models, risks and proof-points. The comparison is structural, not financial.

Ex 6 ACME Solar vs Exide Industries vs Waaree Energies

Dimension	ACME Solar	Exide Industries	Waaree Energies
Value-chain position	Operating BESS / IPP	Cell manufacturing	Solar, BESS, cells and grid equipment
Where value is today	Commissioned BESS + early revenue generation	Legacy battery cash flows; Li-ion cell platform in validation / customer sampling	Solar manufacturing + growing integration
Near-term catalyst	BESS commissioning + utilisation	Commercial cell revenue / qualification	BESS, cell and T&D capacity ramp
Capital intensity	High project capex + debt	High factory capex	Very high multi-track capex
Key risk	Leverage / utilisation	Qualification / commercial ramp	Execution + margin + trade exposure
Best KPI	BESS utilisation, realised spreads, EBITDA, cash	Qualified capacity + offtake	Capacity ramp + margin + cash conversion
Core question	Can returns scale with BESS growth?	Can capital become commercial revenue?	Can breadth become profitable vertical integration?

Source: company disclosures. Illustrative only — not investment advice.

Valuation is secondary to value-chain maturity: ask what stage of conversion — commissioning, qualification or capacity ramp — is already reflected in expectations.

ACME Solar

Stage reached: **commissioning**

Exide Industries

Stage reached: **qualification**

Waaree Energies

Stage reached: **capacity ramp**

09 BOTTLENECK → OPPORTUNITY

As renewables scale, the constraint moves to the grid

The constraint can shift from generation capacity to transmission, transformers, grid connection and dispatchability. The bottleneck itself can become a value pool.

01

Grid readiness

Transformers, HVDC/grid equipment, power cables, power-control systems and BMS.

Value pool: grid hardware

02

Storage-to-dispatch

The chain increasingly links generation → storage → transmission → dispatch.

Value pool: integrated delivery

03

Execution

Falling BESS tariffs raise the value of procurement scale, engineering and working-capital discipline.

Value pool: low-cost executors

04

Qualification

Domestic cell makers create value only after samples convert into qualified, contracted and utilised production.

Value pool: qualified cells

THE NEW VALUE CHAIN

Generation → Storage → Transmission → Dispatch

If the sector grows, what becomes scarce first? Grid hardware, qualified cells and execution capacity — value accrues to whoever clears these bottlenecks at falling tariffs.

10 GOVERNMENT POLICY SUPPORT

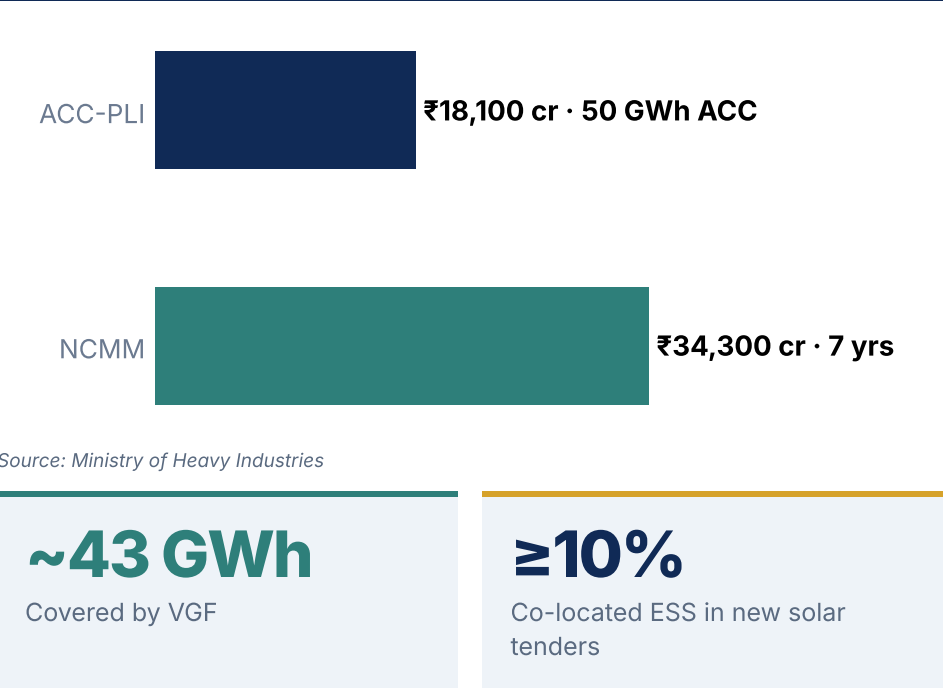
Policy is pulling demand and funding domestic cells

Ex 7 Policy levers

Lever	What has been committed
Demand pull	Energy Storage Obligation rises from 1% (FY24) to 4% (FY30)
CEA advisory	New solar tenders to include ≥10% co-located ESS with ≥2-hour duration
Project viability	VGF covers ~43 GWh; ISTS charges waived for eligible co-located BESS commissioned by June 2028
Manufacturing	ACC-PLI: ₹18,100 cr for 50 GWh of domestic ACC capacity; NCMM: ₹34,300 cr over seven years
Market access	ESS recognised across generation, transmission and distribution, with ancillary services and market access

Source: Ministry of Power / PIB, Ministry of Heavy Industries, CEA

Ex 8 Manufacturing support



POLICY CHAIN



None of these policies is revenue yet — they create potential demand. Value appears only when projects are commissioned and utilised.

11 THE ALPHA ROOM VIEW

Tender wins create potential demand. Commissioned assets create revenue. Sustainable utilisation and returns create economic value.

The opportunity is structurally attractive but uneven. The key distinction is between announced capacity and economic capacity — assets that are qualified, commissioned, utilised and capable of generating cash.

FINAL CHAIN

Qualified cells → Binding offtake → Commercial production → Commissioned projects → Utilisation → Revenue → Cash → Sustainable returns

DON'T ASK ONLY

How much capacity has been announced or tendered?

ASK INSTEAD

How much has been built, qualified, contracted, commissioned, utilised and monetised?

12 SOURCES, DISCLOSURES & AUTHOR**RESEARCH SOURCES**

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2. Ministry of Power / PIB — BESS Policy, VGF & ISTS Support
3. Ministry of Heavy Industries — ACC-PLI Scheme
4. ACME Solar Holdings — Company Disclosures & BESS Updates
5. Exide Industries — Financial & Cell Manufacturing Disclosures
6. Waaree Energies — BESS
7. Waaree Energies — Transformer Disclosures
8. Energy-Storage.News — India BESS Market & Tender Data
9. IEEFA — India BESS Market & Execution Analysis

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