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Power for AI

Flexible Power – The Next Wave of Growth in AI

Power for AI has emerged as a US\$1.5tr theme. We see energy storage as the next wave of growth, with the focus shifting from power availability to power flexibility. Compelling LCOE and infrastructure deferral value enhance the economic case for ESS. Data centers could double demand in five years.



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CHINA ENERGY & CHEMICALS/ASIA PACIFIC

Industry View: In-Line



Tech Diffusion

A Morgan Stanley Research
Key Theme of 2026



Future of Energy

A Morgan Stanley Research
Key Theme of 2026

The next wave of change around "Powering AI": The quest to power the AI boom has significantly re-rated the global power value chain, creating a market worth over US \$1.5tr in the past two years. This re-rating has catalyzed a rotation from nuclear power to grid facilities, backup/gas generators, and more recently to fuel cells. While power capacity is facing supply chain constraints across the board, we believe the next opportunity will be in energy storage systems (ESS), as investment in AI infrastructure continues to accelerate and inference workloads inflect, shifting the focus on AI from energy availability to power volatility, system flexibility, and time-to-power. We believe the thematic rotation toward energy storage is not just a logical step but a necessity. It is not about energy storage replacing generators, but the system rebalancing itself from one that built ahead of demand to one that creates a buffer against future demand, using inventory.

Cost advantages beyond LCOE comparisons: The ESS cost advantage can be seen not only in its levelised cost of energy (LCOE), but more importantly in the ability of electricity inventory to defer or downsize the high opportunity costs of traditional capital-intensive power infrastructure. This time-to-power flexibility and infrastructure deferral value meaningfully enhance the economic case for storage. Battery costs will likely continue to evolve with the coming of the sodium-ion era – cheaper and safer, with the ability to deliver steady energy at low temperatures.

Quantification: As AI data centers develop at an unprecedented pace and scale, the binding constraint is no longer demand or capital, but time to power and peak load management, in our view. ESS will likely emerge as a natural, economically efficient approach at a turning point in the cycle. We map out global ESS demand from data centers in the next five years, considering 1) peak-shaving demand from inference, and 2) deployment required to mitigate shortages in traditional power capacity. We forecast global ESS annual incremental deployment from data centers at ~321GWh by 2030 – 169GWh in the US, 85GWh in China, and 68GWh in ROW, vs. a global power market utility scale of 325GWh in 2025, which we also expect to increase at a 22% CAGR by 2030, driven by the economic energy transition. Overall, we expect a 30% CAGR in global ESS annual incremental deployment by 2030.

Contributors



MORGAN STANLEY ASIA LIMITED+

Jack Lu
Equity Analyst
+852 2848-5044
Jack.Lu@morganstanley.com



MORGAN STANLEY ASIA LIMITED+

Kaylee Xu
Equity Analyst
+852 2239-1506
Kaylee.Xu@morganstanley.com



MORGAN STANLEY & CO. INTERNATIONAL PLC+

Amy Gower (Amy Sergeant), CFA
Commodities Strategist
+44 20 7677-6937
Amy.Gower1@morganstanley.com



MORGAN STANLEY INDIA COMPANY PRIVATE LIMITED+

Girish Achhipalia
Equity Analyst
+91 22 6118-1124
Girish.Achhipalia@morganstanley.com



MORGAN STANLEY ASIA LIMITED+

Rachel L Zhang
Equity Analyst
+852 2239-1520
Rachel.Zhang@morganstanley.com



MORGAN STANLEY ASIA LIMITED+

Tim Hsiao
Equity Analyst
+852 2848-1982
Tim.Hsiao@morganstanley.com



MORGAN STANLEY & CO. INTERNATIONAL PLC, SEOUL BRANCH+

Chan Park
Research Associate
+82 2 399-9920
Chan.Park1@morganstanley.com



MORGAN STANLEY ASIA LIMITED+

Henry Zhao
Research Associate
+852 2239-7731
Henry.Zhao@morganstanley.com



MORGAN STANLEY & CO. LLC

Stephen C Byrd
Equity Analyst
+1 212 761-3865
Stephen.Byrd@morganstanley.com



MORGAN STANLEY ASIA (SINGAPORE) PTE.+

Mayank Maheshwari
Equity Analyst
+65 6834-6719
Mayank.Maheshwari@morganstanley.com



MORGAN STANLEY & CO. INTERNATIONAL PLC, SEOUL BRANCH+

Young Suk Shin
Equity Analyst
+82 2 399-4994
Young.Shin@morganstanley.com



MORGAN STANLEY & CO. LLC

Jeremy Herring
Research Associate
+1 212 761-4182
Jeremy.Herring@morganstanley.com



MORGAN STANLEY ASIA LIMITED+

Eva Hou
Equity Analyst
+852 2848-6964
Eva.Hou@morganstanley.com



MORGAN STANLEY & CO. LLC

Jahvonte G Bain
Research Associate
+1 212 761-9231
Jahvonte.Bain@morganstanley.com



MORGAN STANLEY & CO. LLC

David Arcaro, CFA
Equity Analyst
+1 212 761-1817
David.Arcaro@morganstanley.com



MORGAN STANLEY & CO. LLC

Andrew S Percoco
Equity Analyst
+1 212 296-4322
Andrew.Percoco@morganstanley.com



MORGAN STANLEY AUSTRALIA LIMITED+

Rob Koh
Equity Analyst
+61 3 9256-8932
Rob.Koh@morganstanley.com



MORGAN STANLEY & CO. INTERNATIONAL PLC+

Robert Pulleyn
Equity Analyst and Commodity Strategist
+44 20 7425-4388
Robert.Pulleyn@morganstanley.com



MORGAN STANLEY TAIWAN LIMITED+

Charlie Chan
Equity Analyst
+886 2 2730-1725
Charlie.Chan@morganstanley.com



MORGAN STANLEY ASIA LIMITED+

Chris Jiang
Equity Analyst
+852 3963-1593
Chris.Jiang@morganstanley.com



MORGAN STANLEY INDIA COMPANY PRIVATE LIMITED+

Pranitha Shetty
Research Associate
+91 22 6118-3022
Pranitha.Shetty@morganstanley.com

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Executive Summary

Power for AI and the Next Leg of Value Creation

AI inference workloads are inflecting, making the provision of power more volatile and shifting the focus from pure capacity build-out to flexibility. Energy storage systems (ESS) are emerging as the most efficient way to meet this demand.

Power for AI Theme

- 1) A US\$1.5tn scale market value theme
- 2) Capital rotation across the power value chain as investors reprice scarcity, time-to-power and reliability.
- 3) Value creation has been sequential: nuclear (AI grade base load), followed by grid infrastructure, gas turbines and backup generation followed by fuel cells.
- 4) What is the next leg???

Next Leg: Energy Storage

- 1) Inflection in inference is causing power to become more volatile: spikier and less predictable.
- 2) We view ESS as a system-level necessity: can absorb shocks, fast-response, peak-shaving
- 3) Compelling LCOE vs. gas peaker
- 4) ESS helps defer costly, irreversible investments in generation and transmission

Quantification

- 1) 320GW data center build-out by 2030 globally
- 2) Inference proportion: 45-50%, more inference, more peak-shaving demand
- 3) ESS new installation linking to data centers in 2030: 321GWh vs. current 325GWh ESS market
- 4) AI infrastructure capacity's exponential growth rather than linear rate to lead to our bull case: 590GWh in 2030.

What's New?

This report marks a clear evolution from our prior Powering AI framework, reflecting a fundamental shift in how AI is reshaping electricity demand and where incremental value creation now sits across the power stack.

1) From capacity to flexibility

Our prior work focused on identifying the scale of data center power demand, quantifying emerging power shortages, and highlighting beneficiaries of incremental capacity build-out—most notably nuclear, gas turbines and other firm generation. The new insight is that AI inference workloads are now inflecting, structurally increasing power volatility rather than just absolute demand. As AI becomes more real-time and user-facing, the system challenge shifts from “how much power” to “how fast and how flexibly,” elevating the importance of short-duration absorption, peak-shaving and response times. This reframes energy storage systems (ESS) from an adjunct to a core solution.

2) ESS economics, not just adoption

This report deepens our analysis on ESS economics across regions, comparing storage LCOE against traditional peaker alternatives. We show that, across multiple geographies, ESS is already economically compelling relative to peaking generation, particularly once utilization, response speed and operating flexibility are fully accounted for.

3) Infrastructure deferral as a new value pool

A key addition in this report is the explicit valuation of infrastructure deferral benefits enabled by ESS. By smoothing peaks and absorbing volatility, storage can defer or even avoid incremental investment in generation, grid and transmission. We estimate that ESS can effectively defer ~10% of infrastructure spending when factoring in interest costs, inflation and the time value of money—creating meaningful system level economic value beyond simple energy arbitrage.

4) Technology cost reset via sodium ion batteries

Finally, this report incorporates a major technology update: sodium ion batteries are now ready for mass production. As this chemistry scales, it has the potential to reduce energy storage LCOE by up to ~30%, further strengthening the economic case for ESS and expanding its addressable use cases across power for AI and utility scale markets.

The prior reports identified where power demand from AI would emerge and which capacity assets would benefit first. **This report explains how the demand profile is changing, why flexibility now matters more than incremental capacity, and why energy storage—supported by improving economics, infrastructure deferral value and new battery chemistries—represents the next critical leg of value creation in the Power for AI ecosystem.**

Heat Map of Beneficiaries

Exhibit 1: Heat map of beneficiaries

Company name	Business model	Why it benefits?
Tier 1: Direct, High-Conviction Beneficiaries		
	World-leading battery cell manufacturer with growing system-level ESS integration (data center dominance)	CATL captures value across cell manufacturing, system design, and increasingly software-enabled storage solutions. Its scale, cost leadership, and readiness to commercialize sodium-ion batteries position it to drive ESS LCOE materially lower, expanding adoption across AI data centers and grids.
	Vertically integrated ESS system provider (Megapack) with rapid deployment capability	Tesla is a leading AC-side integrator for grid-scale and data-center storage, capturing full-system economics and benefiting from time-to-power urgency in AI infrastructure.
	Tier-1 global battery cell supplier with strong exposure to stationary storage and long-term utility contracts	LGES monetizes ESS growth through long-duration cell supply and stable OEM relationships, offering leveraged but lower-risk exposure to ESS volume expansion.
	Pure-play ESS system integrator and software platform (hardware-agnostic)	Fluence monetizes ESS adoption through turnkey deployment, digital optimization, and long-term services—well aligned with AI data centers' need for reliability, flexibility, and fast response
	Vertically integrated battery and ESS manufacturer with strong DC-side presence	BYD captures cell-to-system margins and benefits from large-scale ESS rollout in China and emerging markets tied to AI and grid stability
Tier 2: Enablers & Upstream Leverage		
	Advanced battery cell manufacturers with optionality in stationary storage	Participation in ESS expansion via high-performance chemistries, though capital allocation remains partially anchored to EV cycles
	Upstream lithium resource and processing supplier	ESS growth diversifies lithium demand away from EV cyclicality, improving long-term volume visibility
	Electrolyte, cathode, and anode material suppliers	ESS deployment supports incremental materials demand, but value capture remains indirect and chemistry-dependent
		
Tier 3: Grid & Electrical Components		
	Global electrical equipment and grid automation provider	Incremental demand from ESS-related substations, converters, and grid reinforcement, but exposure is diluted across a broad industrial portfolio
	Transmission, distribution, and control equipment	ESS deployment drives incremental grid capex, though AI-linked ESS is not yet a dominant revenue driver

Source: Morgan Stanley Research

Exhibit 2: Bull/base/bear case for ESS shipment forecasts

Scenario	ESS Shipments by 2030	Core Driver	Economics Bias	Key Risk / Catalyst
Bull	>2000 GWh	Larger than expected inference volatility → flexibility becomes mandatory	LCOE down / IRR up (scale + chemistry optionality), attractive infra-deferral value	Faster policy monetization; sodium penetration accelerates
Base	1,200 GWh	Steady grid + data-center ESS adoption	"Investable" IRR, gradual cost down	Stable capacity mechanisms; shipments continue > installs
Bear	600 GWh	Policy delay + slower AIDC ramp	IRR pressure (financing/utilization)	Monetization delays; inventory digestion; weaker spreads

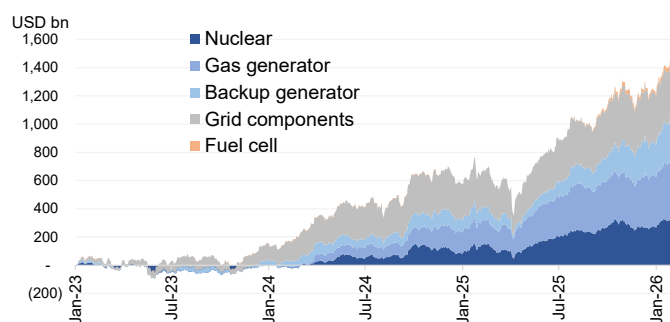
Source: Morgan Stanley Research estimate

Pragmatism vs. geopolitics: Geopolitical concerns that increasingly shape the multipolar EV supply chain should not automatically be transposed onto power-for-AI ESS, in our view, where the strategic calculus is different. AI development can be viewed as strategically critical for national competitiveness. In this context, hyperscalers are more likely to be pragmatic, focusing less on geopolitical signaling and more on securing reliable, scalable and timely energy solutions.

Why Will Power for AI Shift to Energy Storage?

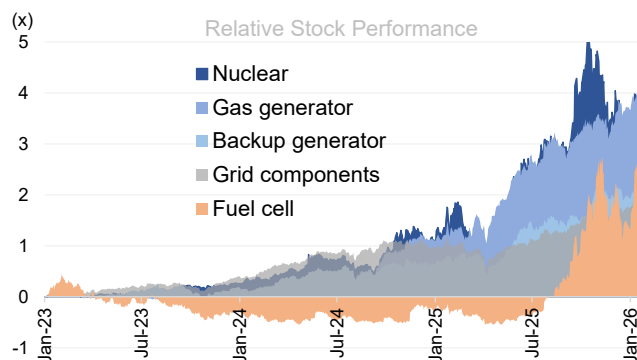
Power for AI has already emerged as a US\$1.5 trillion market value theme, catalyzing a rapid rotation across the power value chain as investors recalibrated around scarcity, time-to-power, and reliability. The first leg of value creation accrued to the nuclear power value chain, as markets priced in base load generation capable of supporting hyperscale AI loads. As deployment timelines and grid constraints tightened, capital rotated toward grid components, backup generators and gas turbines, reflecting the urgency of near-to-medium term capacity and fast-start solutions. More recently, the focus shifted again to fuel cells, which combine high efficiency, modularity, and fast deployment, allowing data centers to bypass grid bottlenecks altogether. Taken together, this sequential rotation, from nuclear to grid facilities, to gas and backup power, and now to fuel cells, illustrates how AI has created a re-rating across the entire power stack worth trillions of dollars.

Exhibit 3: Global Power for AI Basket: >US\$1tr market value accretion



Source: Factset, Morgan Stanley Research

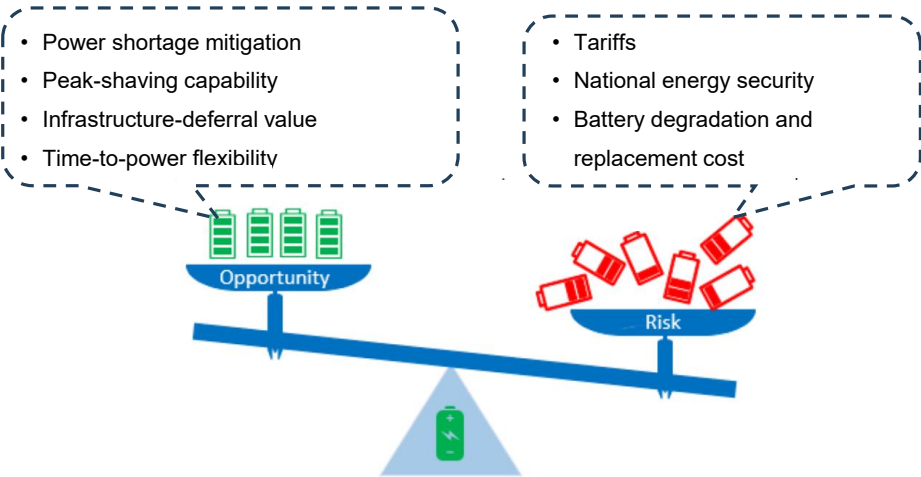
Exhibit 4: Segment rotations from nuclear, gas/backup generators to fuel cells; the next opportunity should be energy storage



Source: Factset, Morgan Stanley Research

In an increasingly power-constrained world, AI workloads are structurally changing the shape of electricity demand. As inference scales and workload become more user-facing - search, enterprise software, autonomous driving as well as many other real-time applications, power demand will likely become more volatile, spikier and less predictable. These inference-driven loads create sharp peaks rather than steady base load requirements, increasing the value of peak-shaving and fast-response capacity. Energy storage systems are uniquely suited to absorb this volatility – modular and rapidly deployable, able to respond rapidly to sudden load ramp, smoothing peaks without requiring overbuilding of generation or transmission infrastructure, and deferring irreversible investments. As inference inflects, this flexibility should move from a “nice-to-have” to a system-level necessity, in our view.

Exhibit 5: Opportunities and risks of ESS in Power for AI



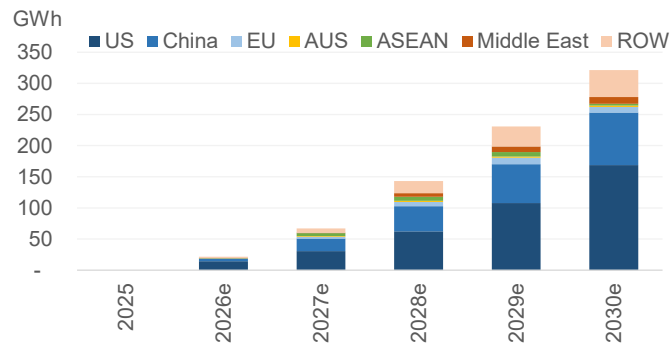
Source: Morgan Stanley Research

We forecast a meaningful ramp up in ESS demand from data centers over the next five years, driven by two structural forces.

1. The rapid growth of AI inference workloads is making power demand more volatile and peak heavy, increasing the need for ESS to perform peak-shaving and smooth sudden load spikes.
2. ESS is increasingly being deployed as a practical mitigation to traditional power capacity constraints, including limited availability of gas turbines, grid congestion, and long interconnection timelines.

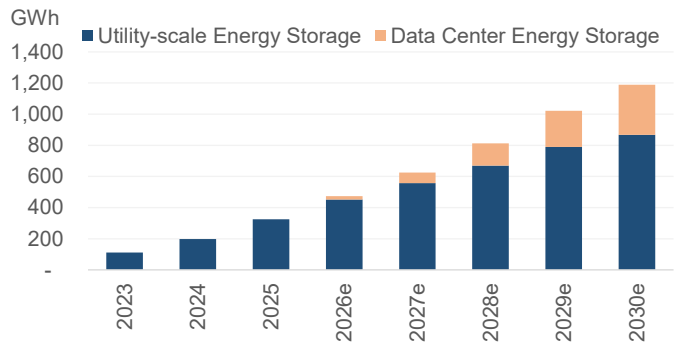
Taken together, these dynamics support a step change in adoption: we estimate annual incremental ESS deployment linked to data centers could reach ~321 GWh by 2030, implying a doubling of current ESS demand as storage becomes a core component of AI power infrastructure rather than an ancillary addition.

Exhibit 6: Global ESS annual incremental deployment forecast for data centers



Source: Rystad, Morgan Stanley Research (e) estimates

Exhibit 7: ...including utility-scale ESS in power market

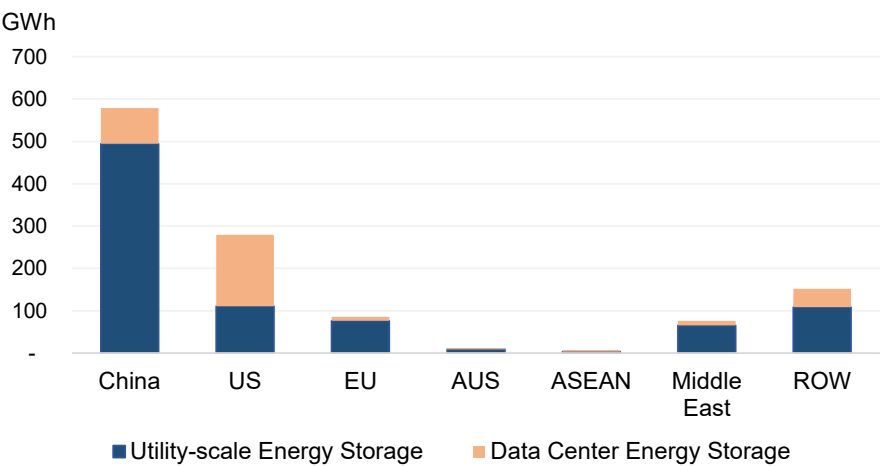


Source: Rystad, Morgan Stanley Research (e) estimates

Utility-scale ESS deployment in power markets is set to continue its strong growth trajectory over the next five years, led primarily by China and the US. In China, policy support, renewable overbuild, and grid stability requirements are driving large scale storage to be paired with both new and existing generation, while in the US, tightening

reserve margins, rising peak demand, and accelerating data center loads are making ESS an increasingly core grid asset rather than a marginal add on. Across the world, we believe batteries will be deployed to address capacity adequacy, price volatility and system flexibility in power markets, positioning itself as one of the fastest-growing components of the power infrastructure build out through the end of the decade.

Exhibit 8: Global ESS battery sales forecast for 2030 and geographic breakdown



Source: Morgan Stanley estimates

Capacity Constraints Today

Rising demand for power from both data center and non-data center

We see global power demand (in TWh) rising at at 3.8% CAGR in 2025-30, driven by a 3.2% CAGR in non data center power demand and a 21% CAGR in data center power demand in the period. The rapid rise in demand for power requires installed capacity from all sources of power generation to expand in a timely manner to ensure a stable power supply. In reality, we're facing potential bottlenecks in adding new generation capacity for a variety of reasons, including environmental concerns (coal generation), potential safety hazards (nuclear generation), and upstream production capacity constraints (gas turbines). Considering all these factors, we believe not being able to add generation capacity quickly enough to meet the growing demand for power has become an imminent risk, particularly to the development of AIDC (AI data centers), which require stable and intensive power supply in the near future.

Exhibit 9: Total global power demand to rise 3.8% CAGR in 2025-30e

Power Demand	2023	2024	2025e	2026e	2027e	2028e	2029e	2030e
Data Center power demand (TWh)	451	534	707	884	1,072	1,298	1,549	1,862
Non Data Center power demand (TWh)	26,515	27,596	28,433	29,403	30,377	31,339	32,305	33,231
Total Power Demand (TWh)	26,967	28,130	29,141	30,286	31,449	32,636	33,854	35,093
Power Generation	2023	2024	2025e	2026e	2027e	2028e	2029e	2030e
Total Power generation (TWh)	29,963	31,256	32,323	33,541	34,805	36,100	37,435	38,842
Coal (TWh)	10,461	10,613	10,311	10,253	10,163	10,047	9,928	9,793
Installed Capacity (GW)	2,141	2,150	2,199	2,247	2,304	2,347	2,402	2,445
Load Factor	1	1	1	1	1	0	0	0
Nuclear (TWh)	2,738	2,818	2,868	2,934	3,012	3,101	3,198	3,265
Installed Capacity (GW)	395	402	409	417	429	439	452	458
Load Factor	1	1	1	1	1	1	1	1
Renewables & Others (TWh)	9,955	10,824	12,026	13,105	14,189	15,219	16,265	17,335
Installed Capacity (GW)	4,655	5,315	5,983	6,669	7,285	7,891	8,514	9,135
Load Factor	0	0	0	0	0	0	0	0
Natural Gas (TWh)	6,810	7,001	7,118	7,250	7,441	7,732	8,044	8,448
Installed Capacity (GW)	1,809	1,833	1,870	1,906	1,947	1,992	2,039	2,090
Load Factor	0	0	0	0	0	0	0	0
CCGT Heatrate (BTU/kwh)	7,486	7,494	7,554	7,586	7,639	7,655	7,683	7,705

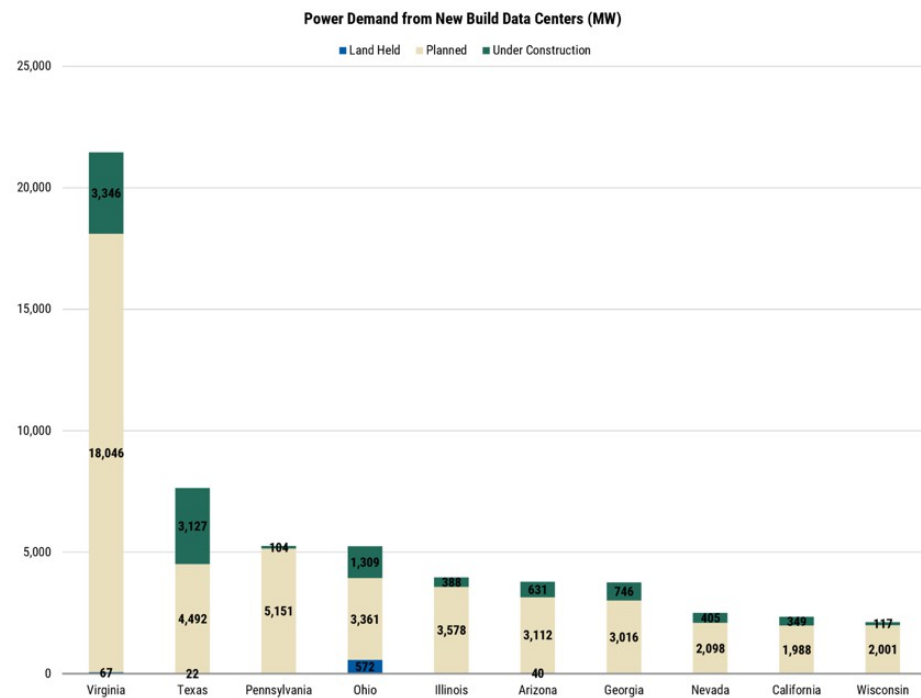
Source: Morgan Stanley research (e) estimates

US sees higher risk of power capacity constraints

Due to the size of AIDC deployment/planning, as well as the infrastructure conditions, we see higher risks of power capacity constraints in the United States. The concentration of data centers in certain states may cause further constraints considering the limited interconnections of grids in different regions.

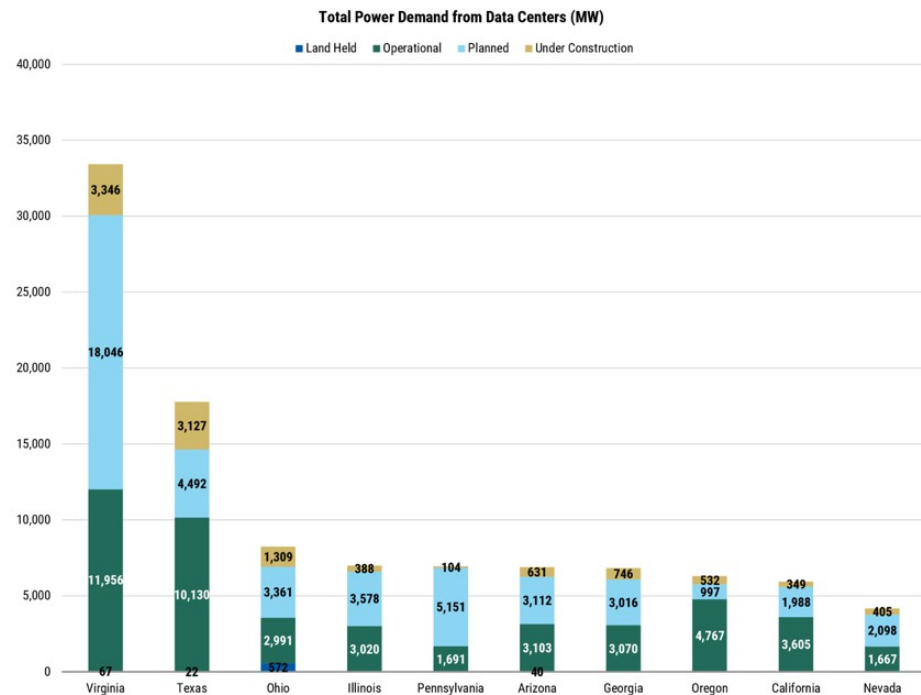
Our Global Tech and Utilities team estimates that total US data center power demand in 2025-28 will amount to 74GW. After exhausting available grid access and new "Time to Power" solutions, the potential net power shortfall in 2025-28 could still range from 9-18GW.

Exhibit 10: US power demand from new build data centers, by state (MW)



Source: EIA, 451 Research, Morgan Stanley Research

Exhibit 11: US total power demand from all data centers, by state (MW)



Source: EIA, 451 Research, Morgan Stanley Research

For more details on these charts, please see [AI Infrastructure: Identifying Key Beneficiaries Across the Natural Gas Value Chain from AI/Data Center Development](#) (19 Feb 2026).

Exhibit 12: Potential net power shortfall from 2025-28 is 9-18GW after exhausting all power solutions

Total US Data Center Power Demand (GW), 2025-28	74
Less Data Centers Under Construction	(10)
Less Utility Grid Access	(15)
Power Shortfall Before New "Time to Power" Solutions	49

	Low End	Midpoint	High End	Probability of Success
Solution #1: Nat Gas Turbines	15	18	20	90%
Solution #2: Bloom Energy Fuel Cells	5	7	8	90%
Solution #3: Site DC at Op'l Nuclear Plant	5	10	15	75%
Solution #4: Convert Bitcoin Sites	10	13	15	90%
Probability-Weighted "Time to Power" Solutions thru 2028	31	40	50	
Net Shortfall Through 2028	(18)	(9)	None	
Shortfall as a % of 2025-28 US DC Deployments	25%	12%		

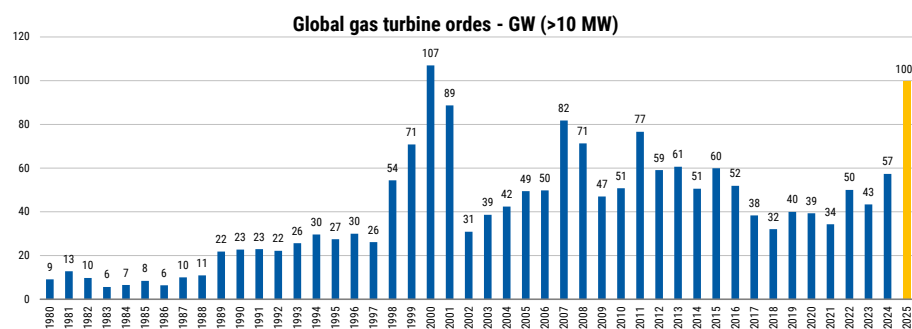
We believe the most likely outcome skews towards the low end of our range

Source: Morgan Stanley research estimates

We discuss all new "Time to Power" solutions in detail below. For all these solutions, there are pros and cons.

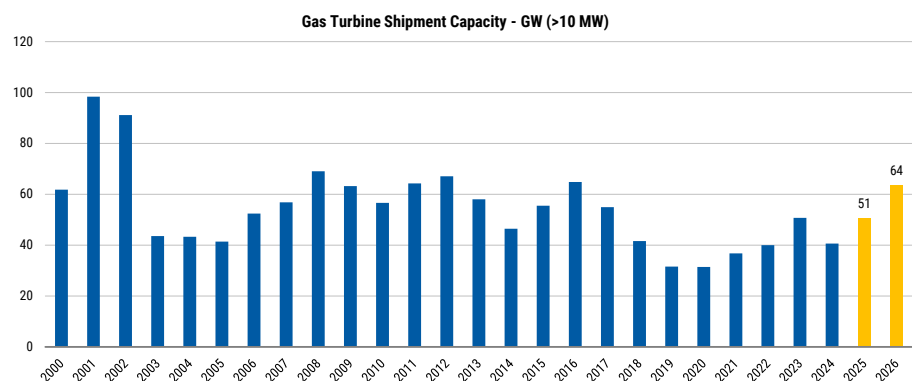
Natural gas turbines – supply shortage: Natural gas turbines are a reliable source of power for AI data centers. Their rapid response times make them an ideal solution to the potentially highly variable loads of AI data centers. As a result, demand for gas turbines has been surging. In the meantime, the production capacity of gas turbine manufacturers is not expanding as rapidly, due to a relatively stable competitive landscape and the long lead time required to add scalable new capacity. As a result, gas turbine manufacturers are reporting multi-year high order backlogs, with delivery lead times of up to five years. We take GE Vernova, the largest gas turbine manufacturer globally, as an example. The latest update from the company's earnings results show that quarterly signings peaked at 24 GW in 4Q and averaged ~14 GW through the year, and the company has officially sold out of 2028 capacity and is actively signing 2029-2031 deliveries. By the end of 2025, management expected the backlog to sit at 100 GW (vs ~24 GW of planned capacity in 2028). Pricing continues to move higher on new orders, with "the price growth in the fourth quarter [of 2025 being] substantially more than the price realized in the first three quarters [of 2025]" and in recent meetings the company noted that \$3,000/kW pricing for CCGT orders could be realized in the foreseeable future. For more details on the latest update from GE Vernova, please refer to [4Q25 Results: Strong Demand Continues](#) and [MS Energy & Power Conference – Takeaways on Power, Utilities and Clean Tech Stocks](#).

Exhibit 13: Global gas turbine orders: 100 GW of new orders were recorded in 2025, the best year since 200 (107GW), and also ~100% higher than the 20-year average of 52GW



Source: McCoy data, Morgan Stanley Research

Exhibit 14: Shipment (MW): 64GW of capacity is contracted (firm order) for 2026 shipment (i.e. delivery)



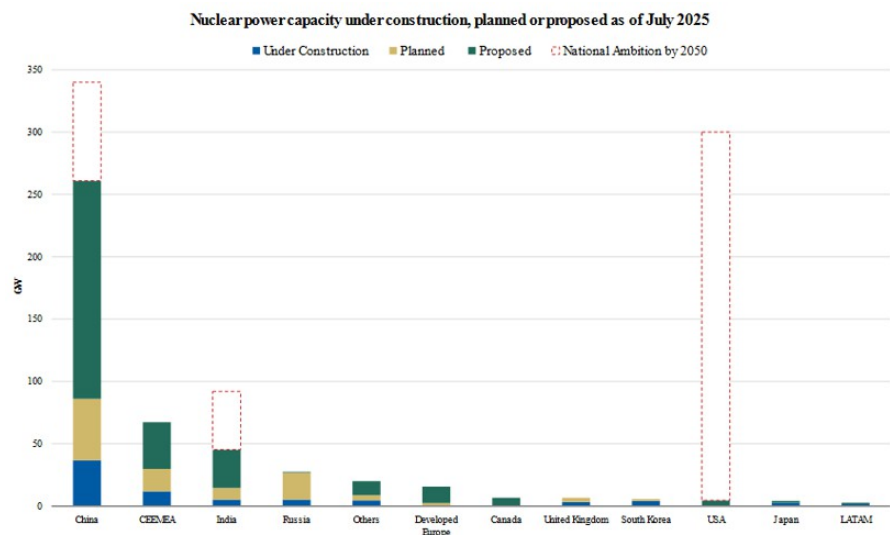
Source: McCoy data, Morgan Stanley Research

Fuel cells brought back online: Fuel cells (behind-the-meter) can be an immediate solution to the power needs of AI data centers as they can deliver scalable, fast, clean and reliable energy. Fuel cells with *supercapacitors* can accommodate extreme variability in AI data center demand very quickly, just like batteries do. Fuel cells can be deployed in less than a year and do not require connectivity to the grid as they're used behind-the-meter. In addition, fuel cells are more efficient than gas turbines. According to California-based SOFC manufacturer, Bloom Energy, solid oxide fuel cells (SOFCs) – a type of fuel cell system used for powering AI data centers – generate heat, and it's possible to capture that heat and use it. By combining heat and power applications, fuel cell efficiency rises from 54% to over 90%, and fuel cells can be integrated with absorption chillers, and thus generate chilled water to run through the liquid cooling loop, according to the company. This can drive a 10% to 15% improvement in the power usage effectiveness (PUE) value of fuel cells, which is an important sustainability metric for any data center. The technology is firmly established in the market, with more than 1.5GW of Bloom Energy fuel cells deployed across over 1,200 sites globally, including hundreds of megawatts powering data centers. The company has secured several high profile counterparties in 2025 and is expected to extend its momentum, with a focus on expanding the project sizes at current partners like Oracle and Brookfield. (For more details, please see [Clean Tech: 2026 Outlook: Leaning into Stronger Demand \(16 Dec 2025\)](#)). We note that one disadvantage

of fuel cells is their high upfront cost.

Nuclear plants, small modular reactors (SMRs): Nuclear plants and small modular reactors can be potential solutions to powering AI data centers. However, deployment can take considerably longer than other power solutions. Our Global ESG teams sees incremental nuclear supply in the US, Japan and China, and they are more constructive on opportunities in the US and Japan. Restarts and life extensions remain the fastest pathways to adding reliable nuclear capacity, but execution risk and regulatory discipline will determine how much capacity is ultimately created. As for SMRs, the opportunities are becoming increasingly selective. While demand from hyperscalers and governments is supportive, we believe only a limited number of projects – those with clear regulatory pathways, credible financing structures, and strong sponsors – are likely to progress meaningfully over the next few years. For more details on nuclear generation, please refer to [Global Thematics and Sustainability: The Nuclear Renaissance Is Here – What's Next? \(12 Aug 2025\)](#).

Exhibit 15: Nuclear power capacity under construction, planned or proposed as of July 2025



Source: World Nuclear Association, data further aggregated and calculated by Morgan Stanley Research. *Planned = Approvals, funding or commitment in place, mostly expected to be in operation within the next 15 years. Proposed = Specific programme or site proposals; timing uncertain.

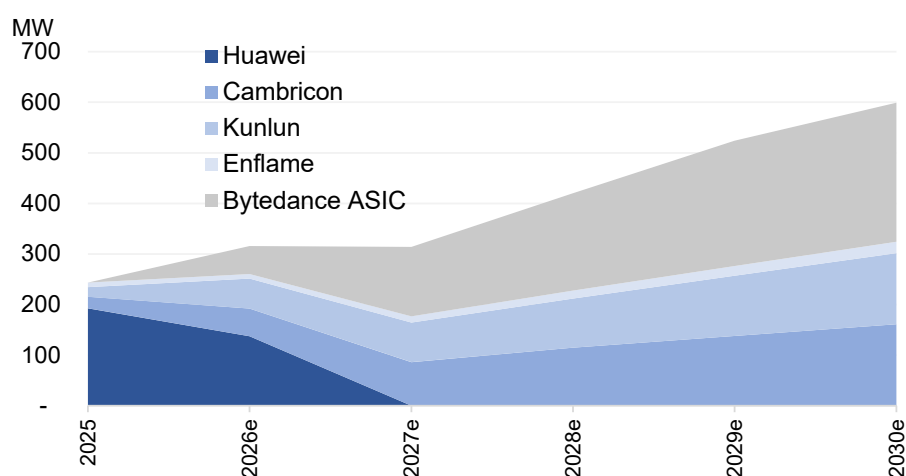
Bitcoin site conversions: We believe that converting existing Bitcoin data mining operations to AIDC facilities represents an attractive proposition, especially given the time-to-power advantage Bitcoin miners can offer. In addition, Bitcoin-to-DC conversions look attractive due to the relatively large scale of Bitcoin mining sites combined with the declining economics of Bitcoin mining (owing to the scheduled Bitcoin halving, with the next one coming in 1H28). These conversion transactions provide faster "time to power" for data center developers relative to other options for a few reasons. First, because power access has already been secured, there is no wait time for grid interconnection to be approved (and in many US power markets, wait times can exceed 5 years). We believe it may be advantageous for data center developers to install significant (4+ hours) energy storage onsite, so that data centers can offer similar "grid flexibility" to the demand response activity that Bitcoin mining companies voluntarily enter into. Data center

development is quickly becoming a NIMBY (not in my backyard) issue in the United States with communities increasingly pushing back and getting projects cancelled. Companies must find ways to address local concerns about environmental and water-related externalities, while also ensuring that consumers are insulated from potentially higher electricity bills. We view repurposing Bitcoin company power access as an attractive approach to addressing concerns about rising power prices from data center growth. For more details on bitcoin site conversions, please refer to [Bitcoin Mining/Data Center Development: Initiating Coverage of 3 Bitcoin Stocks with Data Center Conversion Upside \(8 Feb 2026\)](#).

Inference Inflection Is Challenging Power System Flexibility

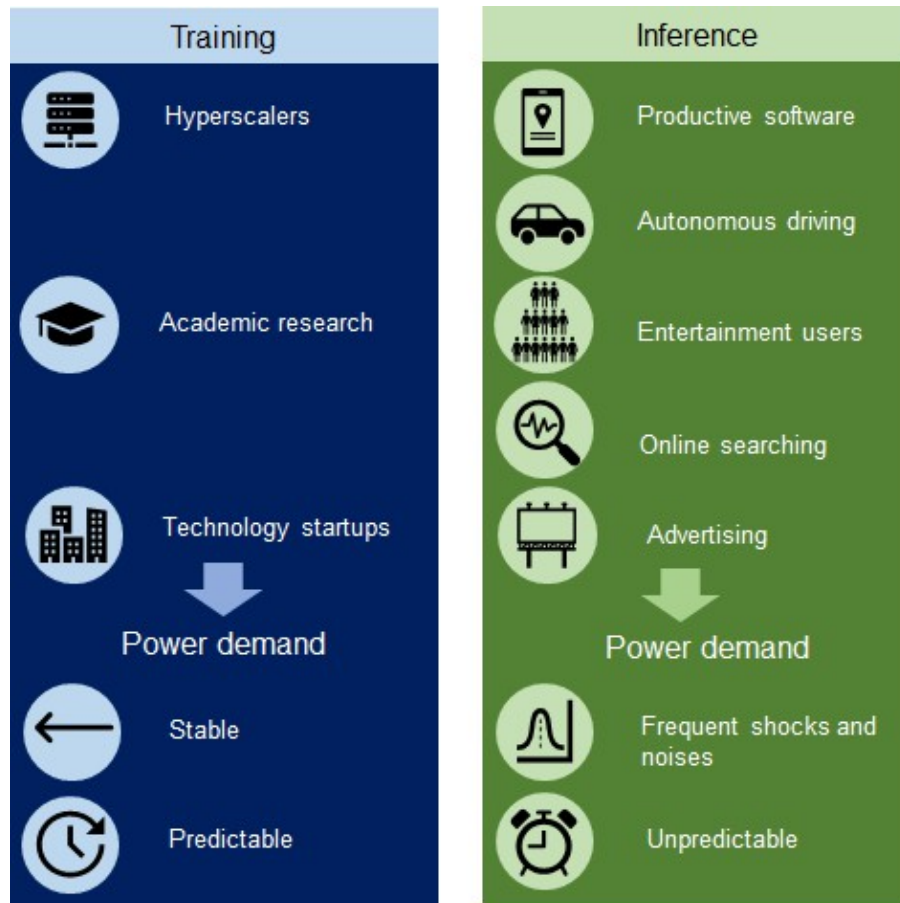
Inference demand is approaching an inflection point: Unlike training workloads, which are episodic and can be scheduled (they can be shifted in time, located where power is cheapest, and paused or stopped if needed) inference runs continuously and close to end users, creating persistent, latency-sensitive and highly volatile load profiles. As AI becomes embedded in search, advertising, productivity software, autonomous systems, and real-time decision engines, inference will scale with end user activity, which is unpredictable, as opposed to predictable, model-development cycles.

Exhibit 16: China's inference capacity potential



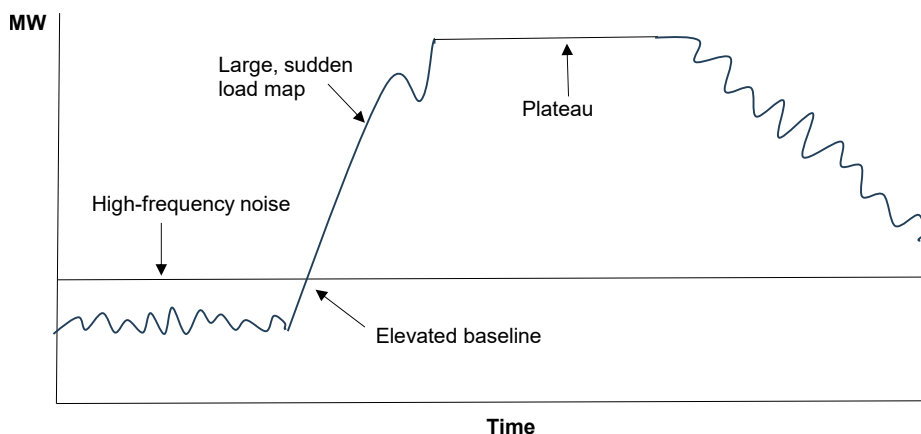
Source: Company data, Morgan Stanley Research (e) estimates

System flexibility is becoming crucial: As AI applications increase across search, productivity, commerce, and real-time decision making, inference traffic should scale non-linearly, driving sharp intra-second and intra-hour power swings that existing grids and conventional generation were not designed to absorb. Traditional grids and thermal generation fleets were designed to manage predictable peaks, not continuous micro-peaks layered on top of a high baseload. This shift elevates flexibility – fast response resources, storage and demand-shaping – into a binding constraint: without sufficient flexibility, adding capacity alone risks grid instability, curtailment, and stranded investment. As a result, the next phase of AI power build out will be defined less by how much electricity can be generated, and more by how effectively the system can smooth, buffer, and respond to inference-driven volatility in real time, in our view.

Exhibit 17: Power consumption shifting from training workload to inference

Source: Morgan Stanley Research

Traditional grids and thermal generation fleets were designed to manage predictable diurnal peaks, not continuous micro-peaks layered on top of a high baseload. As inference volumes compound, the binding constraint becomes the system's ability to absorb and respond to volatility, not its nameplate capacity.

Exhibit 18: How inference causes volatility - large and sudden load ramp, high-plateau peaks and high-frequency noise**Power demand fluctuation curve of inference**

Source: Morgan Stanley Research

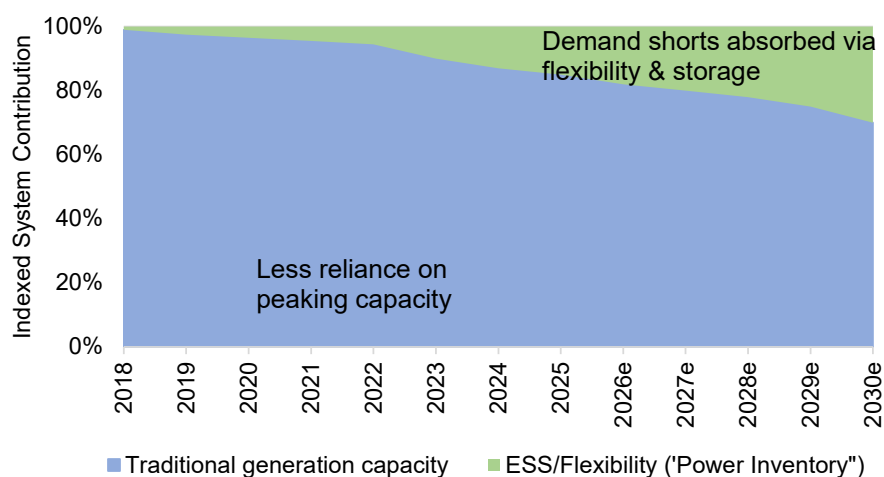
Why ESS Is Becoming Critical in Power for AI

A mismatch between "how power systems are built" and "how AI consumes electricity":

Generation assets, whether gas, nuclear, or renewables, are optimized for energy delivery over hours and days, not instantaneous balancing. Ramping limits, minimum load requirements, and startup constraints mean that adding more capacity does little to address short-cycle instability. Without sufficient flexibility, grids face a growing risk of frequency deviations, voltage stress, and forced curtailment outcomes that are unacceptable for inference workloads that demand near-perfect uptime. In effect, inference growth exposes a mismatch between how power systems are built and how AI consumes electricity.

Energy storage, acting as the "inventory of power", can significantly mitigate this mismatch. It is less about replacing generation outright and more about re-balancing the system toward flexibility, ensuring power markets can absorb demand shocks and structural change without repeating the historical cycle of overbuilding and stranding capacity.

Exhibit 19: Power system rebalancing: from capacity build to flexibility



Source: Morgan Stanley Research (e) estimates. **Note: the chart is indexed and illustrative, not a forecast of absolute MW or GWh. Its purpose is to show system balance, not volumes.

From "build ahead of demand" to "buffer demand with inventory"

1) ESS behaves like inventory, not capacity

Just as in commodity markets, inventory is used to smooth short-term imbalances while avoiding costly over-investment in fixed assets. ESS stores surplus power and releases it during stress events, allowing the system to handle volatility without structurally overbuilding generation.

2) Demand shocks are becoming more frequent and less predictable

AI, electrification, weather volatility, and renewable intermittency have shifted the problem from “average demand growth” to intra-day and intra-hour volatility. Storage directly targets this problem; generation does not.

3) Falling ESS costs change the optimization function

With storage costs declining rapidly, it is increasingly cheaper to: 1) add incremental flexibility, 2) defer grid upgrades and 3) avoid low utilization peaking assets.

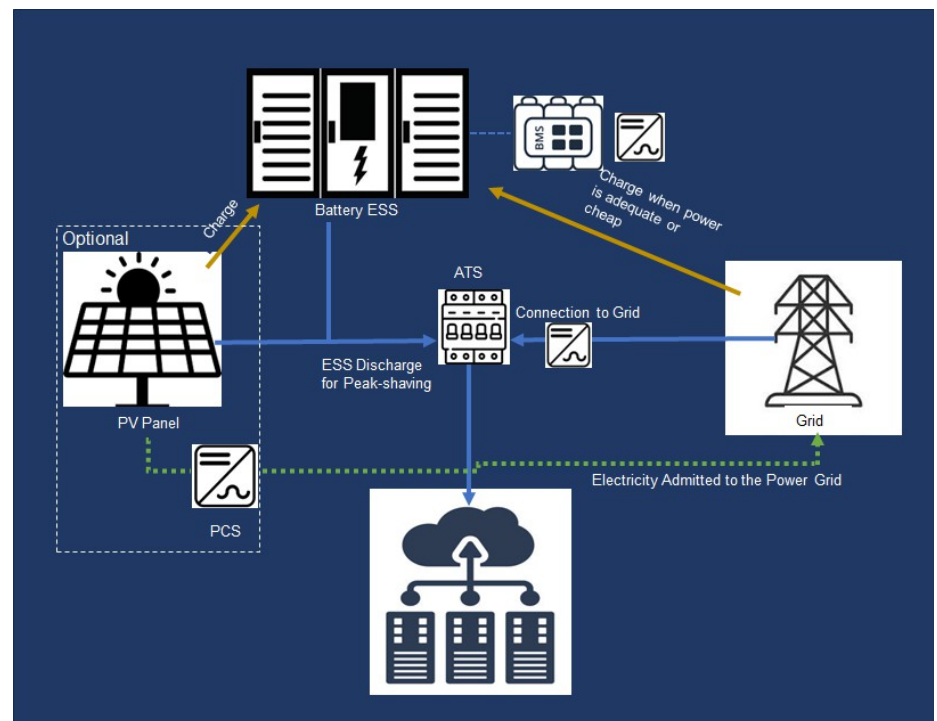
4) Capacity is irreversible; flexibility is optional

Once generation or grid capacity is built, the system must live with it through the cycle. ESS, by contrast: 1) can be scaled modularly; 2) can be redeployed; and 3) can serve multiple functions (arbitrage, reserves, reliability). That optionality is exactly why commodity industries prefer inventory over capacity when demand is volatile.

5) ESS is inherently well suited for peak shaving of inference

Inference features a high-plateau peak with sudden load ramp. ESS can decouple electricity consumption from real time grid supply. ESS charge during off peak periods, whenever power is adequate and demand and prices are low, and discharge instantaneously as inference ramps, when demand spikes and electricity is most expensive. By doing so, storage directly reduces a facility's maximum grid draw, effectively "shaving" the top of the demand curve and lowering peak related costs such as demand charges and capacity charges.

Exhibit 20: How energy storage works with data centers and grids



Source: Morgan Stanley Research

6) Responses in milliseconds to high-frequency noises

Unlike conventional generation assets, energy storage responds within milliseconds, making it particularly effective at addressing short duration but high magnitude demand spikes that drive peak load. This fast response allows storage to smooth volatility without overbuilding base-load generation or transmission infrastructure, which is typically designed for average rather than peak demand.

7) Location-independent and modular

Energy storage is also location agnostic and modular, allowing it to be deployed directly at load centers, such as data centers, industrial facilities, or commercial buildings, where peak demand occurs. This behind-the-meter placement enables peak shaving without relying on grid level reinforcements, while simultaneously improving power quality and system resilience.

From a “nice-to-have” to a system-level necessity

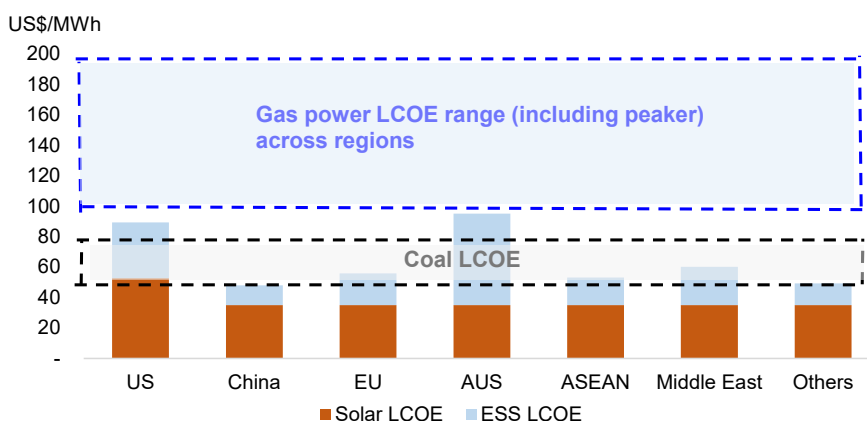
As inference inflects, flexibility will move from a “nice-to have” to a system level necessity, in our view. Energy storage, fast-acting demand response, and intelligent load shaping become the primary tools for maintaining stability, because they operate on the same timescales as inference volatility. Storage can buffer instantaneous spikes, smooth load ramps, and decouple real time AI demand from slower moving generation. Importantly, this flexibility does not replace generation; it protects and enhances the value of existing capacity by allowing it to run more steadily while storage absorbs the noise created by inference-driven load swings.

Over time, we believe this dynamic will reshape planning and investment priorities. If inference demand continues to scale as we expect, power systems that focus only on adding capacity will likely find themselves overbuilt yet unstable, being long on megawatts but short on control. Systems that invest early in flexibility, by contrast, will be better positioned to integrate AI growth without sacrificing reliability or over-committing capital. In this sense, the inference inflection marks a turning point: the challenge of powering AI shifts decisively from “how much power can we build?” to “how flexibly can we deliver it, moment by moment?”

Economies

ESS projects have already reached cost parity with other energy alternatives (i.e. gas peaker, specifically), based on our study of alternative energy costs in different regions. We have also calculated the IRR of ESS projects in each region, which led to a similar conclusion: ESS projects are becoming economically attractive around the globe, irrespective of whether the demand is from utility-scale projects or datacenter projects

Exhibit 21: Solar integrated ESS LCOE across regions vs. gas power LCOE across regions



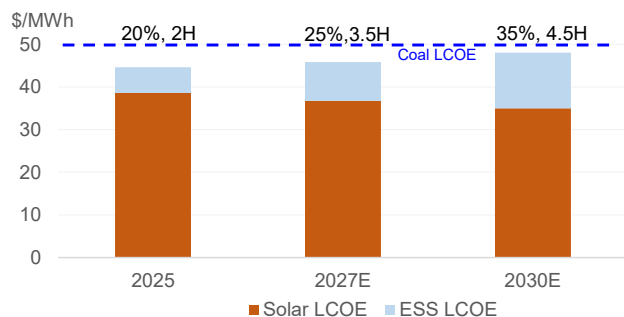
Source: Morgan Stanley Research estimates

China

Utility-scale projects

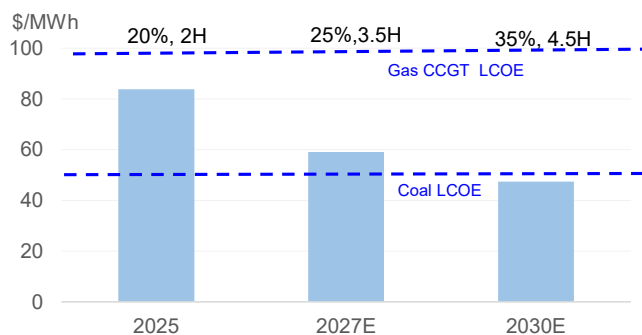
LCOE: We use a required IRR of 8% to calculate the required revenue and therefore the LCOE of solar integrated ESS projects and standalone ESS projects. For solar integrated ESS projects, our results show an LCOE range of US\$44.6–48/MWh (with an attach rate of 20–35% and duration of 2–4.5 hours), which is on par with coal fired generation in China. For standalone projects, we estimate the LCOE will still exceed coal fired generation at the moment, with the potential to reach cost competitiveness by 2030. In both cases, the LCOEs remain lower than gas fired generation (for base load) and gas peakers.

Exhibit 22: China solar integrated ESS LCOE



Source: Morgan Stanley Research (E) estimates

Exhibit 23: China standalone ESS LCOE

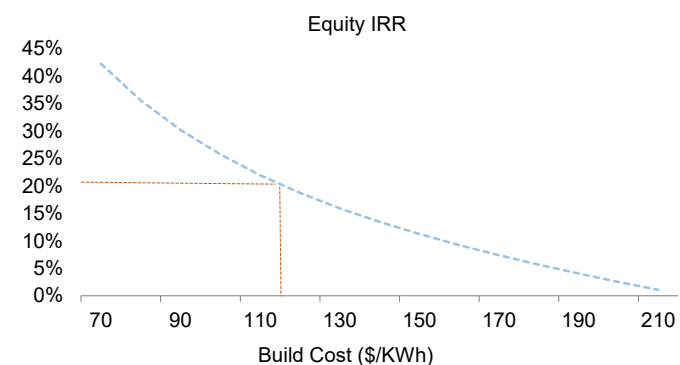


Source: Morgan Stanley Research (E) estimates

IRR: Capacity price has become an important component of ESS project profit after five provinces launched capacity compensation in 2025. We expect capacity revenue policy to be rolled out nationwide gradually in 2025. We use the previous capacity revenue policy in Ningxia as the base for our calculations for utility-scale projects in China. In Ningxia, the capacity revenue for an ESS project is Rmb165/KW/year, so we estimate capacity revenue will constitute ~30% of total utility-scale ESS project revenue each year. The remaining 70% of revenue comes from peak-shaving and ancillary services. With capacity price support, we estimate domestic utility-scale projects can generate an unlevered IRR of 13%; with 50% leverage, project IRR increases to 22%.

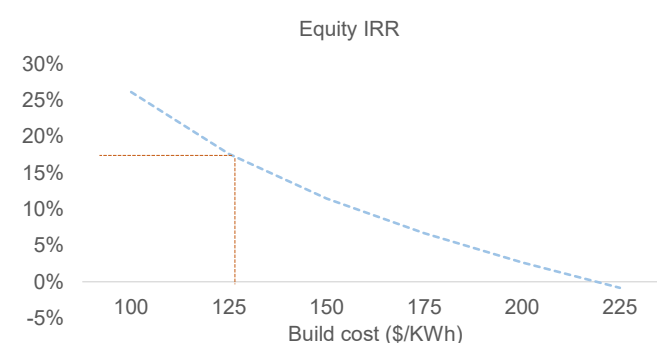
Data centers: In this case, we assume the data center ESS project is behind the meter and can arbitrage electricity price differentials for end users. This is the sole revenue source for such projects. We assume a peak-off peak price differential of ~Rmb0.98/kWh and a 15 year system life, which yields an unlevered IRR of 23% and a levered equity IRR of 36% (50% debt and 50% equity).

Exhibit 24: Equity IRR sensitivity - China utility-scale ESS project



Source: Morgan Stanley Research estimates

Exhibit 25: Equity IRR sensitivity - China utility-scale ESS project

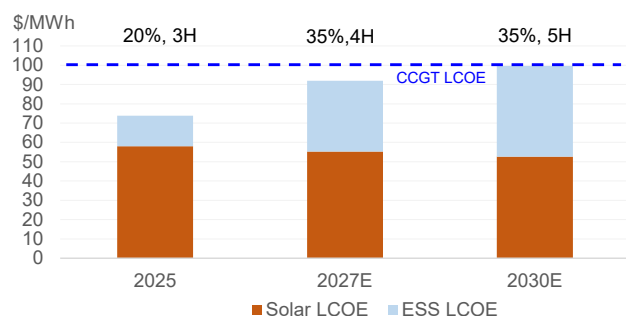


Source: Morgan Stanley Research estimates

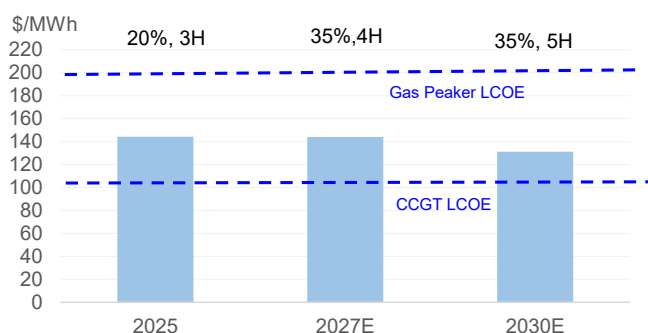
US

In our calculation, we assume all ESS projects are still entitled to an ITC of 30% on initial investment.

LCOE: Due to higher initial capex and a higher required IRR, the LCOEs of both solar integrated ESS projects and standalone ESS projects are materially higher than in China. We estimate solar integrated ESS projects have an LCOE of US\$74–100/MWh as attach rates and duration hours increase. On average, we estimate standalone ESS project LCOE with varying durations will range from roughly US\$100–140/MWh. This level varies significantly by region given different market compensation structures, and we would consider this LCOE level to be the full revenue requirement of the battery system since it doesn't assume any ancillary revenue or capacity revenue separately. In regions with revenue streams from these markets, the breakeven LCOE from power prices would be meaningfully lower. Solar+storage is highly competitive with natural gas generation, and standalone storage is competitive vs. gas peaking plants. Competitiveness of battery storage vs. CCGTs will depend on individual market characteristics and gas prices.

Exhibit 26: US solar integrated ESS LCOE

Source: Morgan Stanley Research estimates

Exhibit 27: US standalone ESS LCOE

Source: Morgan Stanley Research estimates

IRR

Utility-scale projects

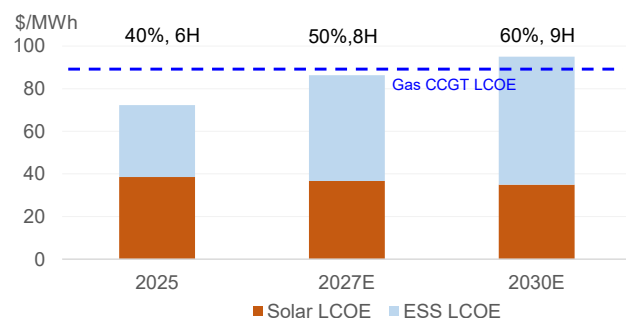
Our US Power & Utilities team forecasts that utility scale ESS projects target unlevered IRR and equity IRRs of high single digits and mid-teens, respectively, supported by 30% base ITC on initial investment. It is worth noting that the LCOE range varies widely across the US due to different state policies, incentives, power prices, among other factors. Generally speaking, to reach an acceptable IRR, standalone BESS projects need operate in regions where pricing swings at least ~\$100/MWh from peak to trough, which is largely only available in ERCOT and CAISO (the largest BESS markets in the US).

Data centers

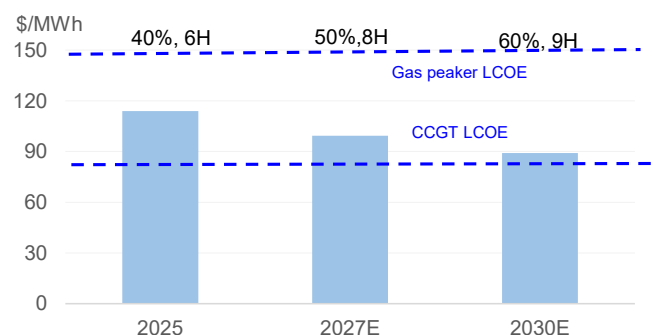
For data centers, ESS project revenue comes mainly from behind the meter electricity price arbitrage. We estimate this arbitrage can generate an unlevered IRR of HSD and a mid-teens levered IRR, similar to that of utility-scale projects.

Australia

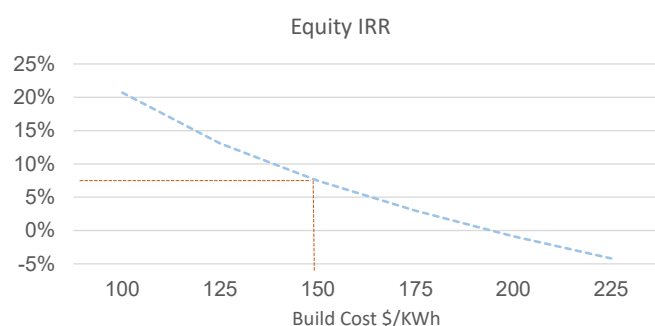
As for Australia, we think ESS demand will also be driven mainly by utility scale projects. We assume a longer duration (6–9 hours) given better arbitrage opportunities in the region. Our results show the LCOE of solar integrated ESS at US\$72–95/MWh, and standalone ESS project LCOE at Australia \$89–114/MWh. Both ranges can be competitive with gas fired generation LCOE of ~US\$86/MWh in the region.

Exhibit 28: Australia – solar integrated ESS LCOE

Source: Morgan Stanley Research estimates

Exhibit 29: Australia – standalone ESS LCOE

Source: Morgan Stanley Research estimates

Exhibit 30: Equity IRR sensitivity – Australia utility-scale ESS project

Source: Morgan Stanley Research estimates

Exhibit 31: Equity IRR sensitivity – Australia AIDC ESS project

Source: Morgan Stanley Research estimates

Middle East

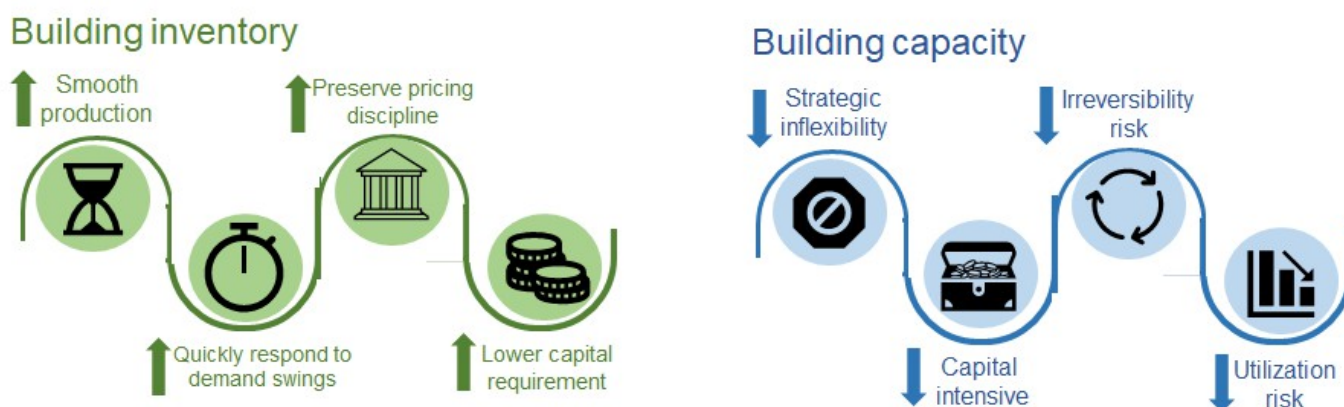
We think the Middle East ESS market will also be driven by utility scale projects. We expect the market to feature high attach rates and long duration hours. We estimate the LCOE of solar integrated ESS projects in the region at US\$63–77/MWh, and standalone ESS project LCOE at US\$89–114/MWh. This appears competitive with gas fired generation LCOE of ~US\$86/MWh in the region.

ESS Cost Advantages Beyond LCOE

A rule of thumb in the commodity world. In the commodity world, companies typically prefer to build inventory rather than incremental capacity to manage demand seasonality, because inventory offers flexibility while capacity is rigid, capital intensive, and slow to reverse. Seasonal demand spikes are often short lived and uncertain, making permanent capacity additions economically risky: once built, capacity carries fixed costs, utilization risk, and potential margin dilution during off peak periods.

On the other hand, inventory allows producers to smooth production, respond quickly to demand swings, and preserve pricing discipline without committing to long term structural oversupply. This behavior is reinforced by long lead times, regulatory hurdles, and high up-front capex of capacity expansion, as well as the historical experience that commodity cycles tend to overshoot, leaving late cycle capacity stranded when demand normalizes.

Exhibit 32: Building inventory is more capital-efficient for managing demand volatility than building capacity in commodity sectors



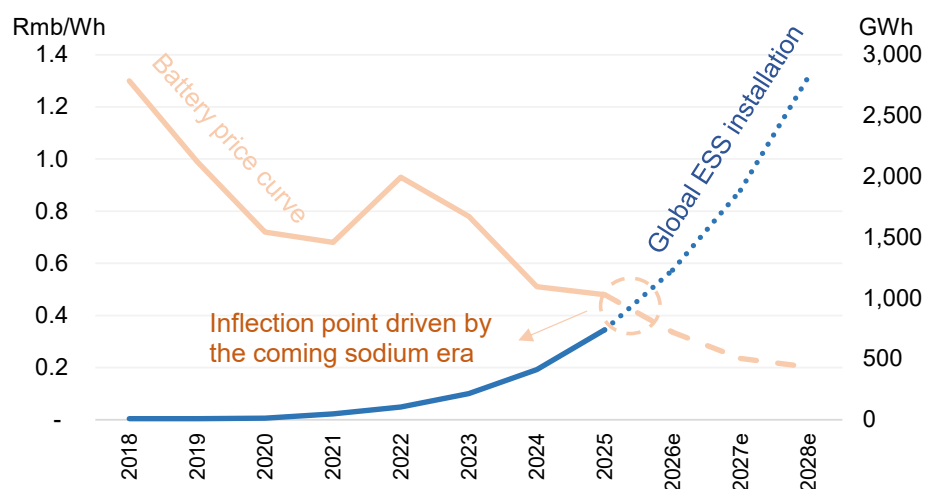
Source: Morgan Stanley Research

Mirroring the power sector. In power systems, ESS functions as “inventory for electricity” – a flexible buffer that can be charged when supply is abundant or cheap and discharged when demand spikes. ESS build-out increasingly mirrors the logic seen in commodity sectors, where firms choose to accumulate inventory rather than expand fixed capacity. Beyond pure economics, ESS offers structural advantages that capacity cannot. Generation and grid assets are capital intensive, slow to permit, and difficult to right size in the face of uncertain demand growth, particularly as load profiles become more volatile with AI, electrification, and renewables. Instead, storage can be deployed modularly and scaled incrementally, allowing system planners and large consumers to respond to demand variability without locking in excess capacity that depresses utilization and returns during off peak periods.

Battery cost evolution materializing “inventory for electricity.” The levelized cost of storage has declined sharply driven by battery cost evolution, with utility scale projects achieving cost parity with power generators (under certain levels of duration across regions). This cost trajectory fundamentally shifts the trade-off between building storage vs. committing to long lived generation plus grid capacity. Battery cost evolution has effectively created “inventory for electricity,” moving the technology from non existent

to scalable over the past five years. We believe the next downward inflection in battery cost will come from sodium ion battery commercialization over the next three years, which will likely reduce ESS upfront cost by 25–30%.

Exhibit 33: Battery cost evolution driving "inventory" building for power



Source: , Morgan Stanley Research estimates

Energy storage creates infrastructure deferral value. Peak demand is the driver of most grid capex. Energy storage can be deployed precisely where and when constraints arise, allowing utilities or large customers to meet peak demand without immediately building new infrastructure:

- Transmission and distribution assets are typically sized for a few hours of annual peak. Storage can shave those peaks, extending the useful life of existing assets and deferring upgrades.
- Optionality under demand uncertainty. Storage provides flexibility when future load growth is uncertain. Instead of committing to a large, irreversible investment today, decision-makers can delay the build until demand materializes, reducing expected capex.

Infrastructure deferral value is typically quantified as: 1) the avoided or deferred capital cost of the traditional infrastructure, 2) adjusted for time value of money (discounting future capex). For example, if a battery allows a \$100m transmission upgrade to be deferred by several years, the expected capex today is materially reduced, generating a positive net deferral value.

ESS infrastructure-deferral value will become increasingly critical as power systems move into a regime defined by volatile, fast growing, and highly concentrated loads. In an environment where grid upgrades, substations, and transmission lines are capital-intensive, slow to permit, and increasingly exposed to forecast error, the ability of energy storage to defer, downsize, or entirely avoid these investments becomes more valuable than incremental improvements in generation cost. As AI inference, electrification, and renewable penetration amplify peak stress rather than average demand, storage acts as "inventory for power," absorbing volatility and allowing existing infrastructure to be utilized more fully. This shifts the economics of system planning away from irreversible capacity build out toward flexible, modular solutions, making ESS not just a reliability tool

but a capital efficiency lever that lowers total system cost and preserves optionality under uncertainty.

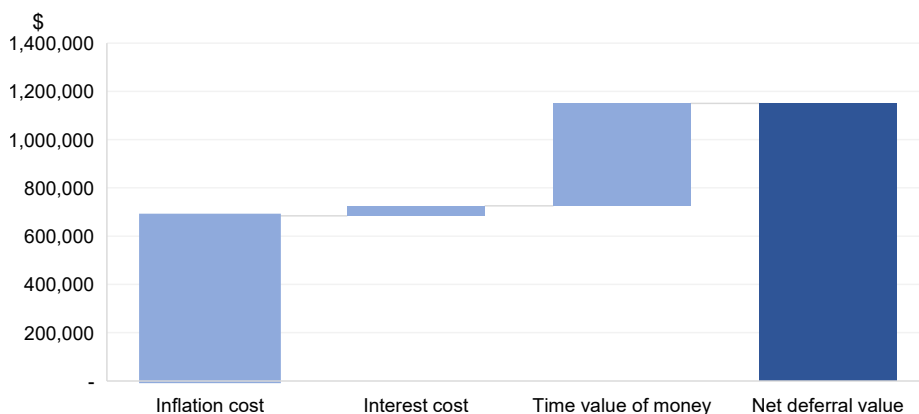
Case study: Quantify the deferral value of a \$10mn capacity expansion investment

ESS can be deployed to defer upfront grid capacity expansion investments. In this case study, we quantify the deferral value of a \$10mn capacity expansion project in the US market. We assume a weighted average cost of capital of 8.2%, with a capital structure comprising 50% debt at an average cost of debt of approximately 6%. The deferred capital expenditure is subject to inflation, which we assume at an annual rate of 3%, and the investment is deferred by five years.

Under these assumptions, a \$10m deferred investment generates an estimated net deferral value of approximately US\$1.15mn. This value consists of \$684,237 from avoided inflationary cost increases, \$41,054 from reduced interest expenses, and \$425,046 attributable to the time value of money. The deferral value represents around 7.5%-12% of the required capacity expansion investment amount.

Applying this framework to a broader system level, [recent approvals](#) granted to the three major US regional grid operators—covering Texas, the Mid-Atlantic, and the Midwest—enable a combined \$75bn of transmission capacity expansion projects. Assuming ESS deployment enables a proportional deferral, this implies potential investment savings of approximately US\$5.6-9 bn.

Exhibit 34: \$10mn investment net deferral value



Source: IEA, Morgan Stanley Research estimates

Going Behind-the-Meter

To bypass regulatory and interconnection hurdles, data center operators are seeking behind the meter solutions to secure power supply. We see solar PV, fuel cells, and gas turbines as viable behind the meter options. Alongside these generation sources, we think ESS can also move behind the meter.

Advantages for power generation to go behind the meter:

- Faster for data centers to go online: Delays in grid connection are one of the biggest concerns for data center operators. Behind the meter generation such as gas turbines and solar PV offers a much faster path to commissioning.

- Stability and less disruption: Behind the meter generation reduces the risk of power shortages or curtailments.
- Opportunity cost savings: Relying on grid supplied power requires significant capex to expand grid capacity. If ESS sits behind the meter, the required grid upgrades are smaller, which lowers overall infrastructure cost.

Challenges in going behind the meter:

- Who bears the cost upfront: Ideally, the grid would invest in capacity upgrades and recover costs through tariffs over time. But given immediate data center power needs, data center operators must fund behind the meter generation and ESS themselves. This adds to already heavy upfront investment.
- Space and land requirements: Datacenters require large power capacity, and powering them fully behind the meter demands substantial space and land for solar PV, ESS, or gas turbines. These land and space requirements are costly.

The Sodium Era Is Coming

CATL has already moved sodium-ion batteries into commercial production, with proven reliability in light commercial vehicles operating across extreme temperature ranges, and has confirmed readiness for broader deployment across multiple sectors. Beyond commercial vehicles, CATL has also disclosed that sodium-ion batteries are being prepared for passenger-car applications, with certified safety standards and performance metrics comparable to LFP, underscoring that this is no longer a lab-stage solution but an industrialized chemistry poised to scale as volumes ramp.

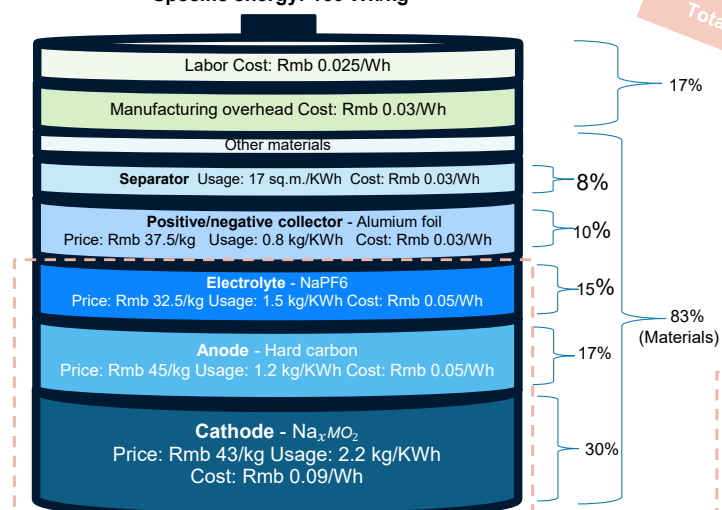
First release of sodium ion battery as a powertrain for light trucks. Sodium-ion batteries are emerging as a promising alternative to lithium batteries following CATL's release of a light truck powertrain solution today. While commercialisation remains non-scalable at this stage, we estimate that the company can achieve cost parity with LFP batteries in the near term. As supply chain capacity ramps up over the next three years, we expect cost evolution to accelerate, potentially driving prices to more than 30% lower than LFP at a production scale of 100 GWh.

Disruption and penetration. In terms of market penetration, sodium-ion batteries could initially gain traction in light trucks as well as the AO and A00 passenger vehicle segments. Beyond automotive applications, we see significant potential for sodium-ion technology to replace LFP in the energy storage systems (ESS) market as well. This shift would be supported by key performance advantages, including superior low-temperature charging capability, slower degradation rates, and consistent full-power output even at low states of charge, which could greatly enhance reliability for trucks. We think these attributes make sodium-ion a viable and economical alternative to LFP in multiple use cases.

Material sourcing diversity. Strategically, the adoption of sodium-ion technology represents a move away from lithium dependency, enhancing energy security and reducing exposure to lithium supply constraints. This transition aligns with broader industry efforts to diversify raw material sourcing while maintaining competitive cost structures and performance standards.

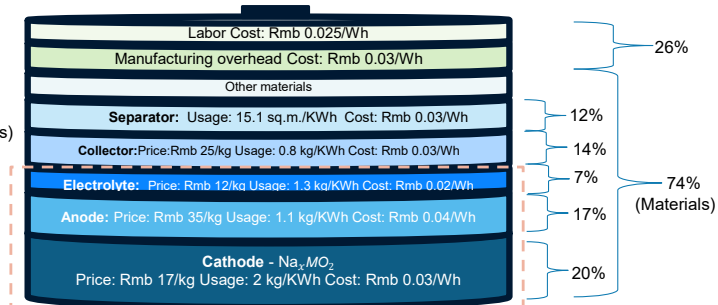
Exhibit 35: Sodium battery economy

Current total cell costs(RMB/Wh)=0.32
Specific energy: 160 Wh/kg



Total cell cost: -32%

Future large-scale total cell costs(RMB/Wh)=0.21
Specific energy: 180 Wh/kg

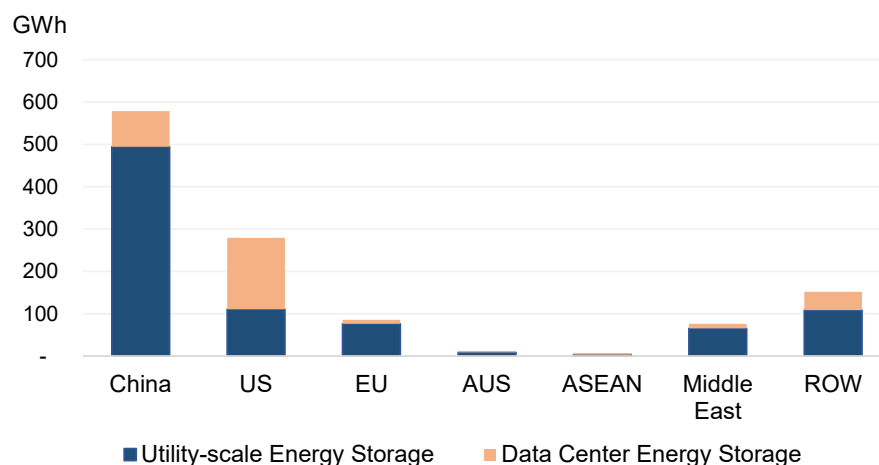


Source: SMM, Company data, Morgan Stanley Research estimates

Market size

As ESS economics have reached a turning point, we think the size of the ESS market will expand fast from now to 2030. We project global ESS installation additions will see 30% CAGR from 325GWh in 2025 to 1,200GWh in 2030e. Of this, we estimate ESS demand from AI data centers will see exponential growth from ~22GWh in 2026e to 321GWh in 2030.

Exhibit 36: ESS battery annual deployment in 2030 – by type



Source: Morgan Stanley Research estimates

Our methodology

We divide our calculation of global ESS market size into two parts.

The first is driven by solar installation, where ESS is needed to flatten the load curve. In most regions, ESS installation still lags accumulated solar capacity, so we see substantial room for both solar integrated ESS projects and standalone ESS projects to grow globally.

The second is driven by AI data center (AIDC) demand. Given the large capex requirements of AIDCs and the bottlenecks around grid access and gas turbines, we see power shortages across regions. Beyond the direct power shortfall created during the training stage, we also factor in additional load variability as workloads shift from training to inference (as discussed in previous sections). We believe that as the share of power used for inference rises, ESS demand will also grow faster than in a training only environment. We discuss regional dynamics in the following sections.

US

As the largest AIDC market globally, we estimate roughly half of ESS potential in the US over 2026–30e will come from AIDC demand. Grid driven ESS demand should grow steadily YoY, supported by ongoing solar installation and still attractive returns from arbitrage opportunities.

AIDC ESS market

According to our Global Tech team, the AIDC power capacity in 2030 will likely reach 188GW, implying annual power additions of 20-40GW from now to 2030. We assume the share of power additions tied to inference rises from 15% in 2026 to 45% in 2030, which results in 51GWh of ESS demand from inference and UPS applications in 2030, assuming ~2 hours of duration. For the remaining power additions, after accounting for all time to power solutions (gas turbines, bitcoin site conversions, fuel cells, nuclear and grid connections), we estimate a further 118GWh of ESS demand in 2030 from mitigating the power shortfall. In total, we estimate US AIDC ESS demand could reach 169GWh in 2030.

Utility-scale ESS market

With the 30% ITC credit, utility scale ESS projects can still generate HSD unlevered IRR and mid-teens levered IRRs based on our calculations. We believe this should continue to support robust growth in the US utility scale ESS market. We also assume gradually increasing attach rates and duration hours, especially for standalone ESS projects. Based on these assumptions, we forecast US utility scale ESS installations will grow from ~57GWh in 2025 to 110GWh in 2030e.

China

We believe China's ESS market will remain dominated by utility scale projects, supported by the expected rollout of capacity revenue for standalone ESS projects nationwide. But as the second largest data center market globally, ESS demand from AIDCs will become increasingly important over the next five years.

AIDC ESS market

China's AIDC investment will also grow robustly, driven by capex from domestic TMT leaders. However, power shortages are less severe than in the US thanks to sustained grid investment in recent years and continued expansion ahead. Using the same methodology applied to the US AIDC market (inference + training), we forecast China's ESS demand from AIDCs will reach 85GWh in 2030, from almost none in 2025.

Utility-scale ESS market

We expect utility scale ESS to be the main growth engine in China over the next five years, supported by policy. In Feb 2026, China's NDRC encouraged provinces to introduce capacity prices for standalone ESS, following similar moves in five provinces in 2025. We see this as an important milestone that accelerates utility scale ESS development because capacity price support drives project IRR to attractive levels. With these policies, we expect China's total ESS installation additions to grow from ~190GWh in 2025 to 579GWh in 2030e. For more details, see [Contemporary Amperex Technology Co. Ltd.: Nationwide Rollout of ESS Capacity Price \(2 Feb 2026\)](#).

Europe

Given the limited scale of data centers in Europe, we expect ESS demand to remain driven by solar integrated ESS and standalone ESS. We estimate ESS installations will rise from 24GWh in 2025 to 85GWh in 2030e.

Middle East

The Middle East is a fast growing emerging market for ESS as the region pivots towards energy transition. We see ESS demand also driven mainly by utility scale projects. Total ESS installations from utility scale projects should grow rapidly from 1GWh in 2025 to 65GWh in 2030e. For data centers, the region has several solar ESS data center projects, exemplified [CATL's 19GWh project in UAE](#).

ESS Supply Landscape

Global ESS cell supply remains concentrated in China, but recent ex-China developments signal a growing trend in ESS cell adoption and supply chain build out across regions despite geopolitical barriers.

China – continuing expansion for global demand: We estimate China's total nameplate ESS capacity reached ~1,000GWh in 2025, with sales volumes exceeding 600GWh, supported by domestic policies. We expect domestic ESS capacity to continue expanding as utility scale projects benefit from favorable regulation. We assume half of total battery capacity additions between now and 2030 will be ESS dedicated, which brings nameplate ESS cell capacity to ~2,000GWh in 2030.

Although total capacity and shipment numbers are large, high quality capacity and export grade volume remain a limited share of the overall base. Much of China's ESS cell output still targets the domestic low price segment, where technical requirements are lower than in overseas markets. A key concern for Chinese ESS manufacturers is geopolitical risk from the US (tariffs and ITC eligibility), as overseas customers account for a meaningful share of volume for several players.

US – dominated by Koreans: The US offers strong growth potential, especially in high end, high price segments driven by AIDC demand. Historically, the US ESS market relied heavily on China sourced ESS cells due to the lack of a local supply chain. The OBBB policy has created meaningful incentives for end users to source non-China batteries, opening the door for Korean manufacturers to gain share.

Among key suppliers, LG Energy Solution began mass production of LFP batteries for ESS in 2Q25 and plans to expand US ESS capacity to 50GWh by end 2026 (from 17GWh at 2025YE). Samsung SDI aims to grow US ESS capacity from 7GWh at 2025YE to 30GWh at 2026YE. Both companies have converted excess EV battery capacity to capture ESS opportunities and may expand further depending on demand. Other players, including Tesla and AESC, are also scaling ESS production. Ford, which recently ended its JV with SK On, announced plans to mass produce LFP batteries from its own plant starting in 2027, though questions about product quality and execution remain.

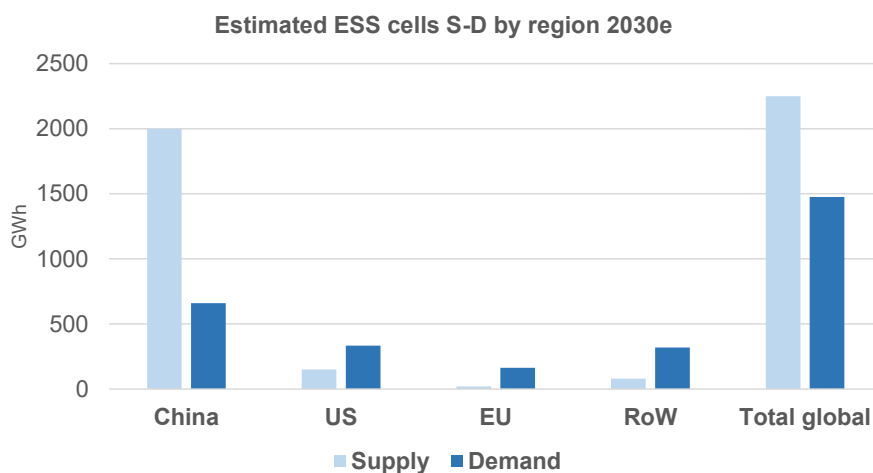
Based on our checks, aggregate ESS cell capacity from non-Chinese suppliers could reach 90–100GWh by end 2026, with further room for expansion or conversion to meet expected US ESS demand of 334GWh in 2030. That said, time to market remains critical for many customers, especially large tech companies, so some buyers may still rely on imported ESS cells despite geopolitical barriers such as tariffs and ITC eligibility.

Europe – limited supplies: We believe Europe will continue to rely mainly on imported ESS cells, as very limited ESS specific cell capacity is planned or likely to be operational before 2030. LGES' Poland plant converted part of its EV battery capacity to ESS cells, but the scale remains small (MSe: 3GWh). In addition, CATL's Hungary plant may flexibly add ESS cell capacity in later expansion phases. As a result, Europe will likely depend on imports to meet ESS demand, whether through ESS cell imports or direct ESS system imports.

Rest of world – dominated by Chinese: ESS cell supply in the rest of the world remains largely dominated by Chinese manufacturers, although detailed capacity figures are often blended with EV batteries. We estimate ESS dedicated cell supply in these regions is unlikely to exceed 100GWh by 2030.

Conclusion: China will remain a critical global ESS supplier despite geopolitical barriers. Localized ESS cell production outside China is developing, but current and near term scale remains insufficient to meet medium to long term ESS demand. This should benefit high end Chinese capacity that already has a strong track record in overseas premium markets.

Exhibit 37: ESS cell supply-demand by region 2030e



Source: Company data, Morgan Stanley research estimates

Supply is measured as all announced nameplate capacities; demand is measured as ESS installation volume

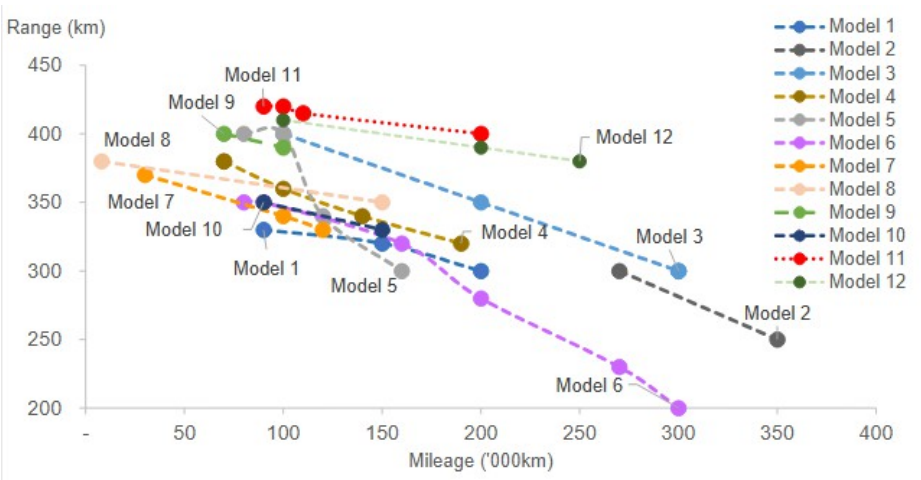
Battery capacity degradation and replacement cost risk

Battery quality varies widely, and the differences extend well beyond energy density and safety. Capacity degradation speed, round trip efficiency, and cycle life are less decisive in EV purchasing decisions but are far more critical in energy storage because they drive economics and operating profiles.

Superior degradation control preserves usable capacity over time, higher round trip efficiency reduces losses and operating cost, and longer cycle life determines how much energy a system can deliver over its economic life. ESS shifts the focus from valuing batteries on a “\$/kWh” basis, as in EVs, to a “\$/cycle” or lifetime energy delivered basis.

While nameplate ESS battery capacity may appear abundant by 2030, we see high quality product capacity remaining structurally tight, depending on how quickly global battery majors can bring new capacity online. Large data center operators are likely to secure battery supply well ahead of time, prioritizing quality, reliability, and lifecycle economics over spot pricing to ensure long term performance certainty.

Exhibit 38: 100-sample battery performance survey from shared mobility: Range (Energy) decays as mileages (charging cycles) increase; high-end batteries' capacity degradation is significantly slower than others, downsizing or avoid replacement costs



Source: Morgan Stanley Research survey

Will Materials Be Sufficient?

Commodity Demand Implications

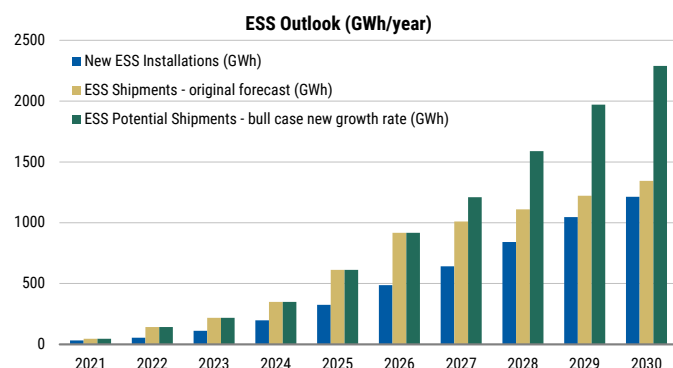
ESS becoming an important demand driver for lithium: ESS has become a growing driver of commodity demand, particularly for lithium but also for other metals like copper and aluminium – see [ESS Emerging as Stronger Metals Demand Driver](#). We estimate 1GWh of ESS uses 1.6 kt of aluminium, 0.4-0.6 kt of copper and 0.65 kt of Lithium carbonate. Lithium iron phosphate (LFP) batteries dominate (>90% market share), but with lithium prices nearly tripling from 2025 lows and more progress being made towards the commercialisation of sodium-ion batteries, there could be some shifts here in the years ahead. Aluminium is used in foil, casing, cold plate and components. Copper is used in copper foil and power equipment connections.

Shipments outpacing installations: We noted an increased divergence between ESS shipments and installations in 2025 as the market expanded, and shipments have become the more relevant metric for metals demand, in our view. To highlight this dislocation, global cumulative ESS deployment is estimated at 325 GWh for 2025 while [InfoLink](#) reported ESS shipments of 612 GWh, 88% higher or equivalent to 187 kt of extra lithium (LCE) demand – a meaningful swing in a market of around 1.6 mln tonnes.

But new forecasts for installations bridge the gap and underpin the strong outlook: [Exhibit 39](#) shows the team's new ESS installation forecasts in blue, which align much more closely with our original shipment forecasts for 2030 (yellow bars). If we assume shipments continue to exceed installations and apply installation growth rates to shipment volumes (green bars), metals demand could be materially higher. This scenario implies full utilization of global ESS capacity of ~2,250GWh by 2030 — a bull case, as it is unclear whether shipments can sustainably outpace installations.

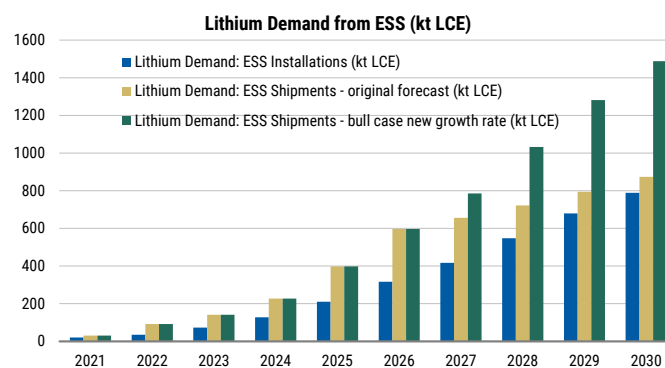
Stronger installation numbers boost confidence in robust lithium demand outlook from ESS: Our current lithium demand model (yellow bars in [Exhibit 40](#)) could shift to a bull case (green bars) if shipments continue to exceed installations or ESS use cases broaden. This would push the lithium market into a persistent deficit through 2030 and increase upside price risk. Currently we model lithium at \$14-15k/t LCE through the remainder of the decade but our bull case is ~\$28.5k/t. Mitigating factors remain: if lithium prices rise too sharply, pressure to commercialise and adopt sodium-ion batteries increases, while excess battery inventory is likely to be used up too, weighing on shipments relative to installations. Higher lithium prices are also already driving some supply response with prices nearly tripling since mid-2025, as we note in [Lithium Overdone?](#) With global production costs mostly below \$10,000/t and relatively fast ramp up times, lithium supply faces fewer constraints than other commodities, making it unlikely to be a limiting factor for ESS deployment. A softer EV outlook also frees capacity, giving ESS more room to grow without tightening the overall balance.

Exhibit 39: New ESS installation forecasts narrow the gap with our original shipment estimates. If shipments continue to outpace installations, upside could be even greater.



Source: Infolink, Morgan Stanley Research

Exhibit 40: This could lift lithium demand significantly and push the market into deficit, depending on supply response, the EC outlook, and competition from sodium-ion.



Source: Infolink, Morgan Stanley Research

Implications for copper and aluminium: We already incorporate our original ESS shipment estimates into our copper and aluminium supply-demand modelling (yellow bars above). However, if the bull case shipment forecast plays out, where shipments continue to outpace installations and grow at a similar growth rate, and material intensity doesn't change significantly, we could also see increased demand for copper and aluminium. For copper, 2030 annual demand from ESS could reach 1.14 mln tonnes versus our current estimate of 670 kt; for aluminium, demand could reach 3.66 mln tonnes versus our current estimate of 2.15 mln tonnes. If this occurs, deficits for both metals could increase significantly, all else equal.

What to watch and risks: ESS economics are likely to remain sensitive to the cost of lithium and other metals, with significant cost increases likely to raise the cost of holding inventory and potentially bring shipments more in line with installations, keeping demand implications closer to what we already model. Progress on sodium ion commercialization could also lower lithium demand and shift copper-aluminium usage further toward aluminium. To the upside, new ESS use cases could emerge, lifting both installation and shipment trajectories, tightening metal balances, and driving prices higher.

Exhibit 41: Potential demand implications from new ESS forecasts

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	CAGR 2024-2030
New ESS Installations (GWh)	32	55	112	197	325	487	641	842	1046	1214	
YoY		71%	104%	77%	64%	50%	32%	31%	24%	16%	
ESS Shipments - original forecast (GWh)	47	143	218	350	612	918	1010	1111	1222	1344	
YoY		204%	53%	60%	75%	50%	10%	10%	10%	10%	
ESS Potential Shipments - bull case new growth rate (GWh)	47	143	218	350	612	918	1209	1588	1971	2289	
YoY		204%	53%	60%	75%	50%	32%	31%	24%	16%	
Lithium Demand											
Current modelled ESS Lithium Demand (kt LCE)	35	54	97	148	197	252	298	337	386	444	
Lithium Intensity of ESS (kt/GWh)	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	
Lithium Demand: ESS Installations (kt LCE)	21	36	73	128	211	316	417	547	680	789	
Lithium Demand: ESS Shipments - original forecast (kt LCE)	30	93	142	228	398	597	656	722	794	874	
YoY (kt LCE)		62	49	86	170	199	60	66	72	79	
Lithium Demand: ESS Shipments - bull case new growth rate (kt LCE)	30	93	142	228	398	597	786	1032	1281	1488	
YoY (kt LCE)		62	49	86	170	199	189	246	249	206	
Aluminium Demand											
Aluminium Intensity of ESS (kt/GWh)	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
Aluminium Demand: ESS Installations (kt)	51	88	179	316	519	779	1026	1347	1673	1942	
Aluminium Demand: ESS Shipments - original forecast (kt)	75	228	349	560	979	1469	1616	1777	1955	2150	
YoY (kt)		153	121	211	419	490	147	162	178	195	
Aluminium Demand: ESS Shipments - bull case new growth rate (kt)	75	228	349	560	979	1469	1935	2541	3154	3662	
YoY (kt)		153	121	211	419	490	466	606	614	508	
Copper Demand											
Copper Intensity High Case (kt/GWh)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Copper Intensity Mid Case (kt/GWh)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Copper Intensity Low Case (kt/GWh)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
Copper Demand: ESS Installations (kt)	16	27	56	99	162	243	321	421	523	607	
Copper Demand: ESS Shipments - original forecast (kt)	23	71	109	175	306	459	505	555	611	672	
YoY (kt)		48	38	66	131	153	46	50	56	61	
Copper Demand: ESS Shipments - bull case new growth rate (kt)	23	71	109	175	306	459	605	794	966	1144	
YoY (kt)		48	38	66	131	153	146	189	192	159	

Source: InfoLink, Morgan Stanley Research. ESS installations are updated using estimates from this note. ESS shipment estimates are as published in November 2025, while bull case ESS shipments apply the same growth rate as ESS installations.

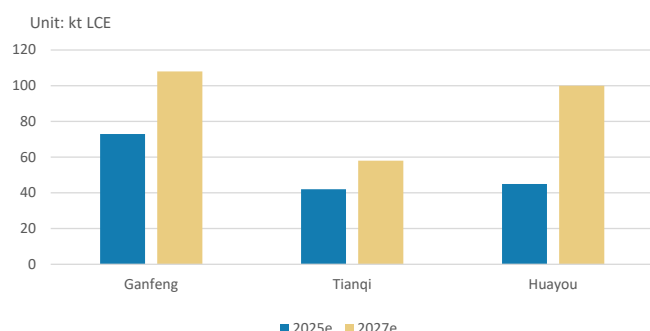
Equity implications: 1GWh of ESS uses 1.6 kt of aluminium, 0.4-0.6 kt of copper and 0.65 kt of Lithium carbonate. Lithium miners shall benefit from rising demand and higher lithium prices driven by accelerated ESS deployment.

Ganfeng: We expect its attributable lithium shipment volume to grow from ~73kt in 2025 to ~108kt in 2027, mainly driven by its Goulamina project in Mali, and Cauchari-Olaroz and Mariana project in Argentina. Shipment volume and contribution should rise further when the PPGS project commences over the longer term.

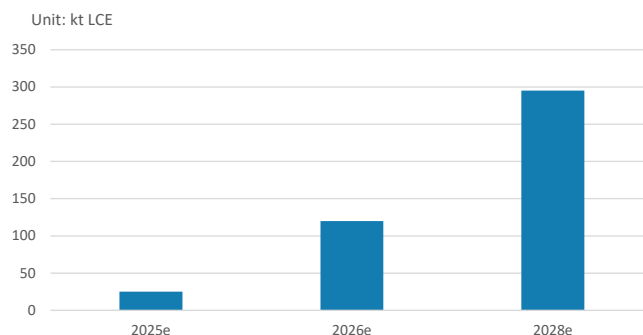
Tianqi: We expect attributable lithium shipments to grow from ~42kt in 2025 to ~58kt in 2027, supported by the CGP3 plant coming online at the Greenbushes mine. Longer term, the Yajiangcuola mine in Sichuan may begin production in 2028 and add ~2.5kt LCE (80% stake) when fully ramped.

Zijin: Zijin will be a major source of lithium supply growth toward 2028. It plans to grow lithium output from ~25kt LCE in 2025 to 120kt LCE in 2026 and 270–320kt in 2028, mainly through the ramp up of the Xiangyuan and Laguocuo projects in China, the 3Q project in Argentina, and the Manono project in the DRC.

Huayou: We expect Huayou's lithium output to rise from ~45kt LCE in 2025 to 70kt LCE in 2026 and ~100kt in 2026, driven largely by the expansion of the Arcadia mine in Zimbabwe and cost saving efforts through local lithium sulphate capacity.

Exhibit 42: Attributable lithium production volume of Ganfeng, Tianqi and Huayou

Source: Company data, Morgan Stanley Research estimates.

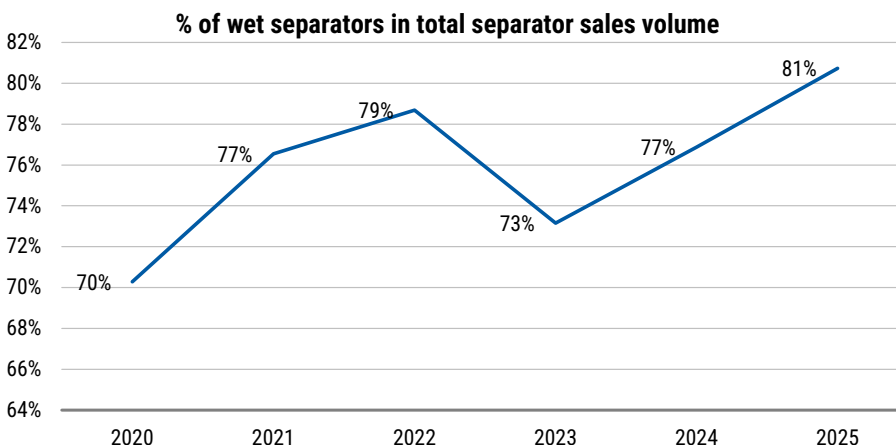
Exhibit 43: Lithium production volume of Zijin

Note: Zijin targets for 270-320kt LCE production in 2028 (mid-point 295kt). Source: Company data, Morgan Stanley Research estimates

Battery components – 15-20% capacity CAGR required until 2030 to meet robust demand growth. We estimate that across the four major battery components (LFP cathodes, anode, separators, and electrolyte), a 15–20% capacity CAGR is required between now and 2030 to support ESS battery demand growth, alongside continued EV battery demand growth. We see particularly high capacity needs (high teens CAGR) for wet separators and LiPF₆ (electrolyte).

- **Wet separators (high-teens capacity expansion required for 2025-30):**

Wet separator capacity expansion in the domestic market has become more disciplined in 2026–27. We think capex intensity will need to accelerate again to support ESS driven demand growth. In addition to robust volume growth, we expect higher penetration of wet separators in ESS batteries to lift demand growth above the pace of other battery components. According to EV Tank, wet separators accounted for 77% of total separator sales in 2024, rising to 81% in 2025 due to the rapid adoption of large ESS cells such as 314Ah formats. As the ESS industry shifts toward even larger cells (approaching 600Ah or higher), we expect wet separator penetration to continue increasing. This should provide an additional volume tailwind relative to other components and support more sustainable pricing strength.

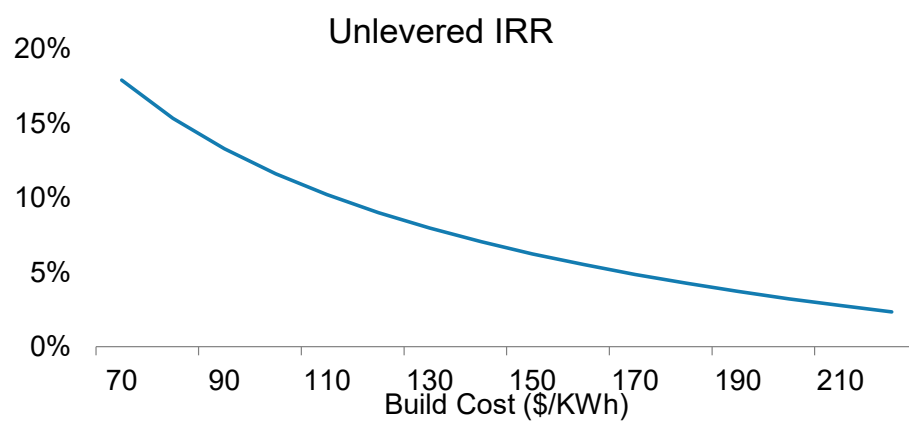
Exhibit 44: % of wet separators in total separator sales volume in China

Source: EV Tank

- **LiPF6 (high-teens capacity expansion required for 2025-30):** With a relatively stable competitive landscape, higher entry barriers, and a steep cost curve, we think LiPF6 supply-demand can remain constructive if ESS demand stays robust. We calculate that to meet our demand forecast in 2030, LiPF6 capacity expansion needs to be kept at a high-teens CAGR over 2025-30. Capacity additions appear on track in 2026–27, but uncertainty remains in later years as medium term expansion plans are limited.
- **Anode (mid-teens capacity expansion required for 2025-30):** We estimate global anode capacity needs to grow at ~15% CAGR in 2025–30 to meet ESS demand. This assumes industry utilization increases from ~60% in 2025 to 80% in 2030.
- **LFP cathode: (low-teens capacity expansion required for 2025-30):** Given currently low utilization rates, LFP cathode capacity does not need to grow as quickly as other battery components to meet demand. The LFP supply chain remains centered in China today. Over time, capacity will likely need to expand outside China to meet ex-China demand and mitigate geopolitical risks.

Battery cost inflation vs. lithium price (LFP) vs ESS IRR: Each GWh of batteries consumes ~650t of lithium carbonate. Every Rmb10,000/t change in lithium carbonate prices translates into a Rmb6.5/kWh change in battery BOM cost. Other components account for a smaller share of cell cost, but aggregate price movements still meaningfully affect battery cost and ESS project IRR. The chart below illustrates IRR sensitivity to battery cost for a project in China's Ningxia with capacity revenue support. For further IRR sensitivity analysis, see the Economies section of the report.

Exhibit 45: Unlevered project IRR sensitivity to build cost for a standalone ESS project in Ningxia, with capacity revenue

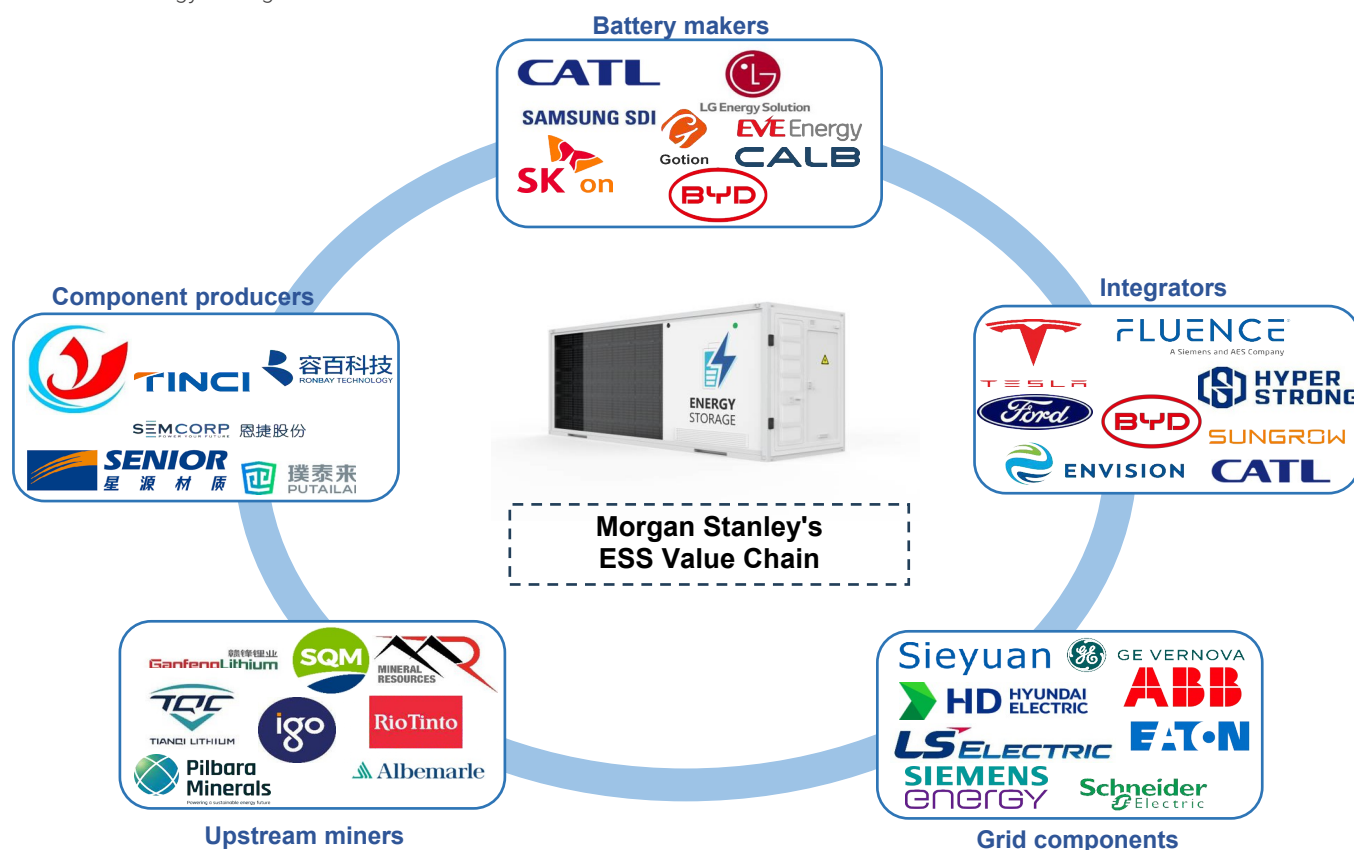


Source: Morgan Stanley Research estimates

Morgan Stanley ESS Investment Portfolio

We identify 40+ stocks across the ESS supply chain, spanning the full value stack from battery manufacturers and system integrators to critical component suppliers and upstream raw material miners. This diversified coverage reflects how value creation in energy storage is no longer concentrated in a single segment, but distributed across cell technology, power electronics, balance of system integration, and resource security, all of which are becoming increasingly strategic as ESS deployment accelerates to support AI driven power demand.

Exhibit 46: Energy Storage Value Chain



Source: Morgan Stanley Research

CATL

Innovation-led demand creation. Through persistent innovation over the past five years, CATL has strengthened EV model cycles and helped build the energy storage market from virtually non-existent to a scalable, commercially viable segment. This has set new benchmarks for adoption and growth, yet the market often overlooks this capability alignment. We believe CATL is positioned to reconsolidate market leadership over the next three years by leveraging technology innovation and strategic infrastructure expansion. The rollout of sodium-ion batteries marks a pivotal shift toward sustainable and scalable energy solutions starting in 2026. In parallel, battery swap build-out for electric trucks and cars is accelerating, bringing an EV energy replenishment ecosystem online earlier than expected. The year 2026 could also mark the beginning of a transformative phase in which ESS becomes a backbone for powering AIDC amid gas turbine shortages.

Sodium-ion batteries: mass-scale deployment path emerging. We believe CATL is set to reconsolidate the A00/A0 car market in China, supported by a 1GWh level ramp in 2026 and a 100GWh level scale by 2030, alongside broader battery swap network deployment. We expect the new product lineup to lift the company's EV market share in China from 39% today to ~50% by 2030.

ESS for AIDC growth. Power constraints for AIDC stem from both generation and grid infrastructure. The bottleneck is primarily a peak load shortage rather than insufficient generation capacity. The power sector must rethink how to meet AIDC needs: building "inventory" through ESS is more capital efficient than building new capacity plus grid reinforcement to serve infrequent peaks, consistent with commodity sector principles. Scaling ESS leverages modularity and speed, avoiding the long lead times of gas turbines and grid upgrades. Flexibility and rapid deployment matter more than traditional capacity build-outs.

BOM inflation? China's EV softness? CATL is well positioned to offset BOM inflation pressures through product mix upgrades, technology improvements, and cost-plus pricing, which supports margin resilience. While China's electric passenger vehicle sales may soften on weaker consumption, CATL's exposure to premium EV models (supported by a larger subsidy pool this year) provides a buffer. Rising battery capacity per vehicle and sodium-ion readiness offer structural levers to lower cost curves and support the next wave of EV penetration in mass-market segments. Combined with strength in e-trucks and ESS, we expect earnings CAGR of 22.8% in 2026–27 and 20% through 2030.

Reliance Industries

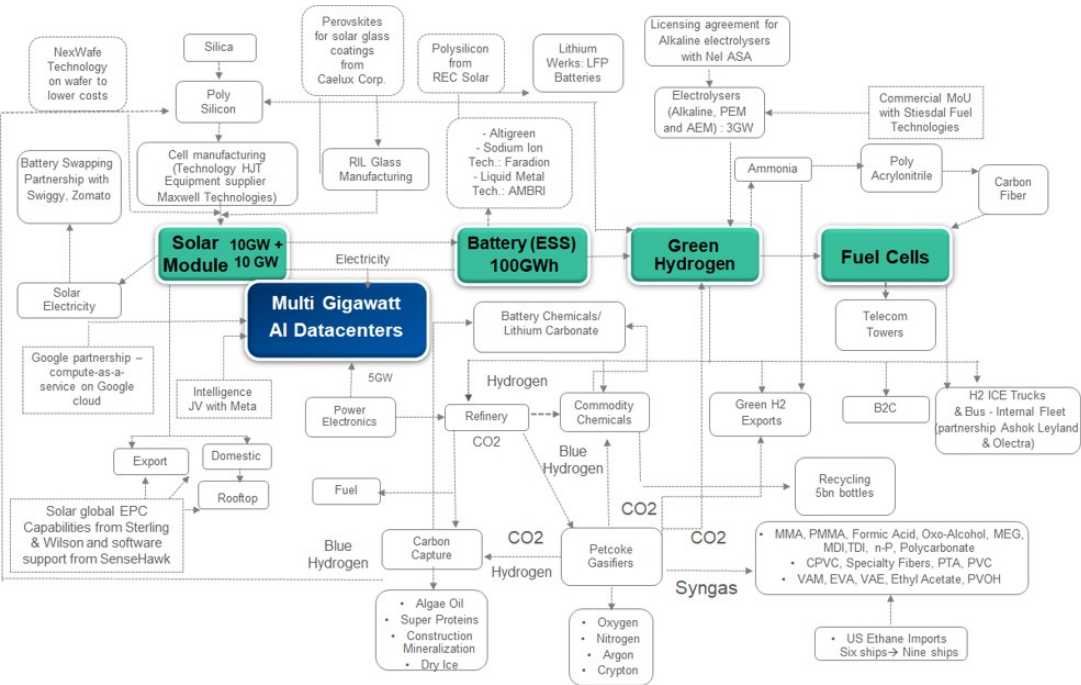
(Overweight, price target INR 1,803, covered by Mayank Maheshwari)

Powering AI Pivot: Reliance Industries has reinvented itself over every decade. New Energy and Powering AI are set to reshape the equity story of RIL this decade. Three building blocks – AI infrastructure, battery supply chain, and solar panel supply chains – lay the foundation for the Powering AI Pivot. The Dhirubhai Ambani Green Energy Giga Complex in Jamnagar – with fully integrated solar value chain (polysilicon to module), battery production, and eventually green hydrogen/ammonia – is slated to commence in 2026 with 10 GW of initial solar capacity along with battery storage of 100 GWh of capacity. The facility is designed to span the full value chain—from solar to energy storage systems—positioning Reliance as one of the few fully integrated clean energy manufacturers globally and power multi-GW data centres ([Reliance Industries: Anti-Involution All Around](#)). This integration is expected to drive cost competitiveness, supply-chain resilience, and flexibility across chemistries, while targeting internal energy costs, exports and domestic consumption ([Future of Energy: Power: Changing Face with AI](#)).

Technology and partnerships: The company plans to start with LFP chemistry with optionality on sodium-ion technology. Acquisition of Lithium Werks and Faradion strengthens RIL's ability to adapt to evolving chemistry preferences and end-market demand. RIL has also secured 10 GWh capacity under India's Production Linked Incentive (PLI) scheme for Advanced Chemistry Cells, providing incentive-backed economics and visibility on scale-up.

US\$50bn in value creation: We believe New Energy remains underappreciated by investors and could drive the next leg of value creation. RIL's own energy costs will fall up to 40% (i.e., ~US\$1bn) by 2030 as it shifts to renewable sources for internal power needs, while by 2027, once integration from polysilicon → cells → wafers → modules → green hydrogen is achieved and RIL starts to export/sell domestically, we estimate new energy to contribute 13% to RIL's earnings. We value new energy NAV at US\$20bn in F27e. We remain OW on Reliance Industries with a price target of Rs1,803/share.

Exhibit 47: RIL: New Energy integration with AI infrastructure will be important to the next leg of market cap creation and is part of our bull case



Source: BSE, company data, Morgan Stanley Research.

Exhibit 48: New Energy division takes form with energy hub at Jamanagar, power generation at Kutch and marine and export facility at Kundla

Reliance New Energy Targets	Solar Modules	Capacity	Timelines
	200MW HJT modules produced, targets to scale to 10GW and 20GW	10 GW	early 2026
	Batteries		
	Gigafactory to start in 2026. Will begin at 40GWh per year and targets to expand modularly to 100GWh	40GWh/year	2026 end
	Renewable Power		
	Kutch mega project could meet India's 10% of electricity demand. To deploy 55MW of solar module and 150MWh of battery containers everyday	Peak 150bn units solar power	generation to start in F28
	Electrolysers		
	3GW per year capacity; factory operational by end of 2026	3GW/year	2026 end
	Green hydrogen		
	3.3MMTPA by 2032; to produce green ammonia, green methanol & SAF; 55CBG plants by 2027	3.3MMTPA	2032

Source: Company data, Morgan Stanley Research.

LGES

(Equal-weight, price target W380,000, covered by Young Suk Shin)

Structural US ESS upside: With structurally rising US ESS demand driven by grid expansion and AI-related data center needs, and supported by OBBB's tilt toward non-Chinese supply, Korean battery makers are well positioned to capture incremental market share. Among them, LGES appears to be pivoting most aggressively toward US ESS production.

Preemptive conversion, scalable capacity: LGES has leveraged its longstanding ESS track record dating back to the LG Chem era and has been preparing for US ESS expansion even prior to OBBB. The company is utilizing idle EV nameplate capacity and underutilized lines for EV-to-ESS conversions, which typically require 6-12 months and limited capex due to equipment compatibility. LGES reached ~17GWh of US ESS capacity in 2025 and guides for 50GWh+ in 2026e, with additional conversion flexibility if demand materializes. The company also booked ~140GWh of ESS order backlog as of 4Q25, providing strong near-term visibility.

System integrator capability: Beyond cell manufacturing, LGES strengthened its US presence through the 2022 acquisition of NEC Energy Solutions (now LGES Vertech), expanding into system integration and software. This vertically integrated positioning allows LGES to capture policy driven demand and differentiates it from peers with more limited downstream exposure. As a system integrator, LGES can bundle cells with modules, inverters, energy management software, and long term service agreements, creating opportunities for ASP uplift and margin enhancement beyond standalone cell sales.

Volume growth vs. margin reality: That said, we remain cautious on profitability. Management's 2026 margin guidance implies potential AMPC sharing of 30%+ even within ESS, suggesting margin expansion may lag volume growth. Unlike the EV segment, where raw material pass through mechanisms remain relatively intact, ESS pricing appears more competitive, increasing sensitivity to raw material price volatility. Combined with ongoing EV downside risks, we maintain our EW rating.

Tesla

(Equal-weight, price target US\$415, covered by Andrew Percoco)

Tesla has positioned Energy Storage Systems (ESS) as a core growth pillar, targeting grid-scale storage, renewable integration, and increasingly AI-driven data center demand. Its manufacturing scale, engineering depth, and vertical integration across the battery supply chain have established the company as one of the global leaders in ESS. As we laid out in our [Tesla report](#) at the end of last year, from 2022–2025 the company's storage deployments grew at a ~93% CAGR and holds ~16% global market share as of 2025, with much of the expansion driven by the US. market. This scale has translated into substantial profitability improvement, with energy gross margins expanding from 7% in 2022 to 28% in 2026.

Tesla's energy portfolio is centered on the Megapack, a modular 3.9 MWh utility-scale battery system offered in 2- or 4-hour configurations and designed for grid stabilization, renewable firming, commercial/industrial applications, microgrids, and data center backup. Megapack deployments now exceed 36 GWh globally and represent >95% of Tesla Energy revenue on our estimates. Tesla also offers the Powerwall (13.5 kWh), which supports residential and small commercial solar self-consumption, backup power and Virtual Power Plant participation. Tesla integrates its hardware with Autobidder, its proprietary energy optimization software, enhancing asset utilization and driving higher-margin, recurring revenue streams. Management has indicated rising engagement with hyperscalers and utilities seeking storage solutions to support large-scale AI compute clusters, with storage increasingly co-located alongside generation and data center assets.

Longer-term, the company is targeting a [100 GW solar manufacturing buildout](#). We expect most of this capacity would support its longer-term data center ambitions, though a portion could be allocated to the US utility-scale market as a complement to its leading domestic ESS business. Taken together, these initiatives underscore Tesla's ambition to build a vertically integrated clean energy platform spanning storage, solar, and energy software, with AI and data center demand serving as a durable tailwind to ESS growth.

Our estimates: From 2025-2040 we expect ESS volumes to grow 18% per annum, reaching 533 GWh by 2040, of which we assume >95% is Megapack (large-scale). We see Tesla's US manufacturing footprint as a competitive advantage over peers as stricter sourcing requirements are implemented in 2026 as a part of recent policy changes to the storage investment tax credit. We expect gross margins to stabilize at ~30% in 2026 and decline modestly over the forecast period, reaching 27.5% by 2030 and 25% by 2035 given heightened competition as Tesla expands its ESS footprint to other global markets, notably Europe and Asia. This is partially offset by increased penetration of software and services (i.e. Autobidder) which we expect to yield higher margin and recurring revenue. On an EBIT basis, we assume margins peak in 2028 at 21%, before declining to 18% by 2035.

We value Tesla Energy at \$40/shr or \$141bn.

Ford

(Equal-weight, price target US\$14, covered by Andrew Percoco)

Ford is entering the Energy Storage Systems (ESS) market as part of its [broader strategic reset](#), targeting battery energy storage demand from data centers and grid infrastructure. The initiative, announced in December 2025, is designed to leverage underutilized EV battery manufacturing capacity to create a diversified and potentially profitable revenue stream, while redeploying capital away from lower-return segments of its EV portfolio.

Ford plans to invest ~\$2 billion over the next two years to repurpose its facilities in Kentucky and Michigan for ESS production to support data center and grid/infrastructure demand. Ford's Glendale, Kentucky site is slated to manufacture 5 MWh+ BESS and related components, while its Marshall, Michigan plant will produce smaller amp-hour cells for residential ESS and LFP prismatic cells to be used in Ford's upcoming UEV platform. BESS system shipments are expected to begin in 2027 with 20 GWh of annual capacity. By monetizing existing battery capacity and targeting grid-scale storage and AI-driven data center load growth, Ford aims to gain exposure to a structurally expanding power and infrastructure market with stronger long-term demand visibility and attractive capital intensity.

Our estimates: If Ford ramps to 20 GWh of run-rate ESS production, it would imply \$4-\$5bn of incremental revenue. Margins across the ESS market vary considerably, with Tesla currently generating a ~30%/20% gross/EBIT margin within its ESS business in part due to its scale and vertical integration, while smaller ESS players generate low-double-digit gross margins and low-single-digit EBIT margins.

Fluence Energy

(Equal-weight, price target \$16, covered by David Arcaro)

In our view, Fluence's growth will be driven largely by the data center-led BESS upcycle, as increasing commoditization and the company's market share positioning will likely limit incremental upside. FLNC deployed 9,200 MWh of storage in CY25, up from 3,900 MWh in CY22, representing a 33% CAGR. Historically, US sales have accounted for 40-60% of FLNC's total revenues, implying just a 10-20% share in the US (57 GWh in 2025). Going forward, while maintaining a similar share, we expect FLNC volume installations to grow at a faster rate, 51% annually through 2028 to 25 GWh, offset by LDD price downs in-line with industry trends. Management highlighted an \$80bn data center TAM (up from \$8bn six months ago), and FLNC's data center pipeline and leads reached 36GWh as of FY1Q26, which should begin converting into firm orders in 2H26 for 2027 delivery. The company identified speed to power (faster access to interruptible grid power), quality of power, backup power, and on-site generation support as emerging BTM applications for storage. Utility demand also remains strong, with FLNC recording \$2.9bn in FY25 order intake. Long duration storage (LDS) represents further optionality, with 34GWh of LDS in pipeline and leads.

All said, we still expect FLNC to maintain a steady state market share, though we would not rule out potentially degrading market share from new stationary storage entrants (Ford, EOS, GM, Samsung, etc.) or better positioned/lowered priced legacy suppliers (Tesla and Sungrow) capturing a greater portion of the TAM. Furthermore, FLNC's long term 10-15% gross margin guidance reflects the difficulty for storage suppliers to expand profitability. Our \$16 PT embeds a 25% probability weighting of FLNC's 36 GWh data center pipeline and leads through 2028 and we would look for indications of the company executing successfully against the data center pipeline and converting leads into orders before becoming more positive on the stock.

Samsung SDI

(Equal-weight, Pprice target W337,000, covered by Shawn Kim)

Near-term ESS but constrained scalability: Samsung SDI, with its long standing ESS track record, is also increasing its US ESS exposure through a series of line conversions at its Stellantis JV plant, targeting ~30GWh of US ESS capacity by end 2026. This positions SDI to benefit from near term strength in US ESS demand, but incremental expansion may be more limited relative to LGES because a meaningful portion of convertible lines has already been allocated to ESS. As a result, we see earnings support in the near term but comparatively limited mid to long term scalability at this stage. In addition, LFP cathode sourcing and initial yield ramp up for ESS production could pose near term operational bottlenecks.

SK Innovation

(Underweight, price target W90,000, covered by Young Suk Shin)

Early stage entry, with limited near-term impact: SK On, having historically focused on EV batteries, remains in the early stages of ESS expansion in the US. The company has announced plans to enter the US pouch type ESS market, with initial North America supply of ~1GWh expected from 2H26. SK On has also indicated a 20GWh ESS order target and potential line conversions to support this roadmap. However, given its later entry into ESS and continued exposure to EV market downside, we expect near term ESS earnings contribution to remain limited relative to domestic peers. While ESS represents a strategic diversification effort, execution and scale up will likely take time. We therefore maintain our Underweight rating.

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(as of February 28, 2026)

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Stock Rating Category	Coverage Universe		Investment Banking Clients (IBC)			Other Material Investment Services Clients (MISC)	
	Count	% of Total	Count	% of Total IBC	% of Rating Category	Count	% of Total Other MISC
Overweight/Buy	1528	41%	444	49%	29%	690	42%
Equal-weight/Hold	1590	43%	374	41%	24%	725	44%
Not-Rated/Hold	4	0%	1	0%	25%	1	0%
Underweight/Sell	588	16%	87	10%	15%	220	13%
Total	3,710		906			1636	

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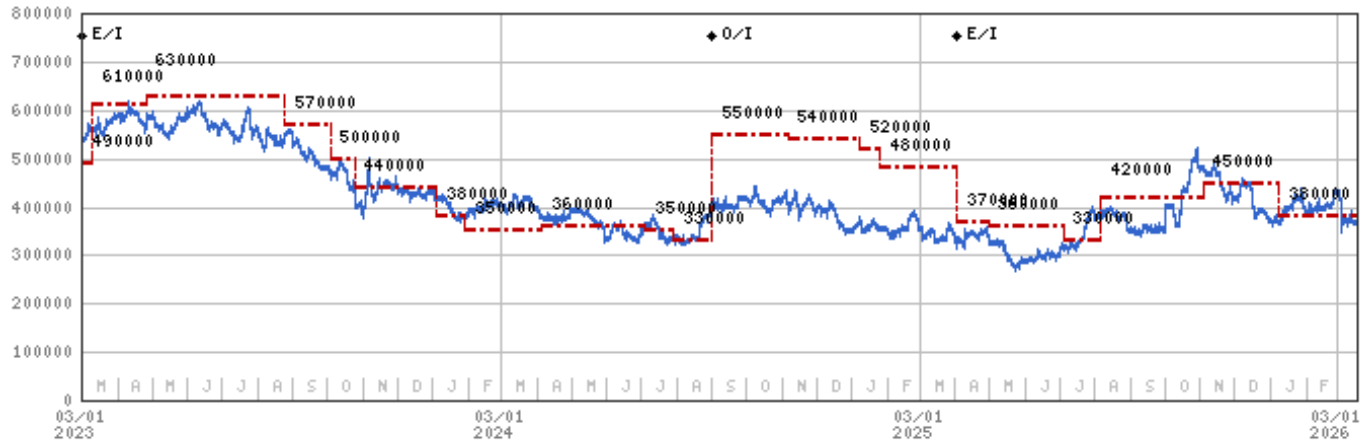
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Stock Price, Price Target and Rating History (See Rating Definitions)

LG Energy Solution (373220.KS) - As of 03/17/26 GMT in KRW
Industry : S. Korea Autos & Shared Mobility



Stock Rating History: 3/1/21 : /I; 3/10/22 : E/I; 9/1/24 : 0/I; 4/3/25 : E/I

Price Target History: 3/10/22 : 360000; 4/4/22 : 400000; 4/27/22 : 440000; 6/16/22 : 410000; 9/2/22 : 530000; 10/26/22 : 570000;
1/3/23 : 480000; 1/30/23 : 490000; 3/10/23 : 610000; 4/26/23 : 630000; 8/25/23 : 570000; 10/4/23 : 500000; 10/25/23 : 440000;
1/5/24 : 380000; 1/29/24 : 350000; 4/5/24 : 360000; 7/4/24 : 350000; 7/29/24 : 330000; 9/1/24 : 550000; 11/6/24 : 540000;
1/8/25 : 520000; 1/25/25 : 480000; 4/3/25 : 370000; 4/30/25 : 360000; 7/4/25 : 330000; 8/6/25 : 420000; 11/3/25 : 450000;
1/8/26 : 380000

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Stock Price (Not Covered by Current Analyst) — Stock Price (Covered by Current Analyst) —

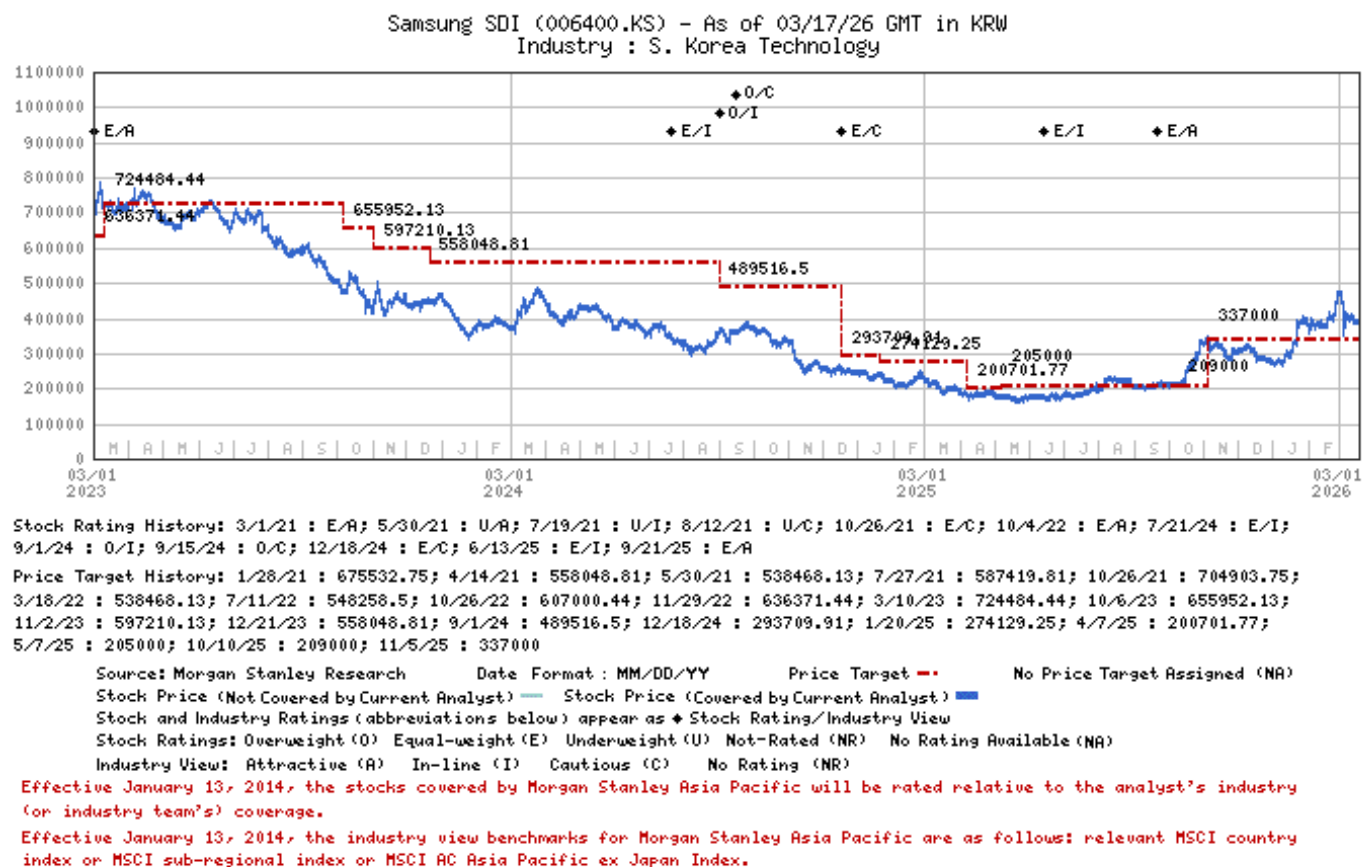
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INDUSTRY COVERAGE: China Energy & Chemicals

COMPANY (TICKER)	RATING (AS OF)	PRICE* (03/17/2026)
Jack Lu		
Bluestar Adisseo Co (600299.SS)		Rmb14.29
China Oilfield Services Ltd. (2883.HK)	O (05/08/2023)	HK\$9.52
China Oilfield Services Ltd. (601808.SS)	O (10/30/2023)	Rmb17.77
China Petroleum & Chemical Corp. (600028.SS)	E (08/19/2024)	Rmb6.25
China Petroleum & Chemical Corp. (0386.HK)	O (07/29/2025)	HK\$4.78
CNOOC (0883.HK)	O (03/17/2021)	HK\$28.80
Contemporary Amperex Technology Co. Ltd. (300750.SZ)	O (06/25/2025)	Rmb405.00
Contemporary Amperex Technology Co. Ltd. (3750.HK)	E (10/09/2025)	HK\$648.00
EVE Energy Co Ltd (300014.SZ)	E (05/31/2022)	Rmb68.62
Gotion High Tech Co Ltd (002074.SZ)	E (04/17/2023)	Rmb37.73
Guangzhou Tinci Materials Technology Co (002709.SZ)	E (01/08/2026)	Rmb45.58
Hengli Petrochemical Co Ltd (600346.SS)	++	Rmb22.05
Ningbo Ronbay New Energy Technology (688005.SS)	U (10/27/2025)	Rmb30.88
PetroChina (601857.SS)	O (08/19/2024)	Rmb12.02
PetroChina (0857.HK)	O (03/17/2021)	HK\$10.58
REPT Battero Energy Co (0666.HK)	E (10/20/2025)	HK\$15.42
Rongsheng Petrochemical Co Ltd (002493.SZ)	E (07/29/2025)	Rmb12.84
Shanghai Putailai New Energy Tech Co Ltd (603659.SS)	U (10/27/2025)	Rmb30.77
Shenzhen Dynanonic Co Ltd (300769.SZ)	U (10/27/2025)	Rmb44.85
Shenzhen Senior Technology Material Co (300568.SZ)	E (01/08/2026)	Rmb14.75
Yunnan Energy New Material Co Ltd (002812.SZ)	O (10/27/2025)	Rmb68.90

Kaylee Xu

Jiangsu Cnano Technology Co Ltd (688116.SS)	U (03/10/2025)	Rmb42.69
Shandong Sinocera Functional Material (300285.SZ)	O (07/25/2024)	Rmb35.90
Shenzhen Capchem Technology Co Ltd (300037.SZ)	E (06/07/2023)	Rmb57.43
Sunresin New Materials Co Ltd (300487.SZ)	E (10/25/2024)	Rmb70.80
Wanhua Chemical (600309.SS)	E (02/02/2026)	Rmb80.15
Zhejiang NHU Co. Ltd. (002001.SZ)	E (01/26/2026)	Rmb35.28

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* Historical prices are not split adjusted.

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