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Future of Energy

Global Merchant Batteries

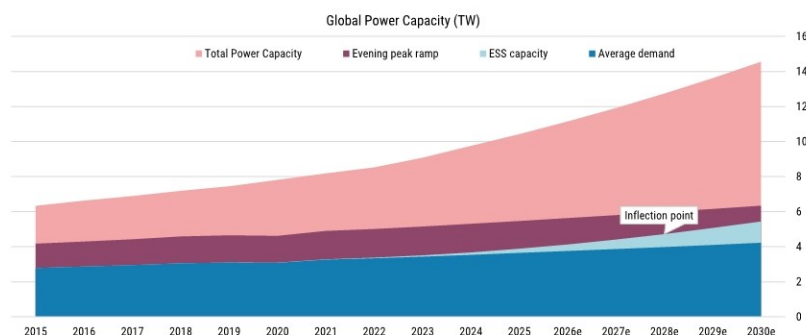
We size the global Energy Storage System (ESS) opportunity at 5TWh by 2030 vs. 1TWh now (46% CAGR) on improving economics and energy security needs. At scale, ESS will dampen power market volatility, and could reduce consumer prices, making ESS a holy grail for utility investors and policy-makers.

Sustainability 

Key Takeaways

- Global power capacity is ~11TW growing at ~7%pa, but with ESS growing at 46%pa, ESS could grow to 8% of capacity by 2030.
- 8% sounds small, but this is more than half of evening peak demand ramp up in most grids, enough to materially reduce volatility and prices.
- We compare daily energy arbitrage opportunities in power grids around the world and provide a ~US\$1.1t global stock screen of integrated/merchant/IPP utilities.
- We introduce our proprietary framework for analysing merchant battery earnings using Australia as a global case study.
- We explore the ability of ESS to reduce power prices for consumers, by dampening volatility, deferring capex, and much much more.

Exhibit 1: ESS dampens power price volatility and prices



Source: International Energy Agency, Rystad, e = Morgan Stanley Research estimates.

Who is this report for?

- Investors looking to gauge utility stock opportunities from ESS trends around the world;
- C-Suite and regulators looking at battery investments, power reliability, and affordability; and
- Responsible investors and stewardship teams tracking the energy transition.

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GLOBAL INSIGHT

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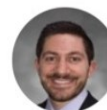
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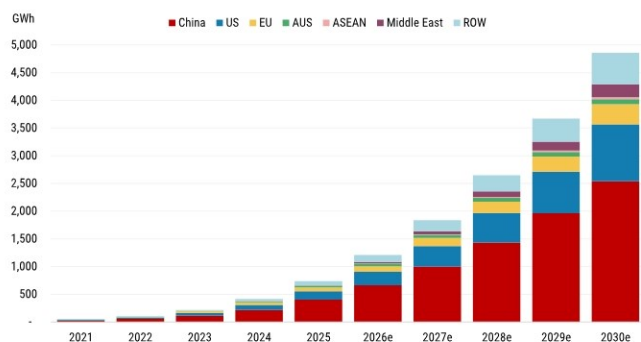
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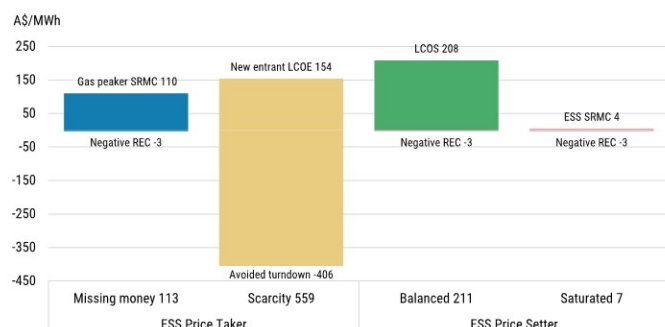
Investment Thesis in 6 Charts

Exhibit 2: ESS installations are growing quickly, to firm AI power demand and balance grids



Sources: Rystad, e = Morgan Stanley Research estimates.

Exhibit 4: We introduce our proprietary framework to analyse merchant ESS revenue opportunities



Source: Morgan Stanley Research. See Exhibit 12 for explanation of terms.

Exhibit 6: We created a global utility stock screen for ESS



Source: Company websites.

Exhibit 3: Helping dampen power market volatility and adding downward pressure to prices



Sources: Australian Energy Market Operator (AEMO), Morgan Stanley Research.

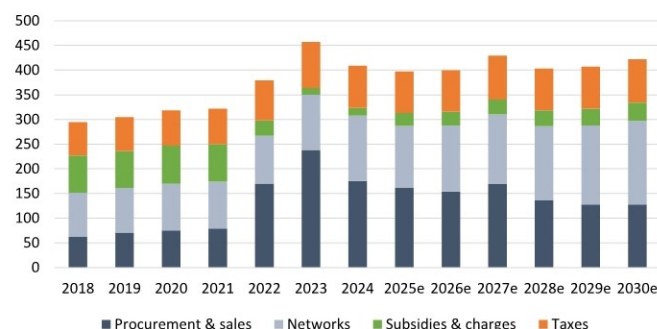
Exhibit 5: We think ESS penetration can materially pressure electricity prices at ~5% of grid capacity



Source: Grid operator websites.

Exhibit 7: With downward pressure to prices for end users and acceptable returns, we see ESS as a utility investor's holy grail.

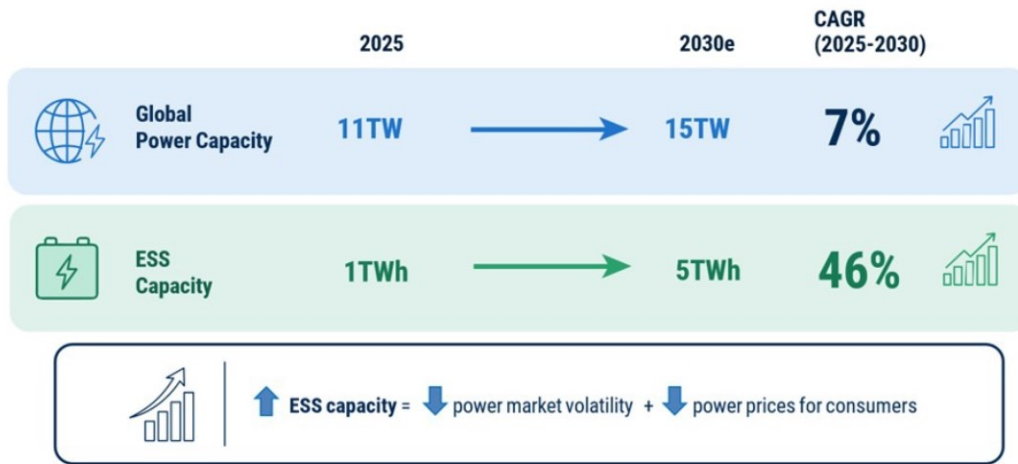
Base Case German Retail Tariff (Eur/MWh)



Source: BNETZA, Morgan Stanley Research estimates

Key Figures

The Global Merchant Battery Opportunity



Global Merchant ESS Markets 2025

Market	Grid	ESS Capacity	TB4 spread	Levelised Cost of Storage 4
	PJM	6GW/18GWh	US\$64/MWh	US\$137/MWh
	ERCOT	20GW/23GWh	US\$51/MWh	US\$137/MWh
	CAISO	16GW/57GWh	US\$40/MWh	US\$137/MWh
	ENTSO-E	46GW/85GWh	US\$102/MWh	US\$77/MWh
	NEM	7GW/15GWh	US\$180/MWh	US\$194/MWh
	NEMS	0.3GW/0.3GWh	US\$77/MWh	US\$103/MWh
	JEPX	0.6GW/2.5GWh	US\$46/MWh	US\$103/MWh
	KPX	1GW/1GWh	US\$30/MWh	US\$103/MWh
	WESM	0.7GW/0.7GWh	US\$33/MWh	US\$103/MWh
	IEX	0.7GW/1.0GWh	US\$42/MWh	US\$103/MWh



Revenue Stack



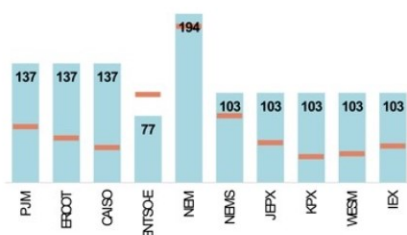
Global Merchant Batteries



Future of Energy

A Morgan Stanley Research
Key Theme of 2026

Exhibit 8: Levelised Cost of Storage (4-hour daily cycle) vs. Top-bottom 4-hour spread (US\$/MWh)



Source: Morgan Stanley Research estimates. blue = LCOS4, orange = TB4.

Why are we writing this report now?

Global demand for electricity is rising, with long-term electrification trends boosted by AI investment ([Powering AI: The 100GW Opportunity \(3 Feb 2026\)](#)), and the need for energy security ([Asia Energy Security and AI: Energy Meets Compute: Supercycle Recharges \(21 May 2026\)](#)). Powering AI and energy security both add a premium on fast installation and firm power.

To meet that urgent demand growth, we see ESS ticking a lot of boxes right now – especially time-to-power and levelised cost ([Power for AI: Flexible Power – The Next Wave of Growth in AI \(17 Mar 2026\)](#)) – and ESS capacity in global power grids is increasing rapidly – 8% of Texas' ERCOT, 3% of the PJM, 4% of Europe's ENTSO-E, and now 12% of Australia's National Electricity Market. We estimate global ESS investment of US\$0.6t to 2030 (US\$200/kWh cost-to-construct with a 10% pa learning curve).

But **costs to consumers have risen** with tighter markets, raising policy intervention risk. This is why we focus on the Australian case study: residential power price caps are falling 3-7% in Australia next year as batteries have contributed to lower and less volatile wholesale prices, but with companies still targeting 11% post-tax returns on largescale batteries vs. 8% observed returns globally.

Technologies that can bring down prices for consumers while generating acceptable returns for investors are the holy grail of utility markets. Right now we think this is ESS, and in this note we zoom in on merchant power markets (a subset of global power markets):

- We introduce a framework for analysing how merchant batteries earn returns, and how to gauge inflection in electricity market price formation as ESS penetration rises;
- We explore the state of play in key merchant power markets, i.e., markets with real-time pricing: PJM, ERCOT, CAISO, ENTSO-E, NEM, NEMS, JEPX, KPX, WESM, and IEX¹; and
- We look at the implications for affordability as the market evolves – we think that ESS grid penetration as low as 5% can materially lower average prices.

1. PJM Interconnection (previously Pennsylvania–New Jersey–Maryland Interconnection); Electric Reliability Council of Texas; California Independent System Operator; European Network of Transmission System Operators for Electricity; National Electricity Market (Australia East Coast); National Electricity Market of Singapore; Japan Electric Power Exchange; Korea Power Exchange; Wholesale Electricity Spot Market (Philippines); Indian Energy Exchange

Follow the volatility. Our thesis is that new entrant ESS dampen power market volatility and reduce average prices, which makes us constructive on ESS investment in markets with high volatility (high variable renewable penetration, high peak-to-average load ratios, growing loads), but cautious once ESS starts to set daily peak prices, which we think can happen surprisingly quickly, as seen in Australia and Texas over the last year.

Through this framework ([Exhibit 21](#)) our preferred global merchant markets for ESS are: PJM, CAISO, ERCOT, and the NEM; and our least preferred are the NEMS, KPX, and JEPX.

Our preferred stocks in this global merchant utility grouping are Talen Energy Corp (TLN.O) and Vistra Corp (VST.N) due to attractive valuations, potential to sign long-term PPAs with data centers at premium prices, and rising power prices in the US – we do not expect our bullish thesis on power prices to be disrupted by BESS given very high load growth (especially in PJM and ERCOT). Our least preferred are ČEZ Group (CEZP.PR) and Korea Electric Power Corporation (015760.KS), based local market conditions and power price outlooks, through this evolving ESS penetration lens.

Exhibit 9: Merchant ESS stock screen

Ticker	MS Analyst	Market cap (US\$b)	Rating	Currency	Price Target	Upside/Downside to PT	%EBITDA impacted by market prices	%EBITDA from batteries	Battery capex (US\$b)
AGL.AX	Koh	4	Underweight	AUD	9.28	8%	84%	6%	0.2
ORG.AX	Koh	13	Underweight	AUD	11.00	1%	47%	8%	0.4
SCIL.SI	Maheshwari	9	Overweight	SGD	7.50	17%	80%	2%	0.2
MER.PS	Maheshwari	10	Overweight	PHP	683.00	20%	20%	2%	0.5
015760.KS	Shin	17	Underweight	KRW	29,000.00	-25%	70%	3%	0.5
ADAI.NS	Achnipalia	19	Overweight	INR	1,133.00	-25%	0%	0%	1.0
JSWE.NS	Achnipalia	10	Overweight	INR	624.00	5%	95%	0%	-
RWEG.DE	Pulleyn	47	Overweight	EUR	66.00	21%	13%	5%	0.6
ENGIE.PA	Sitbon	75	Overweight	EUR	31.00	17%	6%	3%	1.0
ENEI.MI	Pulleyn	113	Underweight	EUR	9.00	-6%	12%	2%	0.2
EDPR.LS	Sitbon	17	Equal-Weight	EUR	13.50	-5%	15%	4%	0.2
IBE.MC	Pulleyn	152	Equal-Weight	EUR	20.00	3%	15%	2%	0.1
VLTA.PA	Sitbon	1	Equal-Weight	EUR	8.00	-5%	1%	2%	0.0
ANE.MC	Sitbon	9	Equal-Weight	EUR	21.00	-9%	12%	3%	0.1
ORSTED.CO	Sitbon	34	Overweight	DKK	225.00	37%	12%	2%	0.3
EDP.LS	Sitbon	21	Equal-Weight	EUR	4.60	5%	15%	1%	0.2
NTGY.MC	Sitbon	31	Overweight	EUR	32.00	12%	7%	1%	0.0
SSE.L	Pulleyn	34	Overweight	GBP	2,950.00	27%	27%	1%	0.1
CEZP.PR	Sitbon	32	Underweight	CZK	880.00	-30%	35%	1%	0.0
SLRS.MC	Sitbon	3	Equal-Weight	EUR	21.00	-11%	24%	0%	0.1
ELE.MC	Pulleyn	44	Underweight	EUR	34.00	-5%	26%	0%	0.1
DRX.L	Lester	4	Equal-Weight	GBP	900.00	14%	3%	0%	-
VST.N	Arcaro	55	Overweight	USD	212.00	32%	84%	2%	0.2
TLN.O	Arcaro	18	Overweight	USD	499.00	29%	47%	0%	0.2
CEG.O	Arcaro	104	Overweight	USD	359.00	25%	84%	1%	0.2
NRG.N	Arcaro	26	Equal-Weight	USD	162.00	21%	47%	0%	0.2
AES.N	Arcaro	10	Equal-Weight	USD	15.00	2%	84%	6%	0.2
NEE.N	Arcaro	182	Overweight	USD	111.00	28%	47%	2%	0.2

Source: Morgan Stanley Research. Prices as of 1 June 2026.

Future research into the Future of Energy

The integrated utility business model. Globally we prefer the risk-return of ratebase or regulated utilities, but merchant markets can reveal efficient power solutions through competition and innovation, and can provide stock alpha when markets inflect. Merchant power markets vary a lot, e.g., different demand patterns (climate, demographics, industrial base), resources (coal, nuclear, gas, hydro, geothermal, wind, solar irradiance), regulatory and policy cycles, and incumbent players. In general, flat power markets tend to lead to more standalone suppliers with competition on billing and bundling, e.g., as seen in the UK, whereas volatile markets tend to encourage vertical integration, with physical generation as a hedge for volatility, e.g., as seen in Australia. Conceptually, higher ESS penetration may drive convergence towards flatter markets, and hence moves away from vertical integration. However, we anticipate multiple cycles of volatility over the course of the energy transition, e.g., as thermal fleets retire and variable renewable energy (VRE) moves in to replace it.

Implications for the global utility value chain (Exhibit 10). We see a long and broad growth runway for power and utilities, with long-term concerns like energy security and energy transition requiring a mix of technologies (e.g., [Global Thematics: Nuclear Renaissance – Key Questions For 2026 \(15 Jan 2026\)](#)) and the development of new technologies (e.g., [Sustainability: Earthshots Series: Sodium-Ion Battery Technology \(16 Apr 2026\)](#)).

Exhibit 10: ESS impact on the utility value chain

Equipment	Contractors	Transmission	Distribution	Billing software	Behind-the-meter
ESS are not a source of energy so don't replace the need for generation for energy additions	ESS installation can often be combined with other projects, e.g., data centres with behind-the-meter ESS	Large-scale ESS are often co-located with plants, e.g., solar attachment	ESS may reduce peak demand and slow Regulated Asset Base growth	Orchestration of behind-the-meter resources (e.g., Virtual Power Plant and Vehicle-to-Grid) adds complexity to billing	Either for back-up or rooftop solar-self consumption, behind-the-meter ESS can add to installation market growth
ESS do compete with gas power for firming, but do not yet compete with gas for long duration backup, e.g., dunkelflaute		ESS may facilitate more VRE rollout, supporting new renewable energy zones	Behind-the-meter ESS may reduce grid demand and slow Regulated Asset Base growth		
ESS may facilitate more VRE rollout		ESS may reduce peak demand and slow Regulated Asset Base growth	There are some low voltage network ESS applications, e.g., community batteries, network support		

Sources: Morgan Stanley Research.

Introducing our Merchant ESS Framework

Top-Bottom 4-hour spreads

We see energy arbitrage as the most significant revenue source for merchant ESS, usually making up 50-70% of total ESS revenue, either directly or via contracts/derivatives. For comparability, we focus on Top-Bottom 4-hour (TB4) spreads, the average spread between lowest priced and highest priced 4-hour periods each day. We describe two scenario bounds to analyse merchant ESS returns:

1. Top4 and Bottom4 prices are independent – so the ESS is a price taker or shadow bidder, with good prospects to generate economic rents ($IRR > WACC$) and fast payback (< 5 years).

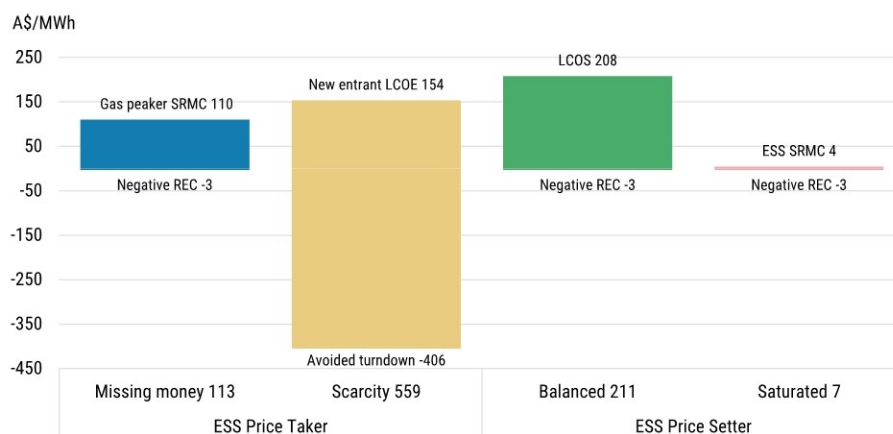
- Top4 price set by
 - Gas peaker short-run marginal cost (SRMC);
 - Revealed new entrant price (LCOE); or
 - Value of Lost Load or market limit price.
- Bottom4 price set by
 - Negative renewable energy certificate price;
 - Avoided thermal turndown cost; or
 - Market floor price.

2. Top4 and Bottom4 prices are related – so the ESS sets either the Top4 or Bottom4 price, and returns are between ESS required return and short-run marginal cost.

- TB4 set by Levelised Cost of Storage (LCOS); or
- TB4 set by Short Run Cost of Storage, e.g., value of a warranted cycle

We provide a worked example for Australia's National Electricity Market (NEM) – see [Exhibit 11](#).

Exhibit 11: Australia TB4 Scenarios



Source: Morgan Stanley Research. See [Exhibit 12](#) for explanation of terms.

The ESS Revenue Stack

Invented in 1799 by Alessandro Volta, chemical electric batteries are not a new technology, but maturing chemistries, inflection in the electric vehicle supply chain, and growing volatility and complexity in power systems has increased the utility battery addressable market.

We see ESS performing multiple functions in power grids around the world:

- **Ancillary services**, e.g., frequency control, inertia, contingency reserve, voltage control/reactive power support;
- **Network services**, e.g., non-wires alternatives, deferral of upgrades, congestion relief, locational or nodal market arbitrage;
- **Demand response**, e.g., emergency/backup services, curtailment abatement;
- **Thermal complement**, e.g., avoiding thermal plant turndowns, heat rate arbitrage, especially as part of an integrated utility fleet;
- **Renewables firming**, e.g., shifting solar to evening peak, firming wind power purchase agreement (PPA) delivery;
- **Energy arbitrage**, e.g., charge at low prices, and discharge at high prices, sometimes structured into off-take contracts, tolling agreements, and derivatives.

The versatility of ESS also complicates the exercise of modelling returns. Many developers use Monte Carlo power market models, and traditional independent power producer tools for risk allocation and financing, e.g., Power Purchase Agreements (PPAs), capacity payment mechanisms, and/or tolling agreements, with limited participation in real-time and derivative power markets (i.e., merchant revenue).

For the purposes of this note we focus on energy arbitrage, as we see this as the dominant source of revenue in most merchant markets, either directly or through contracts or derivatives.

Partly for comparability across markets, and partly as a function of the Earth's daily rotation around the Sun, we zoom in on Top-Bottom 4-hour Spreads (TB4), which is the average of the spread between the lowest priced 4 hours each day, and the highest priced 4 hours for each day in the period under examination. This spread represents the net revenue opportunity for an ESS for energy arbitrage, and has become the reference for a number of early-adopter derivative products in ERCOT and CAISO. Although most utility battery installations to date are in the 1-3 hour storage range, (and there are TB1 and TB2 markets), we focus on TB4 because: (a) TB4 is still a good measure for shorter duration batteries, e.g., a 2-hour battery with 50% foresight; and (b) we believe battery duration will increase over time as battery pack and installation costs continue to fall.

We also anticipate further evolution in derivatives markets and electricity market design (e.g., [Future of Energy - Australia Utilities: ESEM in the NEM \(7 Aug 2025\)](#)), which is always the case in utilities.

Australia's NEM has been an attractive market for ESS owing to:

- The NEM has high renewable penetration (43% in 2025), a high spark/darkspread, and higher forecast volatility with coal closure; and
- The NEM is also one of the world's fastest growth data center markets ([Australia – Data Centre Handbook \(24 Mar 2026\)](#)).

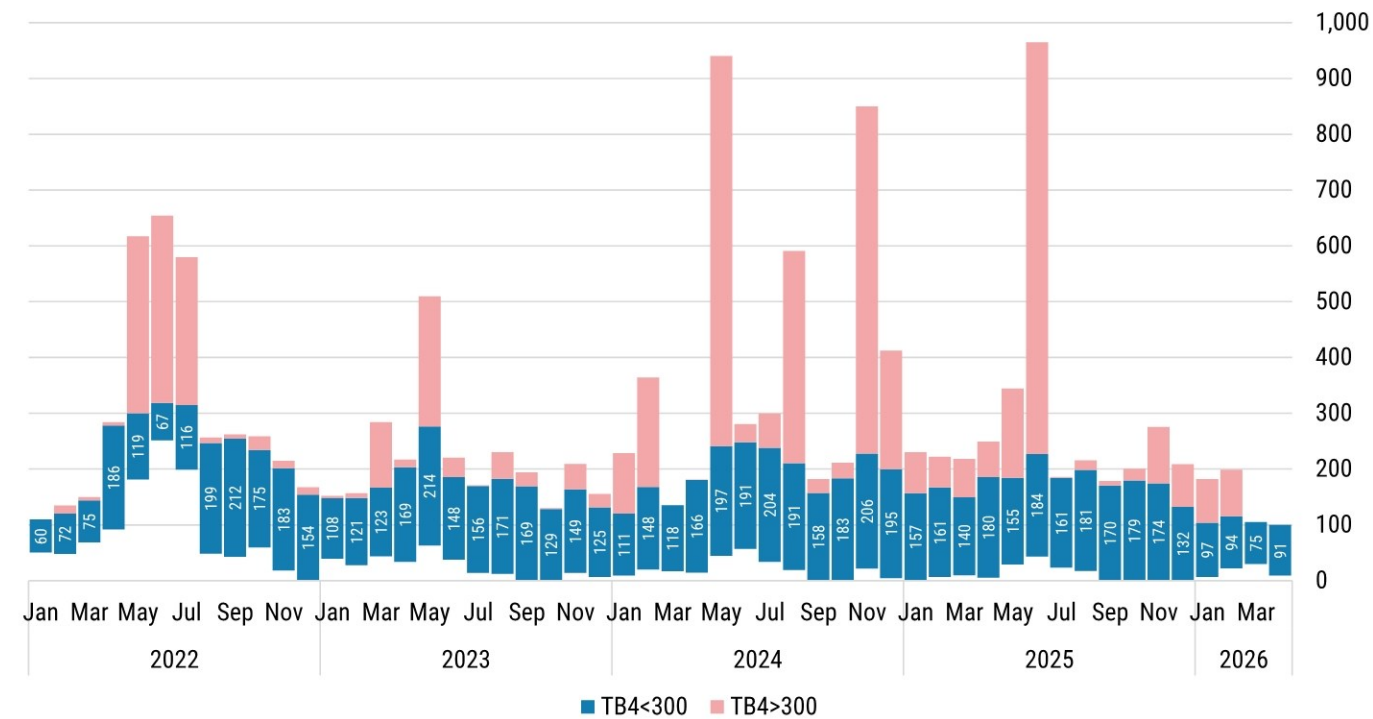
This is how we estimate the Top4 and Bottom4 prices under our two scenario bounds:

Exhibit 12: Australia NEM TB4 scenarios

TB4 emerges from independent Bottom4 and Top4 prices			
TOP4 PRICE	DESCRIPTION	COMMENT	SOURCES
A\$110/MWh	Gas peaker SRMC (A)	Evening peak price, largely set by a gas price of A\$10/GJ x Heat rate 11GJ/MWh.	AEMO
A\$154/MWh	New Entrant VRE (B)	A scarcity price to encourage new investment equal to the LCOE of Firmed Variable Renewable Energy (60% VRE, 8% IRR).	CSIRO
A\$169/MWh	New Entrant CCGT (C)	A scarcity price to encourage new investment equal to the LCOE of Gas Fired Combined Cycle Turbines (Gas price A\$12/GJ, 8% IRR).	CSIRO
A\$23,200/MWh	Market Price Cap (D)	Based on Value of Lost Load estimate. Note that the NEM moves to an administered price cap of A\$600/MWh after ~8 hours at the MPC.	AEMC
BOTTOM4 PRICE	DESCRIPTION	COMMENT	SOURCES
-A\$3/MWh	Negative certificate price (E)	Renewable generators earn Large-Scale Generation Certificates (LGC, a form of Renewable Energy Certificate) for every MWh sent out, so the negative LGC price approximates cash break-even for a zero marginal cost plant, typically a solar plant during daylight hours.	Mercari
-A\$406/MWh	Avoided turndown cost (F)	Thermal plant maintenance costs increase with turndown and ramp up, so thermal plants may pay a price to dispatch and avoid this maintenance. Estimated as A\$1m turndown cost/(30% min gen x ~2.1GW x 4 hours).	AGL
TB4	DESCRIPTION	COMMENT	SOURCES
A\$113/MWh	(A) - (E)	Daylight price set by solar, evening price set by gas peaker.	
A\$560/MWh	(B) - (F)	Negative price set by a thermal plant avoiding a turndown, peak price set under scarcity conditions (revealed new entrant price).	
TB4 compresses to prices set by ESS			
TB4	DESCRIPTION	COMMENT	SOURCES
A\$211/MWh	LCOS	Required revenue for a 4-hour ESS (US\$248/kWh cost-to-construct, 8% IRR)	CSIRO
A\$7/MWh	ESS SRMC	Value of a warranted cycle. Estimated at A\$178/kWh 2035 Battery pack replacement Cost / (6,000 warranted cycles x 4 hours)	CSIRO

Sources: Morgan Stanley Research and as shown above in [Exhibit 11](#).

Exhibit 13: Australia (NSW) average TB4 (A\$/MWh)



Sources: Australian Energy Market Operator (AEMO), Morgan Stanley Research. We separate the portion of TB4 above A\$300/MWh as this is captured within the cap market, a separate derivative market..

Forecasting pool prices – beyond Supply and Demand

In traditional energy-only merchant power market analysis we rank the generation fleet by relative cost (the merit order) to estimate a supply curve, and then run observed demand curves over the supply curve to generate price forecast curves.

- For typical integrated utility stock market analysis with a 2-3 year earnings forecast, we find this level of analysis is sufficient to sanity check risk skew vs. observed forward curves. [Video: Australia Integrated Utilities: Avoided Cap Costs \(6 Mar 2026\)](#)
- For developers, financiers, and utilities looking to assess project and portfolio returns over contract and plant lives, they turn to professional power market forecasters who incorporate dynamic and Monte Carlo supply and demand scenarios incorporating assumptions on future technology costs (learnings curves), fuel costs, and policy (renewable targets) to arrive at their long-term price scenarios.

But in both cases, we can start by considering two basic market states to solve for energy prices:

- **Scarcity markets**, where prices rise high enough to encourage new investment, known as a Revealed New Entrant price, which should be higher than the levelised cost of new entrant plant; and
- **Over-supplied markets**, where prices fall to the cash cost of the marginal price-setting plant, also known as a Missing Money market, as the marginal price-setting plant earns only its cash flow break-even but no return on capital, or return of capital, encouraging the plant owner to improve plant efficiency and improve the plant's position in the merit order, or to retire the plant (ideally with provisioning for rehabilitation). Note that the short-run marginal cost of some thermal plants can be negative, i.e., the generator pays to be allowed to dispatch power so as to avoid incremental maintenance costs associated with shut down and restart.

In a traditional thermal power market, we use some shorthand concepts to evaluate marginal plant economics

- Darksread = power price - cost of coal x heat rate
- Sparksread = power price - cost of gas x heat rate
- Cleansread = power price - cost of gas x heat rate - cost of carbon x emissions intensity
- Quarksread = power price - cost nuclear fuel x heat rate
- Barksread = power price - cost of biomass fuel x heat rate

Where heat rates are fuel quantities required to generate 1MWh of electricity, the inverse of fuel efficiency (e.g., MWh of electricity generated per MMBtu of gas). In a sense, a power market solves for power demand by optimising between different fuels and their efficiencies.

Capacity markets

Conceptually an efficient energy-only market should reach an equilibrium with enough capacity to meet demand at all but the highest demand points in a year (the point known as the revealed Value of Lost Load), however electricity is an essential service with economic productivity benefits, so most merchant markets include mechanisms to socialise the cost of the most expensive capacity required to meet peak demand (daily and annual) and ensure reliability and security.

In markets with a convex load duration curve, peaking plants can enjoy relatively high capacity factors, but in concave load duration curve markets, peakers may need additional payments to cover availability costs, e.g., capacity payments, and/or sold option positions. The value of capacity should theoretically fall somewhere at or between:

- The expected value of high-priced events in the energy only market; and
- The minimum required revenue to cover plant availability, estimated from levelized costs or revealed via capacity auctions.
- Many markets also include an operating reserve as a last line of emergency power, as well as a smoothing mechanism for aged plant retirement.

Residual Demand

The advent of variable renewable energy (VRE), often via renewable portfolio standards (RPS), adds further sub-markets to the energy and capacity markets just described, being the markets for VRE and for firming (sometimes called flexible power or dispatchable power). Total load less VRE is firming demand, sometimes known as Residual Demand.

- Wind power is slightly diurnal but largely stochastic, with some seasonality (depending on latitude and local geography) and cyclicity (e.g., El Niño/La Niña).
- Solar power follows a daily pattern, with stochastic interruption (cloud, precipitation, avian deposit), inverse temperature productivity (more efficient at lower temperatures) and multi-decadal Schabe cycle effects (~11 year sunspot cycle). With ~20-30-year plant useful lives, we ignore the effect of precession for solar power analysis.
- Dispatchable power includes technologies with varying degrees of controllability, or ability to power up on demand, measured in ramp rates (MW/h), which vary from sub second (Chemical ESS), sub minute (hydro, flow battery), sub hour (gas reciprocating, sub 2-hour (gas open cycle), and sub 4-hour (gas combined cycle, some coal and nuclear).

Stock Implications

Incorporating ESS in earnings & valuation

We set out our stock screen for impacted utilities in our global coverage in [Exhibit 14](#).

- We incorporate electricity prices and margins in our earnings estimates as a matter of course, having regard to forward curves and our own proprietary grid models.
- To the extent that we see downside risk to prices as ESS installation accelerates, we will look to decrease earnings and EPS estimates over time, as we've done in Australia, where our estimates are generally the lowest on the Street: [Australia Integrated Utilities: Cyclical Pain, Stochastic Gain \(20 Feb 2026\)](#).
- Where material, we also look to incorporate ESS earnings in our forecasts, with bull, base, and bear cases driven by our proprietary Merchant ESS Framework.
- The base case is that ESS earn a WACC return so are broadly NPV neutral. The bull case is that ESS can ride on the spread between thermal turndown avoidance vs. scarcity pricing. The bear case is a saturated ESS market, where batteries cannibalise the energy arbitrage opportunities (the Ouroboros Effect).
- We have also constructed a number of proprietary standalone ESS models, which we can share with investors on request.

Exhibit 14: Global Merchant ESS Stock Screen

Ticker	MS Analyst	Market cap (US\$b)	Rating	Currency	Price Target	Upside/Downside to PT	%EBITDA impacted by market prices	%EBITDA from batteries	Battery capex (US\$b)
AGL.AX	Koh	4	Underweight	AUD	9.28	8%	84%	6%	0.2
ORG.AX	Koh	13	Underweight	AUD	11.00	1%	47%	8%	0.4
SCIL.SI	Maheshwari	9	Overweight	SGD	7.50	17%	80%	2%	0.2
MER.PS	Maheshwari	10	Overweight	PHP	683.00	20%	20%	2%	0.5
015760.KS	Shin	17	Underweight	KRW	29,000.00	-25%	70%	3%	0.5
ADAI.NS	Achnipalia	19	Overweight	INR	1,133.00	-25%	0%	0%	1.0
JSWE.NS	Achnipalia	10	Overweight	INR	624.00	5%	95%	0%	-
RWEG.DE	Pulleyn	47	Overweight	EUR	66.00	21%	13%	5%	0.6
ENGIE.PA	Sitbon	75	Overweight	EUR	31.00	17%	6%	3%	1.0
ENEI.MI	Pulleyn	113	Underweight	EUR	9.00	-6%	12%	2%	0.2
EDPR.LS	Sitbon	17	Equal-Weight	EUR	13.50	-5%	15%	4%	0.2
IBE.MC	Pulleyn	152	Equal-Weight	EUR	20.00	3%	15%	2%	0.1
VLTSA.PA	Sitbon	1	Equal-Weight	EUR	8.00	-5%	1%	2%	0.0
ANE.MC	Sitbon	9	Equal-Weight	EUR	21.00	-9%	12%	3%	0.1
ORSTED.CO	Sitbon	34	Overweight	DKK	225.00	37%	12%	2%	0.3
EDP.LS	Sitbon	21	Equal-Weight	EUR	4.60	5%	15%	1%	0.2
NTGY.MC	Sitbon	31	Overweight	EUR	32.00	12%	7%	1%	0.0
SSE.L	Pulleyn	34	Overweight	GBP	2,950.00	27%	27%	1%	0.1
CEZP.PR	Sitbon	32	Underweight	CZK	880.00	-30%	35%	1%	0.0
SLRS.MC	Sitbon	3	Equal-Weight	EUR	21.00	-11%	24%	0%	0.1
ELE.MC	Pulleyn	44	Underweight	EUR	34.00	-5%	26%	0%	0.1
DRX.L	Lester	4	Equal-Weight	GBP	900.00	14%	3%	0%	-
VST.N	Arcaro	55	Overweight	USD	212.00	32%	84%	2%	0.2
TLN.O	Arcaro	18	Overweight	USD	499.00	29%	47%	0%	0.2
CEG.O	Arcaro	104	Overweight	USD	359.00	25%	84%	1%	0.2
NRG.N	Arcaro	26	Equal-Weight	USD	162.00	21%	47%	0%	0.2
AES.N	Arcaro	10	Equal-Weight	USD	15.00	2%	84%	6%	0.2
NEE.N	Arcaro	182	Overweight	USD	111.00	28%	47%	2%	0.2

Source: e = Morgan Stanley Research estimates. Prices as of 1 June 2026.

North America

The US Independent Power Producers (IPPs) generally have limited exposure to battery energy storage systems (BESS) and are largely concentrated on thermal generation (fossil and nuclear). VST has the highest exposure to batteries in the group at 2% of its portfolio followed by CEG at 1.5%, while NRG and TLN do not have exposure currently. While the greenfield pipeline of these companies is mostly concentrated on gas-fired generation, they may opportunistically consider BESS solutions, such as TLN's strategic partnership with Eos Energy (EOSE, not covered) to deploy zinc-based BESS at TLN's facilities across Pennsylvania. TLN submitted over 3 GWh of new long-duration energy storage projects into the PJM Interconnection queue, but no final investment decision has been made at this point. CEG also included new batteries among the technologies that comprise its 9,350 MW incremental capacity through 2030+.

On the renewables side, NEE (OW) and AES (EW – recently announced an agreement to be acquired by a consortium led by BlackRock) have unregulated businesses and are usually seen as the main vehicles to play clean energy developers, given the scarcity of listed US renewables pure plays. NEE's unregulated portfolio is ~12% comprised of BESS and AES's is ~15% - as a percentage of the total companies' EBITDA we estimate BESS contribution is closer to ~4% and ~6%, respectively.

We expect this mix to rise going forward given the increasing attachment rate of batteries to solar projects to replicate a generation profile closer to baseload, as well as more frequent standalone batteries projects. While technically merchant players, developers like NEE and AES typically have long-term PPAs that support their renewables plus storage fleet and thus have much more predictable returns compared to IPPs' merchant assets.

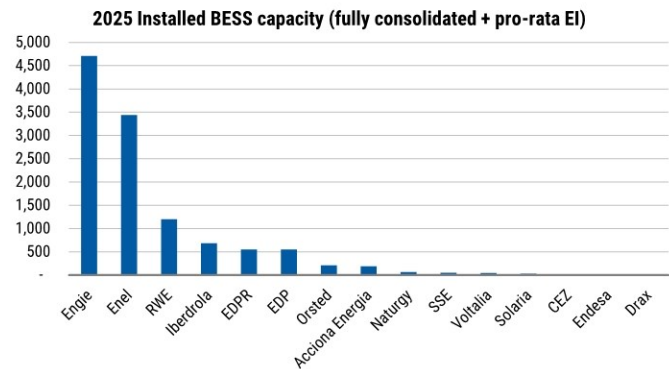
Europe

In Europe, listed utilities & clean energy names under our coverage still have limited exposure to the BESS theme, largely due to their diversified business models and the early stage of development of the industry in Europe.

We would highlight Engie (Overweight), RWE (Overweight) and EDPR (Equal-weight) as amongst the most exposed names to the theme under our coverage, although we note that a significant part of their installed BESS capacity and pipeline is in the US, not in Europe. For purer European exposure, we think Drax and Solaria could be more relevant exposed names (both Equal-weight rated).

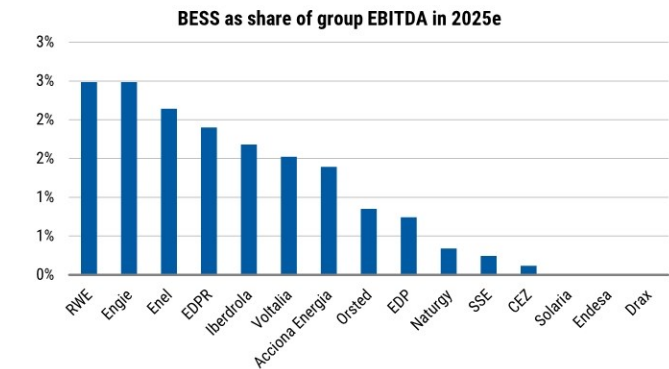
We do expect significant growth in BESS capacity for a number of our companies as shown below. However, we still think this will represent a relatively small share of EBITDA for most of these groups, even by 2030.

Exhibit 15: Engie has the highest installed BESS capacity amongst the names we cover



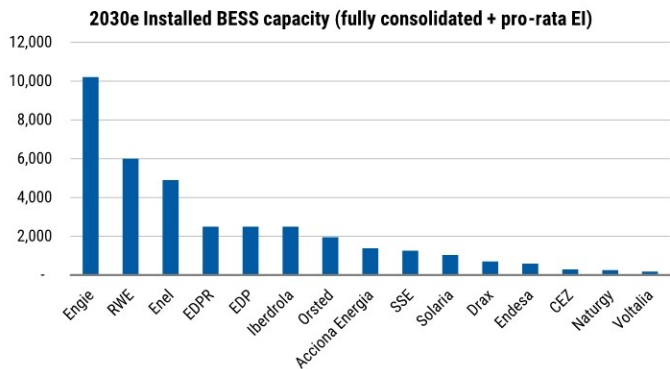
Source: Company data, Morgan Stanley Research estimates

Exhibit 17: RWE and Engie have the highest EBITDA exposure to BESS in 2023, both around 2% of group EBITDA



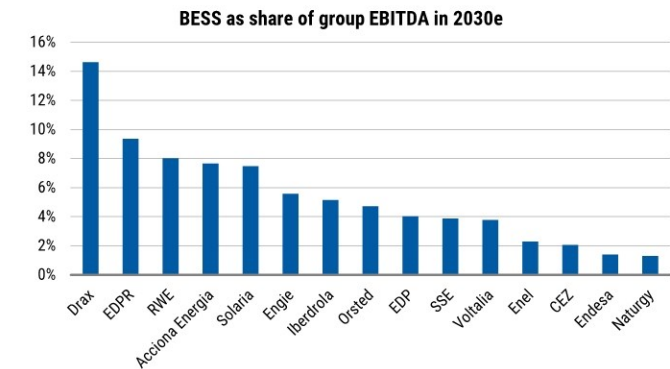
Source: Morgan Stanley Research estimates

Exhibit 16: And we expect the group to lead in terms of growth, together with RWE in coming years



Source: Morgan Stanley Research estimates

Exhibit 18: We expect smaller entities to be most exposed at BESS in 2030, both around 2% of group EBITDA



Source: Morgan Stanley Research estimates

Australia

Exhibit 19: Battery earnings contributions (base case)

A\$m EBITDA	FY26e	FY27e	FY28e
AGL	75	125	250
%	4%	6%	13%
ORG	98	299	407
%	3%	10%	13%

Sources: Company reports, e = Morgan Stanley Research estimates.

Base case returns. The integrated utilities in our coverage target post-tax returns of 8-11% on generation and ESS investment. AGL targets the upper end of that range for its on balance sheet ESS investments. ORG targets the upper end of that range for the first half of plant useful lives. We see these returns as accretive (observed returns 8%) and an increasing portion of earnings ([Exhibit 19](#)).

AGL on balance sheet ESS is ~1.3GW/2.3GWh and ORG ~1.0GW/3.5GWh. Both companies also have off-balance sheet and orchestrated fleets, but neither company splits out asset-level earnings. Over the forecast period, we incorporate ESS EBITDA in our AGL and ORG base cases based on 11% post-tax returns and 20-year depreciation – see: [Video: Australia Utilities: Same Battery Time \(6 Mar 2025\)](#).

Off-balance sheet & capital re-cycling. Utilities can enter into a range of structures to keep ESS off-balance sheet, e.g., swap agreements, virtual capacity agreements, tolling agreements, off-take contracts, and contracts for dispatch.

- AGL contracted 200MW/400MWh of batteries in 2019 in undisclosed arrangements, and ORG contracted 500MW/1,560MWh of batteries in 2024, which have now been brought on-balance sheet as leases as Australian accounting standards² require capitalisation of right of use leased assets and corresponding lease liabilities where the lessee controls the asset.
- AGL divested its 20% interest in Tilt Renewables (but for a 0.1% share) in November 2025 after establishing the renewables development vehicle in 2016. AGL is currently in the process of establishing a new third party funding vehicle for its developments. Given the recycling rates to date, investors typically focus on supply earnings and don't look at AGL build multiples or development earnings.

Household Batteries. The Australian Government targets >2 million household battery installations by 2030³ (originally a 1m target, and vs. 0.45m as of February 2026).⁴ The Government provides an upfront subsidy of ~A\$372/kWh on 5-100kWh installations. The subsidies taper down over time and for larger installations – see [Video: Australia Utilities: Are batteries far far away? \(Episode 2\) \(7 May 2025\)](#).

2. https://www.aasb.gov.au/admin/file/content105/c9/AASB16_02-16.pdf

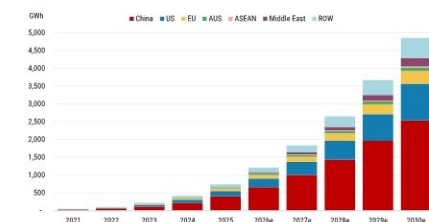
3. <https://www.dceew.gov.au/energy/programs/cheaper-home-batteries>

4. <https://cer.gov.au/markets/reports-and-data/small-scale-installation-postcode-data>

State of Charge – Grid Overviews

Flat AI load + VRE supply → Flexible Power

Exhibit 20: Cumulative ESS installations (GWh)



Sources: Rystad, Morgan Stanley Research (e) estimates

Powering AI has catalyzed investment in the global power value chain to the tune of US \$1.5t to 2030, we estimate, now with a focus on flexible power ([Power for AI: Flexible Power – The Next Wave of Growth in AI \(17 Mar 2026\)](#)).

We provide an ESS state of play across major merchant power markets ([Exhibit 21](#)), ranking markets by:

- Volatility (VRE penetration, peak-to-average demand ratios),
- ESS penetration as a percentage of daily peak demand,
- Required revenue (LCOS₄), vs. observed TB4 spreads, and
- Revenue stack options, e.g., capacity contracts, ancillary services.

Exhibit 21: Global Merchant ESS Markets 2025

Market	Grid	Capacity (GW)	Demand (TWh)	VRE penetration (%)	Average demand (GW)	Peak-to-average (x)	ESS capacity (GW)	ESS capacity (GWh)	ESS/peak (%)	Average price (US\$/MWh)	TB4 (US\$/MWh)	LCOS ₄ (US\$/MWh)	Revenue stack
USA	PJM	193	800	15%	95.0	1.5x	5.8	17.5	12%	47	64	137	Capacity prices, Capacity, Arbitrage, Ancillary Services
USA	ERCOT	249	464	36%	57.0	1.7x	19.9	22.9	50%	33	51	137	Arbitrage, Caps/Avoided Caps, Ancillary Services, Avoided thermal turndown
USA	CAISO	89	239	49%	29.0	1.8x	16.3	56.9	70%	32	40	137	Arbitrage, Ancillary Services, Capacity Markets, Balancing Services
Europe	ENTSO-E	1,268	2,977	30%	315.0	1.3x	46.1	85	49%	90	102	77	Arbitrage, Ancillary Services, Capacity Markets, Balancing Services
Australia	NEM	102	218	43%	25.0	1.5x	7.1	15	57%	58	180	194	Arbitrage, Caps/Avoided Caps, Ancillary Services, Avoided thermal turndown
Singapore	NEMS	13	58	4%	7.5	1.2x	0.3	0	22%	90	77	103	Capacity contracts, Arbitrage
Japan	JEPX	394	803	24%	95.0	1.4x	0.6	2	2%	74	46	103	Capacity contracts, Arbitrage
South Korea	KPX	148	551	9%	66.0	1.4x	1.0	1	4%	75	30	103	Capacity contracts
Philippines	WESM	28	103	12%	14.0	1.6x	0.7	1	8%	67	33	103	Capacity contracts, Arbitrage
India	IX	522	1,729	19%	205.0	1.5x	0.7	1	1%	46	42	103	Capacity contracts

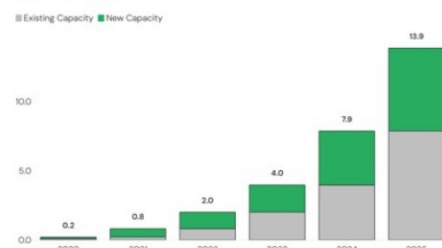
Sources: Grid operators as shown above, Morgan Stanley Research estimates.

North America

The US power system is comprised of several Regional Transmission Organizations (RTOs) with distinct market dynamics and BESS attractiveness. The most relevant

RTOs in the unregulated space are ERCOT (the Texas power system) and PJM (comprised of 13 states in the mid-Atlantic region), which are the two key markets for the IPPs. CAISO (the California power system) has meaningful BESS penetration, but more challenging to get exposure to through listed stocks.

Exhibit 22: BESS additions in ERCOT since 2020



Source: Modo Energy, ERCOT.

ERCOT's BESS economics are mainly driven by power prices volatility and scarcity pricing hours. ERCOT is an energy-only market, with potentially high spread between

peak and off-peak prices and power prices that can reach up to US\$5,000/MWh during scarcity hours. Volatility is highly dependent on weather (especially in the summer), which has been relatively mild in 2025 and YTD. Over the last years, Texas has seen a large expansion of batteries, supported by renewables competitiveness and the IRA subsidies of 30% of capex as Investment Tax Credits (ITCs), plus potential bonuses of another 10-20% if the project is located in an energy community and complies with domestic content rules. That expansion contributed to reduce intra-day volatility and keep forward prices at a level we think is well below fundamentals. In the latest conference calls, different IPPs pointed to BESS as one reason why ERCOT prices are down YTD and mentioned that BESS developers' recent returns have been weak, which could lead to a slow down in

Exhibit 23: PJM's capacity accreditation by source (2028/29 auction)

Onshore Wind	34%
Offshore Wind	60%
Fixed-Tilt Solar	7%
Tracking Solar	10%
Landfill Intermittent	50%
Hydro Intermittent	35%
4-hr Storage	59%
6-hr Storage	68%
8-hr Storage	71%
10-hr Storage	78%
Demand Resource	91%
Nuclear	96%
Coal	85%
Gas Combined Cycle	78%
Gas Combustion Turbine	67%
Gas Combustion Turbine Dual Fuel	79%
Diesel Utility	93%
Steam	75%
Waste to Energy Steam	84%
Oil-Fired Combustion Turbine	83%

Source: PJM.

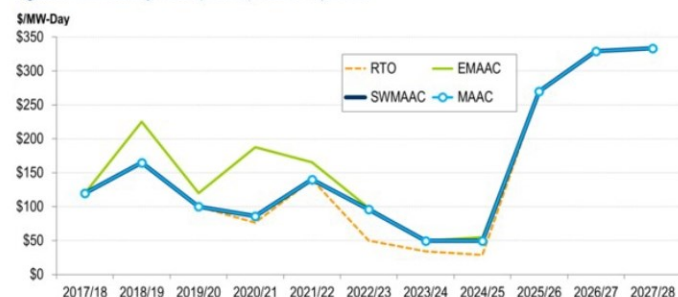
developments going forward. Morgan Stanley estimates that BESS in ERCOT would be economic at a TB2 spread of US\$90-100/MWh.

PJM incentivizes BESS through the fixed revenues of its capacity market. Power generation companies operating in PJM have a variable revenue stream from the energy market as well as a fixed component from the capacity market. The capacity prices are set for 12 month periods through auctions where the clearing price for all participants is based on the last bid to fulfill PJM's load forecast (and target reserve margin). The bids are adjusted by a capacity accreditation factor (i.e. ELCC), where batteries receive a 59-78% accreditation ([Exhibit 23](#)). The latest two auctions cleared at a pre-defined cap price, with the most recent one clearing less capacity than PJM's requirement.

Volatility in PJM's energy market is usually more muted than ERCOT (in part due to worse renewables economics) and not enough to incentivize meaningful batteries addition on its own. The capacity revenue component has been modest or negligible until the 2024/25 auction (see [Exhibit 24](#)), but prices increased 9x in the following auction and remained elevated since then. The BESS capacity clearing the auction responded to the price increase ([Exhibit 25](#)) – the latest US\$333/MW-day capacity price is equivalent to US\$49/MWh assuming 4-hours dispatch per day and its 59% capacity accreditation factor.

Exhibit 24: PJM auction historical prices (\$/MW-day) for major delivery areas

Figure 1. BRA Clearing Prices by Delivery Year for Major LDAs



Source: PJM.

Exhibit 25: BESS capacity cleared in recent PJM capacity auctions

Table 6. Offered and Cleared MWs by Type for RPM and Committed FRR for Previous BRAs

Type	Offered and Cleared UCAP									
	2024/25		2025/26 (Reflects ELCC Accreditation)		2026/27 (Reflects ELCC Accreditation)		2027/28 (Reflects ELCC Accreditation)		2027/28 - 2026/27 Change	
	Offered	Cleared	Offered	Cleared	Offered	Cleared	Offered	Cleared	Offered	Cleared
Coal	35,114	31,532	30,081	30,081	30,948	30,948	30,366	29,766	(582)	(1,182)
Distillate Oil (No.2)	2,776	2,674	2,408	2,408	2,608	2,608	2,421	2,421	(187)	(187)
Gas	85,469	83,258	66,354	66,354	63,377	63,377	62,800	62,634	(577)	(743)
Nuclear	31,835	31,629	30,549	30,549	30,562	30,562	30,552	30,552	(10)	(10)
Oil	2,493	2,220	578	578	1,155	1,155	1,167	1,167	12	12
Solar	4,234	4,232	1,337	1,337	1,584	1,567	1,481	1,465	(103)	(103)
Water	6,137	6,137	5,365	5,361	5,597	5,597	6,002	6,002	405	405
Wind	1,396	1,396	2,618	1,676	4,507	3,717	4,144	3,526	(363)	(191)
Battery/Hybrid	36	36	14	14	35	35	205	205	171	171
Other	1,153	1,153	911	911	899	899	1,005	1,005	106	106
Demand Response	10,334	8,180	6,363	6,342	5,795	5,795	7,641	7,641	1,847	1,847
Aggregate Resource	503	503	327	273	58	49	-	-	(58)	(49)
Total (without EE)	181,481	172,951	146,905	145,883	147,125	146,309	147,786	146,385	661	76
Energy Efficiency	8,417	7,669	1,460	1,460	-	-	-	-	NA	NA

Source: PJM.

Exhibit 26: Utilities large loads pipeline in advanced stage

	4Q25 Update	1Q26 Update
AEE	4	4
AEP	56	63
AES*	2	2
CMS	7	7
CNP	11	12
D	21	22
DTE	4	4
DUK	9	15
ED	0	0
EIX	1	1
ES	0	0
ETR	7 to 12	7 to 12
EXC	18	18
FE	13	15
IDA	NA	NA
MGEE	0	0
NEE*	9	12
PCG	4	5
PEG	3	3
PNW	5	5
PPL	29	32
SO	20	23
SRE	38	127
XEL	5	5
Sum	271	387

Source: Companies data, Morgan Stanley Research. Note: (*) regulated portions only.

The US power demand forecasts have spiked across all energy markets. Following 15 years of stagnant power demand, load growth is significant accelerating on the back of AI demand coupled with other tailwinds such as industrial on-shoring and electrification. Our Thematic Research team estimates 455 TWh of AI power demand in the US in 2028, growing to 10% of the total electricity demand in the country (from virtually zero a few years ago). Also, regulated utilities in our coverage reported an aggregate 387 GW of large loads in advanced stage pipeline, which keeps rising every quarter.

Power prices are still too low to incentivize the new generation needed to match the rising demand. Forward power prices are at ~US\$55/MWh in ERCOT and ~US\$80/MWh in PJM (incl. capacity revenues), still below the US\$100+/MWh LCOE we estimate for a new CCGT at the current capex levels. As power prices go up, we think solar + batteries solutions will become increasingly in the money across the RTOs, even after the renewables subsidies phase out for new projects (BESS subsidy remains available into the next decade). They also offer quick time-to-power relative to a new CCGT (whose turbines lead time are exceeding 4 years), although increasing interconnection queue is becoming a risk to fast deployment. Batteries capex in the US are elevated relative to other regions (we see US\$200-250/kWh currently), mostly due to tariffs on China.

Europe/UK

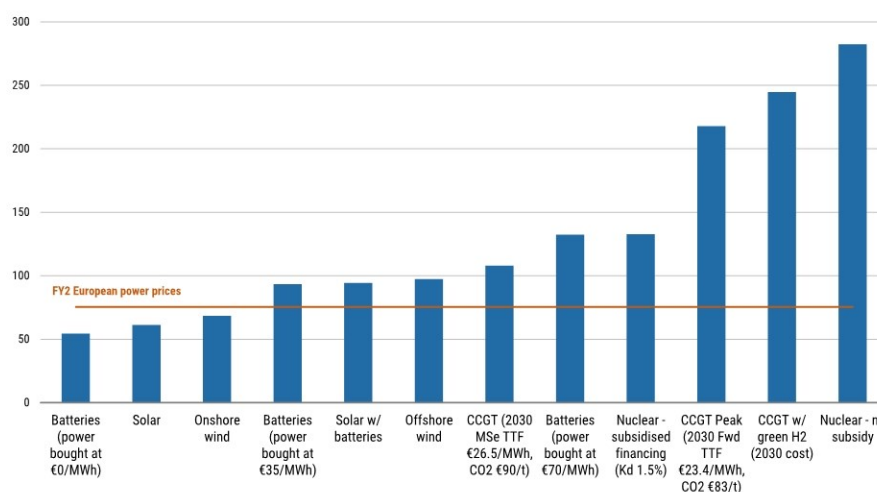
Strong decline in unitary capex levels for utility-scale BESS has driven a strong decline in LCOS in Europe. The unitary cost of batteries has come down rapidly in the past few years in Europe as a result of falling Asian prices (Europe's supply chain relies largely on imports from the region) as well as standardisation & industrialisation of projects. We estimate that it has come down by >50% from >€0.25mn/MW in 2023 to €0.11mn/MW in 2026.

We estimate that this has resulted into a decline in the LCOE of hybrid solar/BESS projects in Europe from >€130/MWh to ~€95/MWh on average in 2026. We also think that LCOS has come down from >€115/MWh to ~€55/MWh over the same time frame.

We now see hybrid solar and BESS projects as cost competitive with offshore wind projects in Europe and getting closer to the average level of wholesale power prices in the region, although still above these levels - see [Exhibit 27](#).

Exhibit 27: The LCOE of hybrid solar & BESS projects has been coming down significantly

Average LCOE (€/MWh) by technology (for a new build project) in Europe

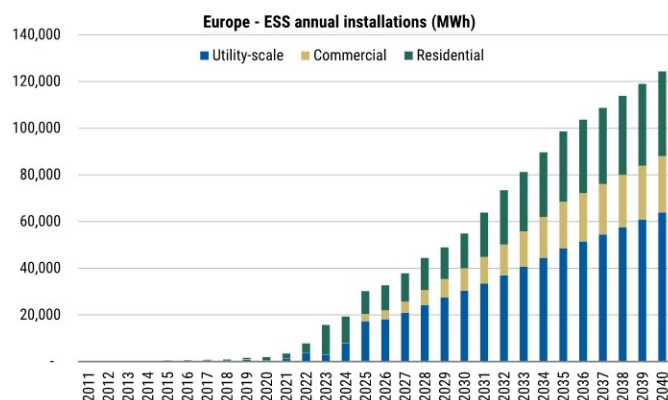


Source: Morgan Stanley Research estimates

Together with a clear need for higher flexibility in Europe's power system, we think this has been driving a pick up in BESS installations. We show on [Exhibit 28](#) and [Exhibit 29](#) that total annual BESS installations have gone up from 7.8 GWh in 2022 to 30 GWh in 2025 in Europe, with an increase across the board, in utility-scale, commercial and residential segments.

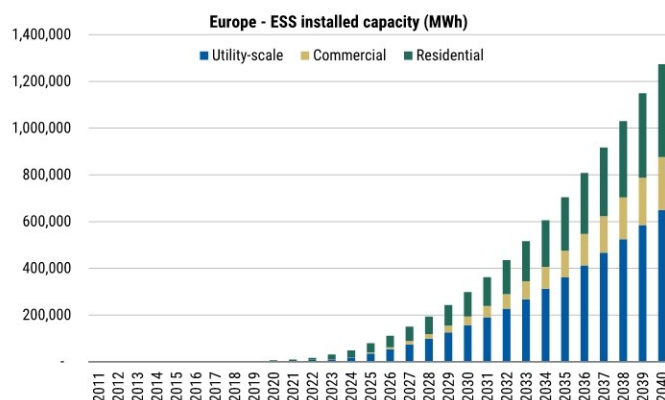
We expect the roll-out of BESS to continue in coming years. We think total annual additions could reach 55 GWh in 2030, leading to a total installed base of >300 GWh in 2030 vs. 85 GWh in 2025. In particular, we expect the utility-scale market to be multiplied by 4x from ~35 GWh to >155 GWh.

Exhibit 28: We expect total annual additions of BESS to keep increasing in Europe...



Source: BNEF, Morgan Stanley Research estimates

Exhibit 29: ...leading to a total installed BESS base of >300 GWh in 2030 vs. 85 GWh in 2025



Source: BNEF, Morgan Stanley Research estimates

Which business model for utility-scale BESS in Europe? Utility-scale batteries in Europe have multiple revenue streams and, contrary to some preconceived ideas, do not solely rely on spot price arbitrage. In most markets, we believe the majority of revenues captured come from ancillary services (typically FCR and aFRR) and are complemented by spot arbitrage revenues, capacity markets as well as potentially other mechanisms/revenue sources.

Exhibit 30: Germany shows high power price spreads in a same day, creating revenue opportunities for batteries



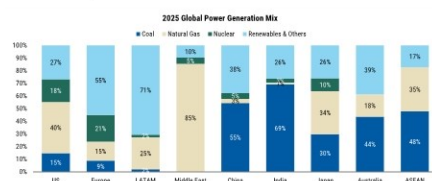
Source: ENTSO-E, Morgan Stanley Research estimates

More and more projects have been getting developed, but we still see a number of utilities in the sector reluctant to allocate a lot of capital to battery developments in Europe. Generally speaking, the market is not considered as structured enough yet and thus funding battery projects still comes with a higher cost of capital than for usual renewable projects. Ancillary services revenues remain volatile and so do spot price arbitrage opportunities. Capacity mechanisms or similar structured schemes are not present in all markets unfortunately. They exist in UK, Italy, Poland, Belgium and France for example. And such a scheme could emerge from Spain in coming months too.

ASEAN

Utility-scale BESS deployment in Southeast Asia is accelerating as grids grapple with rising solar penetration, peak demand growth, and energy security needs. Revenues today are largely capacity payment based or fixed ROCE on capex (EPC + hardware), but the medium-term stack increasingly includes contracted availability, reserve services, and grid-support payments as market rules evolve. A significant portion of incremental BESS are also integrated with renewables to support a local round-the-clock clean power system to reduce load on the main transmission grid. We estimate projects in the region earn ~7-8% ROCE on capital employed.

Exhibit 31: Limited renewable deployment in ASEAN limits BESS rollout in the region



Source: Statistical Review of World Energy, Morgan Stanley Research

Singapore: Early adopter with front-of-the-meter ESS procured for contingency reserves and fast frequency response; revenues are largely contracted and availability-based, anchored by system reliability mandates. Singapore operates a spot power market where power is traded every 30mins leaving room for arbitrage opportunities in the future, we estimate peak to trough spreads to average US\$80/MWh.

Philippines: Among the most advanced ESS markets in ASEAN, with batteries paired with solar and peakers to provide capacity, regulation, and ramping; revenue stacking is emerging through ancillary and reserve services. The Philippines, like Singapore, has a spot power market making arbitrage opportunities possible, however spreads remain limited at US\$30/MWh.

Indonesia: Utility-scale ESS is being deployed alongside renewables and gas to stabilise weak grids across islands; revenue remains EPC-led with limited merchant upside near term. Power prices are regulated limiting arbitrage opportunities.

Malaysia: Initial utility-scale ESS rollouts are policy-driven, focused on renewables integration and peak support; revenues are primarily fixed-contract installations with future grid-services upside. Power prices are regulated limiting arbitrage opportunities.

Vietnam: Rapid solar buildout is forcing ESS deployment for curtailment reduction and grid stability; utility-scale projects are early-stage and dominated by EPC revenues. Power prices are regulated limiting arbitrage opportunities.

Thailand: Slowest adopted in the region given significant flexible gas fired power capacity which has ability to flex with demand. Gradual ESS adoption centred on grid support and renewable balancing; utility-scale systems are mostly state-or utility-backed with limited merchant exposure for now. Power prices are regulated limiting arbitrage opportunities.

Australia

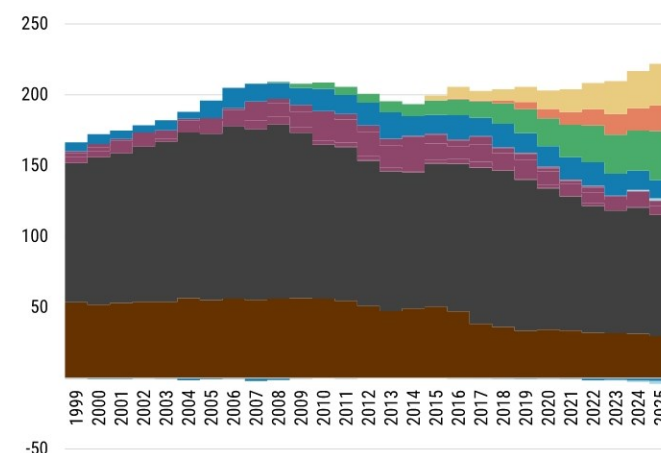
Australia's east coast electricity grid, the NEM, is primarily an energy-only market with capacity payments only for emergencies (the Reliability & Emergency Reserve Trader scheme). Incentives to invest in low utilisation capacity come from the derivatives and contract markets based on the expected value of high but infrequent price events, e.g., A \$300/MWh cap options. The NEM pool price also has an inbuilt measure to socialise volatility, known as the Market Price Cap (MPC, the maximum pool price in any single 5-minute interval, currently A\$20,300/MWh) and the Cumulative Price Threshold (CPT, set at A\$1,823,600/MWh notionally 8-hours of MPC).

Exhibit 32: National Electricity Market overview

Metric	Comment
Annual demand	222TWh (2025)
Meters	~10.7m household & commercial
Installed capacity	104GW
Operator	Australian Energy Market Operator (AEMO)
Regulator(s)	Australian Energy Regulator , Australian Energy Market Commission , state-based regulators
Market design	5-minute gross pool energy only; minimum price -A\$1,000/MWh and maximum price currently A\$20,300/MWh.
Key contracts	Base load, A\$300/MWh caps
Renewable target	~82% by FY30 (2025 42.9%) via reverse auctions, e.g., the Capacity Investment Scheme

Sources: Australian Energy Market Operator, Australian Energy Regulator, Australian Energy Market Commission, ASX Energy, Australian Government, Morgan Stanley Research.

Exhibit 33: National Electricity Market fuel mix

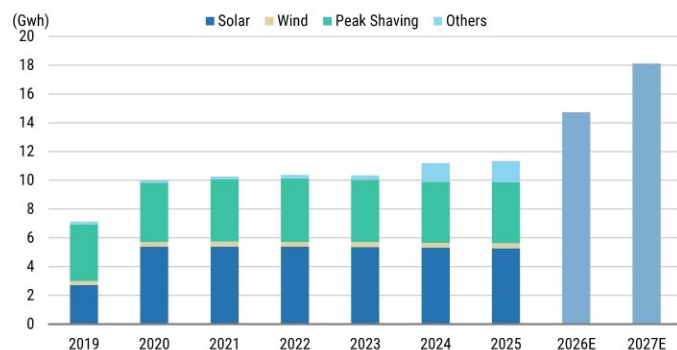


Sources: OpenElectricity.org.au, AEMO, Australian Photovoltaic Institute (APVI), Morgan Stanley Research. Brown = lignite, black = coal, purple = gas, light blue = batteries, blue = hydro, green = wind, orange = utility scale solar, yellow = rooftop solar.

Korea

Korea's ESS market has remained at ~10-11GWh since 2020, following a series of battery-related fires in 2019-2020. However, with rising renewables under the government's electricity plan and increasing need for grid stability, the government has re-established policy to support ESS, which we view as a transition into a policy-driven recovery phase. A key development is the introduction of the centralized ESS contracting market, under which the authorities pre-contract capacity with project developers/operators and provide capacity payments (CP), enhancing revenue visibility. Under this framework, the government targets annual BESS deployment of 540-600MW over 2026-2029, implying total battery demand of ~13GWh based on 6-hour duration systems. Notably, two bidding rounds of 565MW each have already been conducted through 2025-2026, with battery pricing roughly at ~₩200mn/MWh (accounting for 50-60% of total capex) and CP levels at ~₩30/kWh. We also note that Korean battery suppliers appear to have secured all of project awards, contrasting with the China-dominated global ESS supply chain.

Exhibit 34: Korean ESS cumulative additions



Source: KESCO, Morgan Stanley Research estimates

Exhibit 35: Korea government's ESS deployment plan



Source: KEPCO, Morgan Stanley Research

Exhibit 36: 2025 ESS bidding results

Battery Makers	Region	Capacity (MW)	Capacity (MWh)
SDI	South Jeolla	48	288
SDI	South Jeolla	96	576
SDI	South Jeolla	80	480
SDI	South Jeolla	80	480
SDI	South Jeolla	96	576
SDI	South Jeolla	29	174
LGES	South Jeolla	96	576
LGES	Jeju	40	240
Total		565	3,390

Source: MCEE, Morgan Stanley Research

Exhibit 37: 2026 ESS bidding results

Battery Makers	Region	Capacity (MW)	Capacity (MWh)
SK On	South Jeolla	96	576
SK On	South Jeolla	96	576
SK On	South Jeolla	92	552
SDI	South Jeolla	66	396
SDI	South Jeolla	96	576
LGES	South Jeolla	79	474
SDI	Jeju	40	240
Total		565	3,390

Source: MCEE, Morgan Stanley Research

In the meantime, while Chinese battery cell makers have historically dominated the ESS supply chain on cost competitiveness, recent policy support in the US suggests a shift toward non-Chinese suppliers. In particular, US policy frameworks, including OBBBA-driven ITC eligibility requirements, tightening PFE/FEOC restrictions, and higher tariffs on Chinese ESS, are effectively incentivizing developers to source, non-Chinese cells. Given the market's historical reliance on Chinese LFP batteries, this regulatory shift creates a meaningful opportunity for Korean battery makers to gain share, supported by ongoing capacity expansion and EV-to-ESS conversion. While near-term supply tightness and execution risks remain, we see a credible path for Korean battery names to increase their presence in the US ESS market under the evolving policy landscape.

India: BESS moving beyond tenders, and PSP getting through approvals

India's Energy storage solutions (ESS), which include BESS (battery energy storage systems) and PSP (pumped storage plants) plays a critical role in increasing renewable energy adoption (grid stability) and lowering fossil energy dependence. The power duck curve has deepened with peak demand in the non solar hours. ESS helps to flatten the duck curve as it can be ramped up & down in a very short span of time, thus is becoming critical to supply side management. Said differently, ESS shifts the economics of system planning away from irreversible capacity build toward flexible, modular solutions, making it not just a reliability tool but a capital efficiency lever that lowers total system cost and preserves optionality under uncertainty. Both ESS are early cycle themes. CEA targets 174GW of storage by F36 (BESS: 80GW, PSP: ~100GW).

BESS is crossing the chasm from pilot to deployment at unprecedented speed. The policy architecture is supportive (VGF expanded to 43.2GWh, ISTS waivers, 10% storage mandate on solar), global battery costs have declined ~70% in 3 years, and corporate capex commitments are large. BESS could well be the defining investment theme in India over the next decade, in our view. BESS has 5.6GWh operational and 56GWh is under construction. Cumulatively 117GWh has been tendered, however 75% of 2-hour capacity has been bid at "risky" tariffs, and India remains ~90% import-dependent on China for its battery value chain (domestic cell manufacturing is only ~2GWh).

PSP is the long-duration storage solution. Currently, 7.4GW is operational, ~15.9GW under construction, and another ~102GW is at DPR (Detailed Project Report) Concurrence or S&I (survey & investigation) stage.

Storage to play a critical role in RE adoption: The integration of large amounts of variable and intermittent RE poses challenges for grid stability and uninterrupted power supply which can be met with storage solutions being commissioned in tandem. Also, interestingly, storage technologies (BESS and PSP) can be ramped up and down in a very short span of time and therefore are a critical part of a load following renewable projects, further strengthening the case of achieving a 24*7 clean energy supply. The power duck curve deepening has deepened with peak demand appearing in non-peak hours for power generation. While the government is attempting to incentivize a shift in demand to solar hours, peaks are still mostly seen in non-solar hours. Storage therefore would play a critical role in managing the demand supply and flattening the duck curve.

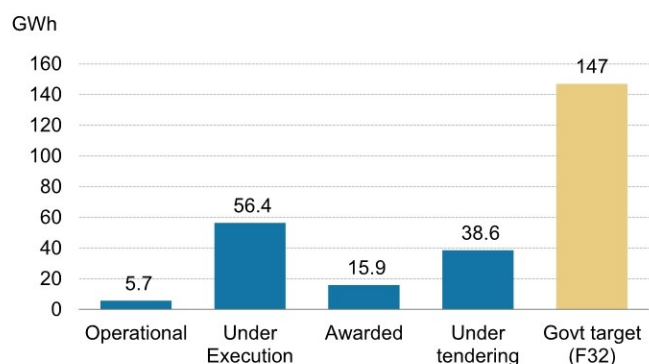
Government envisaging strong capacity addition over F23-32: NEP aims for India's energy storage capacity to be at 74GW/41GWh by F32, with 27GW/175GWh from PSPs and the remainder from BESS. Further, CEA has also projected that by the year 2047, the requirement of energy storage is expected to increase to 2,380GWh (540GWh from PSP and 1,840GWh from BESS), due to the addition of a larger amount of renewable energy in light of the net zero emissions targets set for 2070.

BESS vs. PSP: Grid-scale storage is currently being implemented through two modes: Battery Energy Storage Systems (BESS) – a relatively newer technology – and Pumped

Storage Plants (PSP), with a well-established operational track record. PSP has longer storage cycle capability (~8 hours) but involves longer gestation (approvals + construction: 6-8 years), whereas BESS requires less time on ordering and installation, is less complex to construct, but has a shorter lifespan of ~12 years (assuming 2 cycles/day) vs PSP (>40 years) and shorter cycle capability (2-4 hours). Both can play different roles: BESS is more suitable for controlling variability at the source of generation, whereas PSP offers a credible solution for longer-duration storage, energy and grid management. PSP's round-trip efficiency compares better, while BESS faces higher charging-discharging losses and periodic capacity augmentation due to battery degradation. Batteries' dependence on rare earth minerals also exposes the segment to geopolitical and supply chain risks.

BESS: Early signs of progress

Exhibit 38: Battery energy storage linked tenders



Source: IESA, Morgan Stanley Research

On-ground activity nascent but building: India had ~7.4 GW of pumped storage capacity operational as of Apr-26, while battery storage – first bid out at large scale only in Jun-23 – had just 5.6 GWh operational. Another 9.5 GWh of BESS and ~18 GW of PSP are at various stages of development, and 60+ sites are being evaluated for pumped storage. Adani Green has commissioned a 3.37 GWh BESS project at Khavda – the world's largest single-location installation outside China. However, most BESS capacity remains in the tendering or under-construction stage, and the pace of actual commissioning will depend on tariff viability, financing, and supply chain readiness.

India's BESS – a large but untested pipeline: Cumulative tendered BESS capacity rose sharply from 0.66 GW in 2018 to over 90 GW by 2025. However, the transition from tendering to commissioning

remains early-stage – actual operational capacity is a fraction of the pipeline, and the sector faces unresolved questions around tariff viability, bankability, and supply chain localisation.

BESS is now co-integrated with RE: BESS capex is now embedded into the core strategy of India's largest RE developers (vs. standalone technology bet earlier), as an essential component of solar-plus-storage and round-the-clock (RTC) power delivery. This adds a layer for investors to think through about competitive positioning of developers.

Execution milestones: As of Dec-25, only ~0.7GWh was commissioned & 9.2GWh (12 projects) was scheduled for commissioning in 2026 (+13x). 1) IndiGrid & AmpereHour Energy commissioned India's largest standalone utility-scale BESS (180 MW/360 MWh) in Gujarat (discom off-taker, 12-year BOO basis); 2) ACME Solar has commissioned 2.3GWh of storage capacity; 3) AGEL targets commissioning of 15GWh by Mar-27 & 50GWh over next five years, committing Rs150bn towards BESS; 4) Waaree Energies targets a Rs300bn capex roadmap across modules, cells, and storage.

Technology advancing at a fast pace: 1) In the last 18 months, the size of batteries has gone up significantly from 50 Amps to 314A and the industry is exploring higher capacities of 528A, 548A, and 1175A cells – which implies the same 20 ft container can now host a higher capacity of ~9MWh (vs 3.8MWh earlier), thereby reducing land requirements significantly. 2) Battery storage through the use of sodium-ion batteries, nickel-manganese batteries, and vanadium redox flow batteries are evolving at a fast pace however are yet to reach parity with LFP which remains the most widely used technology. Challenge: One

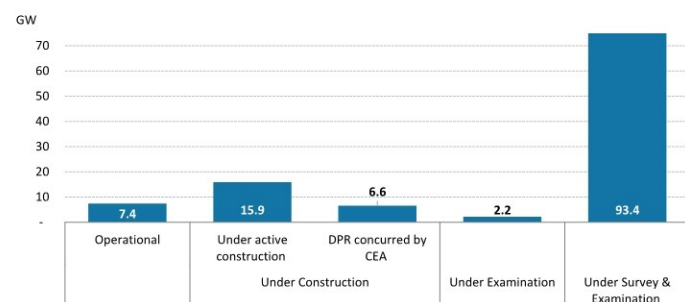
of the major challenges with larger cells is heat generation, which would need technological advancement in cooling and electronic management systems.

Steep decline in battery prices, improving attractiveness: Battery prices have corrected by more than 70% in the last three years. This, combined with government VGF support, has led to a steep decline of ~75% in discovered tariffs — from ~Rs1.08mn/MW/yr (Jun-23) to ~Rs0.224mn/MW/yr in recent bids. In per-unit terms, this translates to ~Rs3.5/unit ex-charging cost and ~Rs6-6.5/unit including charging cost. However, the current price decline could partly be attributable to slower-than-expected global EV growth and corresponding oversupply in China – which, if reversed, could pose a risk of tariffs increasing.

Global – powerful tailwinds: As per IEA's [Global Energy Review 2026](#), BESS is now the fastest-growing power technology in the world, with 108GW deployed globally in 2025 (+40% YoY & 11x higher vs CY2021). As per [BloombergNEF](#), the global benchmark cost for a 4-hour battery project was -27% YoY to a record low of US\$78/MWh, while turnkey BESS costs dropped to US\$117/kWh globally and as low as US\$63/kWh in China. India's cost curve is tracking 2-3 years behind China and the convergence is accelerating. As per InfoLink, global BESS capacity was 275GWh in 2025 (+61% YoY) & would be 353GWh in 2026. LFP (lithium iron phosphate) batteries now account for approximately 90% of utility-scale deployments globally. China led with ~60% of global additions in 2025.

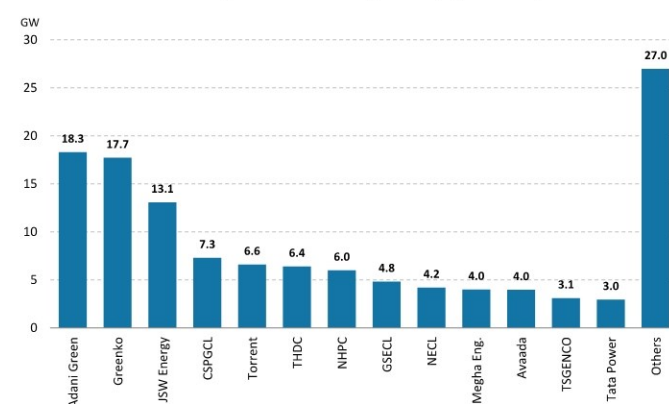
PSP – Long-duration storage: Pumped storage projects are estimated to have capex of ~Rs50-60mn/MW and could require ~2 years for initial survey, investigation and approval and about ~4 years for construction. But unlike BESS, PSPs have longer lives of more than 40 years and are supportive of longer storage cycles of ~8 hours. India targets to expand pumped storage capacity to 50GW by F32 (F25: 4.7GW). CEA expects 3GW per annum addition from F26-29 and expects a steep rise in annual commissioning beyond F29 with ~10-13GW addition per year. This would help in stabilizing the grid and provide storage of clean energy.

Exhibit 39: PSP: Rollout in India (Apr-2026)



Source: CEA, Morgan Stanley Research

Exhibit 40: PSP: Corporate India's plans (Apr-2026)



Source: CEA, Morgan Stanley Research

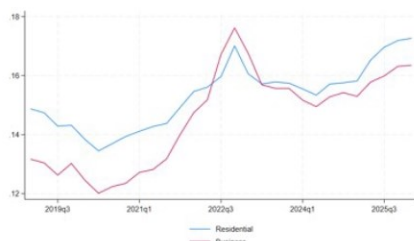
Supportive regulatory environment in last 12 months: 1) Draft National Electricity Policy 2026 prioritises storage-led system management; 2) CERC issued three regulatory amendments covering IESS tariff frameworks, REC multipliers for storage, and ESS connectivity rules; 3) Gujarat regulator has notified dedicated BESS regulations; 4) GRID India has recommended that all new BESS installations >50MW must incorporate stability

safeguards.

India Battery Storage Vision 2047: A Long-Duration Energy Storage (LDES) policy is being jointly developed by Ministry of Power & Ministry of Heavy Industries & is expected to be rolled out by F28. A separate VGF mechanism for LDES technologies (flow batteries, compressed air, gravity storage) is under active discussion. Policy makers have stated that excessive reliance on short-duration lithium-ion storage alone could "reduce energy security and limit 100% green power penetration."

Energy Consumers & Affordability

Exhibit 41: World Average Electricity Prices (US\$/kWh)



Source: globalpetrolprices.com

Lower prices and acceptable returns?

As of 4Q2025 global residential electricity prices range from US\$0.08/kWh (China) to US\$0.45/kWh (Ireland)⁵, and residential and commercial prices are ~10% higher YoY on average (Exhibit 41) as a function of higher fossil fuel costs and accelerating demand.

As is usually the case, rising end-user prices raises social license risk for utilities, attracting policy intervention.

We highlight affordability and policy measures in the key markets covered in this note, calling out:

- ESS installation has actually led to **lower** wholesale prices in ERCOT and the NEM in the last two quarters, contributing to lower electricity tariffs in Australia in the year ahead. We estimate that ESS penetration at 5% of total grid capacity can be enough to materially impact price formation, and lower wholesale prices, based on these two examples.
- We also highlight different policy responses in key markets, with a mix of socialisation (taxes/subsidies), tiered pricing, and some innovation, e.g., Australia's Solar Sharer Offer (three hours/day free power for anyone opting in).

North America

Data center power demand continues to pressure utility electric rates given the scale of needed infrastructure build. Regulated utilities have played defense, with many proposing and receiving approval for data center specific rates which aim to protect existing consumers. In unregulated markets, power prices have risen and the forward curves in several major markets show further increases in the coming years. On the ground, local opposition to data centers is also growing.

We think affordability concerns are likely to be major issues in legislative and regulatory efforts in 2026, and while regulated utilities generally have more influence to protect customers, they also face the most regulatory and political scrutiny. We would evaluate affordability risk based on the specific state/regional dynamics at play – see Exhibit 42 for our affordability risk screens.

5. <https://www.statista.com/statistics/263492/electricity-prices-in-selected-countries/>

Exhibit 42: Summary of Affordability Risk Screens

	Commissioner Elections	Gubernatorial Election	Battleground State	PJM
Alabama	Yes	Yes	No	No
Alaska	No	Yes	No	No
Arizona	Yes	Yes	Yes	No
Arkansas	No	Yes	No	No
California	No	Yes	Yes	No
Colorado	No	Yes	Yes	No
Connecticut	No	Yes	No	No
Delaware	No	No	No	Yes
Florida	No	Yes	No	No
Georgia	Yes	Yes	Yes	No
Hawaii	No	Yes	No	No
Idaho	No	Yes	No	No
Illinois	No	Yes	No	Yes
Indiana	No	No	No	Yes
Iowa	No	Yes	Yes	No
Kansas	No	Yes	No	No
Kentucky	No	No	No	Yes
Louisiana	Yes	No	No	No
Maine	No	Yes	No	No
Maryland	No	Yes	No	Yes
Massachusetts	No	Yes	No	No
Michigan	No	Yes	Yes	Yes
Minnesota	No	Yes	No	No
Mississippi	No	No	No	No
Missouri	No	No	No	No
Montana	Yes	No	No	No
Nebraska	Yes	Yes	No	No
Nevada	No	Yes	No	No
New Hampshire	No	Yes	No	No
New Jersey	No	No	Yes	Yes
New Mexico	No	Yes	Yes	No
New York	No	Yes	Yes	No
North Carolina	No	No	No	Yes
North Dakota	Yes	No	No	No
Ohio	No	Yes	Yes	Yes
Oklahoma	Yes	Yes	No	No
Oregon	No	Yes	No	No
Pennsylvania	No	Yes	Yes	Yes
Rhode Island	No	Yes	No	No
South Carolina	No	Yes	No	No
South Dakota	Yes	Yes	No	No
Tennessee	No	Yes	No	Yes
Texas	No	Yes	No	No
Utah	No	No	No	No
Vermont	No	Yes	No	No
Virginia	No	No	Yes	Yes
Washington	No	No	Yes	No
West Virginia	No	No	No	Yes
Wisconsin	No	Yes	Yes	No
Wyoming	No	Yes	No	No

Source: Morgan Stanley Research

Regulated markets have been more efficient in allocating data center costs and building out necessary infrastructure. Vertically integrated utilities' load and generation planning processes have helped them plan for growth and in many instances, get ahead of equipment procurement. An Integrated Resource Plan (IRP), for example, is a long-term planning process, including load forecasting, resource assessment, optimization, and procurement and investment steps. While not strictly binding, this process has helped utilities plan and build infrastructure and later recover costs. Many utilities have also proposed large load tariffs to protect existing ratepayers, reduce stranded asset risk, and introduce a standard pathway for load requests. While each tariff is unique, similar key provisions across the country include minimum charges, ramp schedules, exit fees, minimum demand thresholds, and credit and collateral requirements.

Affordability concerns adds to power reliability concerns. Despite rising electricity bills, power prices in the unregulated markets are not enough to incentivize new generation, given the recent spike in capex. PJM had a capacity shortfall in its latest auction, with a cleared reserve margin of 14.4% below PJM's target of 20%. As a measure to mitigate the shortfall, PJM will hold a one-off reliability backstop auction (RBP) to procure 15 GW of new generation to the market by 2031 – these separate capacity payments will be shared by new large loads that have not added new generation to the market. We see the PJM

market as very tight even with the 15 GW procurement target, supporting continued high capacity prices. Rules still under discussion but the auction's demand is likely to be met by peakers or batteries.

In Texas, resource adequacy has been managed through requirements for large loads to bring power additionality and subsidized loans. Senate Bill 6 approved last year requires large loads to add new generation or accept to be curtailed during grid stress periods. And the Texas Energy Fund set in 2023 established ~US\$5bn of low interest rate loans as well as completion bonuses for selected new gas-fired generation projects that COD by June 2029.

Europe/UK

Europe has been focused on ensuring its energy system follow three key priorities : decarbonisation, security of supply and affordability. After several years of strong focus on decarbonisation, the 2022-23 energy crisis has brought back security of supply and affordability at the forefront of the agenda.

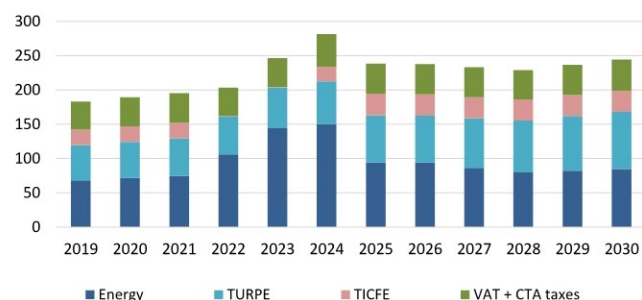
In particular, Europe has been working on building better resiliency in its energy system. We think the renewed uncertainty linked to the new gas price spike driven by renewed geopolitical uncertainty makes it all the more important.

We think batteries have an important role to play in this context. Overall, as shown on exhibits below, we see believe electricity retail tariffs across Europe will remain under control in coming years, with a -4%/+1% CAGR trajectory to 2030. This is due to two opposing forces manifesting simultaneously. On one hand, we expect the wholesale electricity price component of the tariff to keep normalising or remain broadly stable as the forward power curve is in backwardation in most markets. On the other hand, we expect network costs and ancillary costs to potentially increase as Europe invests in resilience and flexibility of the electricity system.

While rising battery penetration may – for now – lead to a higher cost for the system, in due time, we think it will allow higher renewables penetration, which over the long-run has the potential to lead to lower electricity tariffs in our view.

Exhibit 43: French regulated residential electricity tariffs

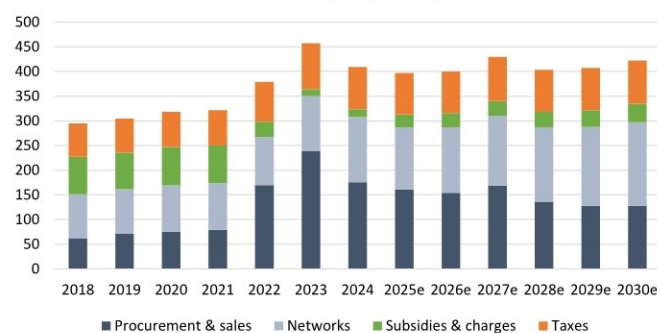
French Regulated Residential Electricity Tariff (€/MWh)



Source: EDF, CRE, Morgan Stanley Research estimates

Exhibit 44: German residential electricity tariffs

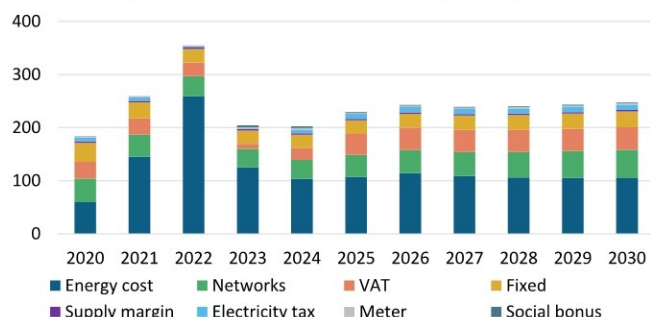
Base Case German Retail Tariff (Eur/MWh)



Source: BNETZA, Morgan Stanley Research estimates

Exhibit 45: Spanish regulated residential electricity tariffs

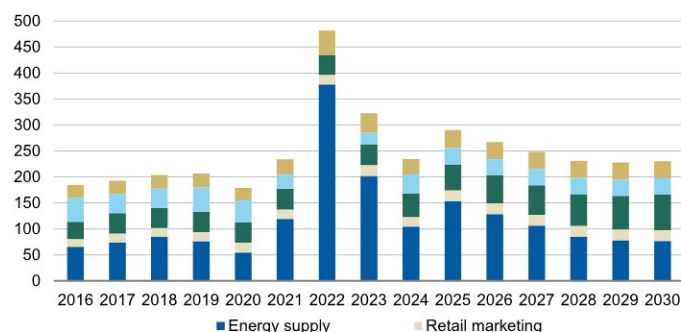
Spanish Regulated Electricity Retail Tariff (€/MWh)



Source: CNMC, Morgan Stanley Research estimates

Exhibit 46: Italian regulated residential electricity tariffs

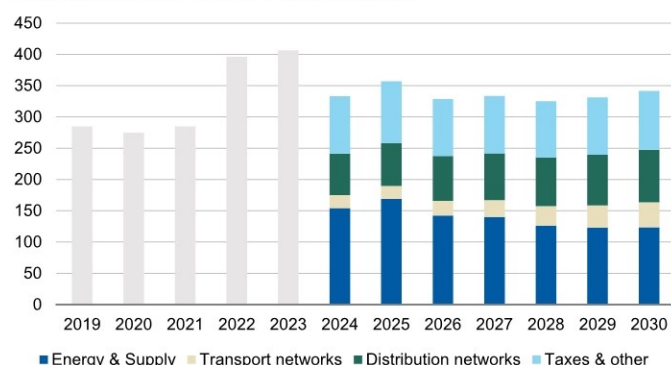
Italian Regulated Forward Curve Electricity Tariff (€/MWh)



Source: Morgan Stanley Research estimates

Exhibit 47: Belgian residential electricity tariffs

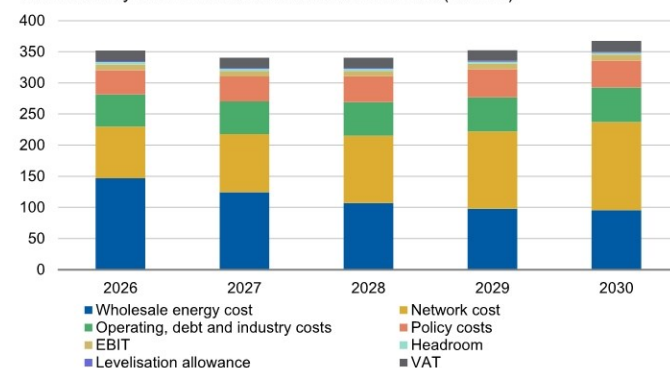
Belgian Residential Electricity Tariffs (€/MWh)



Source: CREG, Morgan Stanley Research estimates

Exhibit 48: UK residential electricity tariffs

UK Electricity Tariff Fwd Curve Scenario Forecasts (£/MWh)



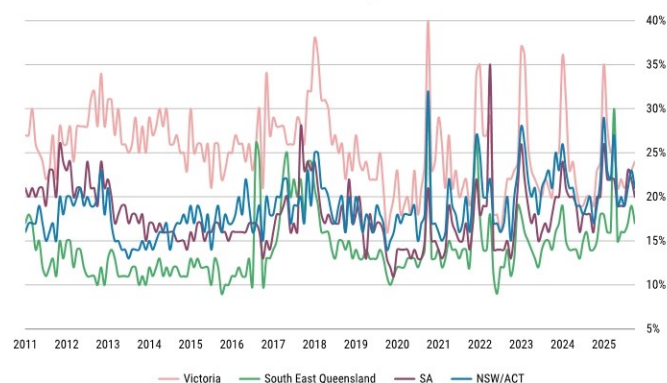
Source: Ofgem, Morgan Stanley Research estimates

Australia

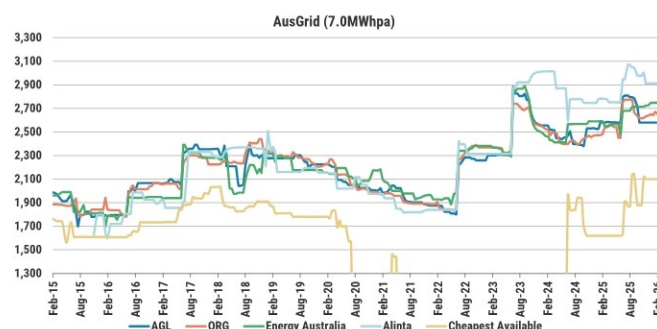
Australia's NEM has a regulated tariff cap based on trailing averages of wholesale futures prices, regulated network determinations, and a retailer margin allowance. All else equal, the market passes on lower wholesale prices to consumers on a one to two year lag.

In March 2025, the Australian Energy Regulator (AER) also changed the mechanism to estimate the Wholesale Energy Cost allowance, effectively reducing tariffs to reflect lower market volatility – see [Australia Integrated Utilities: WECs In Effect \(7 Nov 2025\)](#). In FY24 and FY25 the Australian Government gave A\$300 and A\$150 per household subsidies to mitigate market cost increases. Notwithstanding the roll off of these subsidies, we anticipate only modest bill increases in FY27 YoY, well below inflation, as a result of the lower WEC.

With wholesale prices in backwardation, we anticipate heightened price competition in retail electricity supply, as the space for discounting (i.e., gross margin within a default tariff) widens.

Exhibit 49: Australia retail electricity - annualised transfer rate

Source: AEMO.

Exhibit 50: NSW metro residential electricity bills (A\$pa including GST)

Sources: EnergyMadeEasy, AlphaWise, Morgan Stanley Research.

Sharing solar abundance? On 4 November 2025, the Australian Government announced the creation of a new form of tariff that retailers must offer to customers: the Solar Sharer Offer (SSO), which provides free electricity from 11am-2pm each day (12-3pm in South Australia), with non-free hours at regulated tariffs – see [Australia Integrated Utilities: Solar Sharer \(4 Nov 2025\)](#). The AER has calibrated fixed charges and non-free hour tariffs to allow an efficient return to suppliers, however the AER's FY27 SSO uses a standard household usage pattern to set the inaugural SSO, which we think exposes the companies to adverse selection risk, i.e., customers opting in to the SSO will have or will shift usage into the free hours and out of the paid hours, reducing company margins until better data becomes available to calibrate tariffs. Nevertheless, we can see system benefits from load smoothing in the longer term.

ASEAN

Across Southeast Asia, regulation for utility-scale battery energy storage systems is shifting from technology pilots to formal market frameworks. Early movers are explicitly recognising ESS as a grid asset eligible for ancillary services, reserve, and availability payments, while others remain in planning or pilot phases where deployment is still driven by state utilities and policy mandates rather than open markets. The direction of travel is consistent: ESS is being positioned as critical infrastructure for reliability, renewable integration, and energy security.

Singapore – ESS is fully integrated into the wholesale market framework under the Electricity Act, treated as a licensed generation asset. The Energy Market Authority (EMA) actively procures utility-scale ESS for contingency reserves and frequency regulation.

Philippines – The Department of Energy (DOE) and Energy Regulatory Commission (ERC) have issued dedicated ESS rules covering pricing, interconnection, and ancillary services participation, enabling large-scale batteries to earn contracted revenues for regulating and contingency reserves via NGCP procurement.

Indonesia – Regulation is evolving and remains utility-led. Recent Ministry of Energy and Mineral Resources (MEMR) rules formally embed BESS into hybrid power plants, especially for island and remote grids under PLN's de-dieselisation programme.

Malaysia – Policy support is accelerating through centralised procurement. The Energy

Commission and Tenaga have launched the MyBeST tender programme for utility-scale ESS, alongside pilot projects owned by the grid operator, with regulated returns and limited merchant exposure at this stage.

Vietnam – A regional policy inflection point. Under revised Power Development Plan VIII and new MOIT circulars, Vietnam has introduced a formal two-part tariff for BESS (availability + delivery)

Thailand – Storage policy is embedded in long-term system planning rather than spot markets. National energy plans and ERC standards support utility-scale ESS mainly through utility procurement.

Appendix – Global Integrated Utilities

Exhibit 51: Integrated Utilities Comp Sheet

Company Name	Ticker	Sector	EV/EBITDA	2024	2025	2026e	2027e	2028e	P/E	2024	2025	2026e	2027e	2028e	FCF yield	2024	2025	2026e	2027e	2028e	DPS yield	2024	2025	2026e	2027e	2028e
Integrated Utilities				10.6x	11.0x	10.2x	9.6x	9.3x		14.3x	13.1x	16.1x	15.6x	14.9x		1.1%	1.0%	-1.1%	0.9%	0.7%		3.5%	3.7%	3.9%	4.0%	4.1%
AGL Energy Ltd	AGL.AX	Utilities		4.1x	4.7x	4.7x	4.6x	4.3x		8.3x	11.1x	9.1x	9.9x	10.9x		12.4%	6.1%	10.1%	3.5%	2.3%		6.5%	5.1%	5.8%	5.4%	5.3%
Origin Energy Ltd	ORG.AX	Utilities		6.1x	6.6x	7.3x	7.4x	7.8x		11.8x	12.3x	15.9x	15.4x	15.6x		3.7%	1.8%	6.0%	8.1%	7.3%		4.7%	5.0%	5.5%	5.9%	5.9%
Contact Energy Ltd	CEN.NZ	Utilities		13.0x	11.8x	12.5x	11.9x	10.2x		24.8x	24.8x	22.1x	23.7x	22.0x		0.8%	-0.6%		1.6%	5.6%		4.0%	4.0%	4.2%	4.4%	4.4%
Meridian Energy Ltd	MEL.NZ	Utilities		19.3x	27.8x	15.3x	14.3x	14.8x		36.8x	104x	35.9x	34.5x	30.9x		3.5%	2.6%	4.0%	5.0%	5.1%		3.7%	3.5%	3.7%	4.0%	4.1%
Genesis Energy Ltd	GNE.NZ	Utilities		8.9x	8.3x	8.3x	8.2x	7.6x		28.6x	20.1x	19.2x	21.5x	18.4x		6.5%	6.2%	11.7%	9.3%	10.2%		5.6%	5.5%	5.7%	5.8%	5.9%
Centrica PLC	CNA.L	Utilities		2.3x	4.8x	5.5x	3.8x	5.1x		7.6x	10.5x	13.7x	12.8x	11.6x		8.6%	-0.1%	-1.1%	0.5%	2.7%		1.5%	2.9%	3.3%	3.7%	4.0%
SSE PLC	SSE.L	Utilities		8.7x	8.9x	8.5x	7.0x	8.8x		12.0x	9.5x	14.5x	12.8x	11.3x		0.4%	0.3%	-3.3%	-4.4%	-7.8%		2.4%	2.7%	2.9%	3.1%	3.4%
Engie SA	ENGIE.PA	Utilities		5.0x	6.7x	6.0x	5.9x	7.2x		7.1x	6.7x	11.5x	12.8x	12.3x		3.1%	4.3%	0.3%	4.7%	4.0%		5.0%	5.2%	5.3%	5.5%	5.8%
E.ON SE	EONGn.DE	Utilities		5.3x	8.5x	8.5x	7.6x	8.0x		11.5x	8.8x	14.9x	14.8x	14.0x		-4.0%	-3.1%	-3.9%	-3.6%	-4.3%		2.7%	3.2%	3.2%	3.4%	3.6%
Enel SpA	ENEL.MI	Utilities		6.3x	7.2x	6.4x	6.3x	6.8x		10.2x	9.1x	12.5x	12.9x	12.2x		7.1%	5.2%	2.2%	1.2%	3.0%		4.5%	5.1%	5.3%	5.6%	5.9%
A2A SpA	A2.MI	Utilities		5.6x	5.9x	5.7x	5.3x	5.4x		6.9x	8.7x	11.2x	10.6x	10.2x		-1.1%	6.5%	0.4%	1.5%	1.2%		4.1%	4.6%	4.9%	5.0%	5.4%
EDP SA	EDP.LS	Utilities		7.7x	8.1x	8.6x	8.3x	7.9x		15.2x	9.4x	13.2x	14.8x	13.9x		-2.3%	2.1%	4.9%	3.7%	8.5%		4.3%	4.8%	4.7%	4.8%	4.9%
Endesa SA	ELE.MC	Utilities		6.2x	7.4x	6.7x	6.6x	7.7x		11.1x	9.0x	13.6x	15.5x	14.8x		5.0%	1.5%	4.2%	2.9%	4.1%		3.3%	4.5%	4.6%	4.7%	5.0%
Iberdrola SA	IBE.MC	Utilities		8.4x	10.8x	10.1x	9.6x	9.8x		14.1x	11.8x	18.5x	18.6x	17.2x		-1.2%	0.0%	-1.4%	-1.3%	-2.1%		2.7%	3.5%	3.7%	3.9%	4.1%
Naturgy Energy Group SA	NTGY.MC	Utilities		6.8x	7.4x	7.9x	8.0x	7.2x		14.7x	9.6x	12.5x	14.1x	14.1x		4.9%	4.4%	2.9%	5.8%	6.1%		5.0%	6.3%	6.3%	6.7%	6.6%
AES Corp	AES.N	Utilities		15.8x	16.2x	13.0x	11.8x	11.8x		10.1x	6.0x	6.3x	6.2x	5.9x		-12.1%	4.1%	-13.9%	-18.1%	1.3%		4.7%	4.8%	4.8%	4.9%	5.0%
American Electric Power Company Inc	AEP.O	Utilities		12.4x	13.0x	10.8x	9.8x	10.1x		14.4x	15.6x	18.1x	18.5x	16.7x		1.1%	-3.5%	-6.1%	-7.7%	-10.2%		2.8%	3.0%	3.1%	3.2%	3.3%
Atlantica Sustainable Infrastructure Ltd	AY.O	Utilities																								
Dominion Energy Inc	D.N	Utilities		13.3x	15.4x	13.8x	10.9x	10.8x		17.1x	15.8x	16.3x	17.5x	16.5x		1.2%	-7.8%	-7.4%	-5.9%	-3.4%		4.0%	4.0%	4.0%	4.0%	4.0%
DTE Energy Co	DTE.N	Utilities		12.5x	12.3x	11.0x	10.3x	10.0x		16.3x	16.7x	16.7x	17.1x	15.8x		-1.5%	-0.2%	-6.2%	-5.6%	-6.1%		3.1%	3.1%	3.3%	3.5%	3.7%
MGE Energy Inc	MGEE.O	Utilities		16.3x	14.5x	13.4x	12.6x	12.6x		21.1x	25.5x	20.2x	18.7x	17.7x								2.3%	2.5%	2.6%	2.7%	2.9%
Sempra	SRE.N	Utilities		18.0x	18.3x	14.9x	14.6x	16.4x		15.8x	19.1x	17.3x	16.2x	14.9x		-3.7%	-4.4%					2.8%	2.9%	3.0%	3.0%	3.1%
Entergy Corp	ETR.N	Utilities		12.1x	12.4x	10.5x	9.8x	9.6x		14.0x	19.4x	21.0x	21.6x	19.0x		-1.9%	-6.4%	-12.7%	-13.6%	-7.2%		2.1%	2.2%	2.4%	2.5%	2.7%
Exelon Corp	EXC.O	Utilities		10.6x	10.6x	9.7x	9.3x	9.0x		14.6x	13.9x	15.2x	15.0x	14.0x		-0.6%	-0.1%	-1.8%	-1.5%	0.2%		3.3%	3.5%	3.7%	3.9%	4.1%
Eversource Energy	ES.N	Utilities		12.2x	12.2x	10.4x	9.6x	9.8x		13.5x	12.2x	14.4x	13.8x	12.9x		1.9%	2.7%	-0.9%	2.0%	0.0%		4.2%	4.4%	4.6%	4.9%	5.2%
FirstEnergy Corp	FE.N	Utilities		10.7x	11.3x	11.0x	9.6x	9.2x		13.7x	15.6x	16.4x	15.8x	14.6x		3.7%	1.0%	1.8%	2.6%	0.0%		3.6%	3.8%	4.0%	4.2%	4.4%
Nextera Energy Inc	NEE.N	Utilities		18.5x	18.4x	12.7x	11.5x	13.2x		17.8x	19.4x	20.0x	19.8x	18.2x		-5.5%	-2.9%	-8.6%	-7.9%	-8.6%		2.4%	2.6%	2.9%	3.0%	3.2%
Public Service Enterprise Group Inc	PEG.N	Utilities		17.9x	15.4x	12.6x	11.7x	11.3x		16.7x	20.9x	18.3x	16.7x	15.6x		1.2%	2.0%	-1.5%	-1.5%	-0.7%		3.1%	3.2%	3.4%	3.6%	3.8%
PPL Corp	PPL.N	Utilities		12.1x	11.9x	10.7x	9.8x	9.5x		15.8x	17.9x	18.0x	16.7x	15.5x		-1.4%	-0.7%	-6.4%	-8.5%	-7.9%		2.9%	3.1%	3.2%	3.4%	3.6%
Clean Energy				9.3x	12.3x	11.1x	10.1x	10.1x		29.3x	11.1x	17.4x	19.1x	19.7x		-3.6%	-2.4%	-2.1%	-1.2%	1.9%		0.0%	0.0%	0.0%	0.0%	0.0%

Sources: Refinitiv consensus estimates, Morgan Stanley Research. Prices as of 1 June 2026. Sector averages are medians.

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(as of May 31, 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	1542	42%	465	51%	30%	707	43%
Equal-weight/Hold	1571	43%	369	40%	23%	723	44%
Not-Rated/Hold	3	0%	0	0%	0%	1	0%
Underweight/Sell	551	15%	86	9%	16%	201	12%
Total	3,667		920			1632	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

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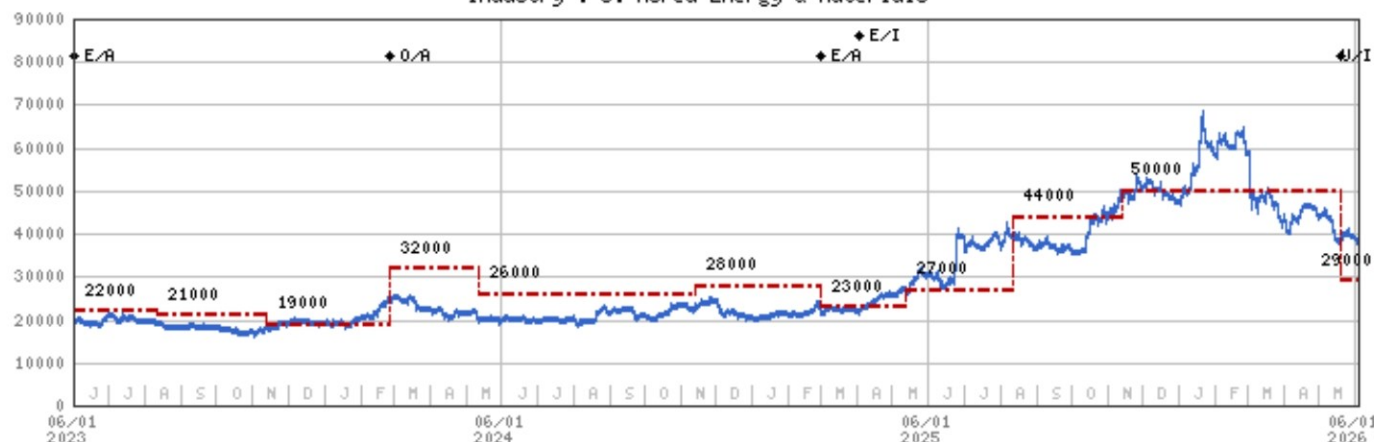
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Stock Price, Price Target and Rating History (See Rating Definitions)

Korea Electric Power (015760.KS) - As of 06/03/26 GMT in KRW Industry : S. Korea Energy & Materials



Stock Rating History: 6/1/21 : E/A; 11/5/21 : O/A; 8/12/22 : E/A; 2/26/24 : O/A; 3/1/25 : E/A; 4/3/25 : E/I; 5/19/26 : U/I

Price Target History: 5/14/21 : 25000; 11/5/21 : 33000; 11/12/21 : 32000; 5/13/22 : 29000; 8/12/22 : 22000; 11/14/22 : 20000; 5/15/23 : 22000; 8/11/23 : 21000; 11/13/23 : 19000; 2/26/24 : 32000; 5/13/24 : 26000; 11/13/24 : 28000; 3/1/25 : 23000; 5/13/25 : 27000; 8/12/25 : 44000; 11/13/25 : 50000; 5/19/26 : 29000

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target --- No Price Target Assigned (NA)
 Stock Price (Not Covered by Current Analyst) — Stock Price (Covered by Current Analyst) —
 Stock and Industry Ratings (abbreviations below) appear as ♦ Stock Rating/Industry View
 Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
 Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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INDUSTRY COVERAGE: ASEAN Utilities and Infrastructure

COMPANY (TICKER)	RATING (AS OF)	PRICE* (06/02/2026)
Mayank Maheshwari		
Airports of Thailand (AOT.BK)	O (08/25/2021)	Bt56.25
Global Power Synergy PCL (GPSC.BK)	U (09/12/2025)	Bt41.25
Gulf Development PCL (GULF.BK)	O (03/26/2025)	Bt64.50
Manila Electric Company (MER.PS)	O (06/20/2022)	PP585.00
Maynilad Water Services, Inc. (MYNLD.PS)	O (11/30/2025)	PP22.60
Perusahaan Gas Negara (PGAS.JK)	U (05/17/2023)	Rp1,825
SembCorp Industries Ltd (SCIL.SI)	O (03/23/2026)	S\$6.28
Tenaga Nasional (TENA.KL)	O (09/12/2023)	RM14.28
Vivek Rajamani		
International Container Terminal Service (ICT.PS)	O (03/04/2024)	PP830.00

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* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Australia Utilities & Infrastructure

COMPANY (TICKER)	RATING (AS OF)	PRICE* (06/03/2026)
Rob Koh		
AGL Energy Ltd (AGL.AX)	U (02/20/2026)	A\$8.41
APA Group (APA.AX)	E (05/21/2026)	A\$10.13
Atlas Arteria (ALX.AX)	E (07/20/2022)	A\$5.06
Auckland International Airport Ltd (AIA.NZ)	E (02/23/2023)	NZ\$8.21
Aurizon Holdings (AZJ.AX)	U (03/17/2025)	A\$4.28
Origin Energy Ltd. (ORG.AX)	U (08/15/2024)	A\$10.75
Transurban Group (TCL.AX)	E (10/18/2021)	A\$15.04
Samantha R Edie		
Cleanaway Waste Management Limited (CWY.AX)	O (01/14/2022)	A\$2.32
Qube Holdings (QUB.AX)	E (11/24/2025)	A\$5.00

Stock Ratings are subject to change. Please see latest research for each company.

* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Utilities

COMPANY (TICKER)	RATING (AS OF)	PRICE* (06/02/2026)
Arthur Sitbon, CFA		
CEZ (CEZ.PR)	E (06/02/2026)	CZK 1,287.00
Corporacion Acciona Energia Renovables (ANE.MC)	E (04/16/2025)	€23.18
EDP Energias de Portugal SA (EDP.LS)	E (02/10/2025)	€4.37
EDP Renovaveis (EDPR.LS)	E (10/24/2025)	€14.25
Elia (ELI.BR)	O (03/18/2026)	€131.50
Enagas SA (ENAG.MC)	E (03/31/2026)	€17.01
ENGIE (ENGIE.PA)	O (10/19/2020)	€26.61
Naturgy (NTGY.MC)	O (05/20/2026)	€28.72
NEL ASA (NEL.OL)	U (10/29/2024)	NKr 3.64
Redeia (REDE.MC)	E (03/25/2026)	€14.75
Solaria Energia y Medio Ambiente SA (SLRS.MC)	E (12/03/2025)	€23.79
Veolia (VIE.PA)	O (12/03/2025)	€34.30
Voltalia SA (VLTSA.PA)	E (07/18/2022)	€8.57
Ricardo Rezende, CFA		
Hidroelectrica SA (ROH20.BX)	U (01/22/2024)	RON177.00
Robert Pulleyn		
E.ON (EONGn.DE)	O (12/03/2025)	€17.80
Endesa SA (ELE.MC)	U (12/11/2023)	€35.93
ENEL (ENEL.MI)	U (05/01/2026)	€9.58
Fortum Oyj (FORTUM.HE)	E (05/01/2026)	€20.73
Iberdrola SA (IBE.MC)	E (03/18/2025)	€19.56
Orsted A/S (ORSTED.CO)	O (05/13/2026)	DKr 165.90
RWE AG (RWE.G.DE)	O (11/29/2019)	€55.12
SSE (SSE.L)	O (11/03/2020)	2,256p
Verbund AG (VERB.VI)	U (08/09/2023)	€58.45
Sarah E Lester, CFA		
A2A SpA (A2.MI)	O (10/31/2025)	€2.22
Centrica (CNA.L)	E (03/02/2026)	186p
Drax Group Plc (DRX.L)	E (03/02/2026)	792p
ERG SpA (ERG.MI)	U (12/11/2023)	€23.50
Italgas SpA (IG.MI)	E (12/03/2025)	€9.81
National Grid plc (NG.L)	O (01/06/2023)	1,188p
National Grid plc (NGG.N)	O (12/11/2025)	US\$80.64
Pennon Group (PNN.L)	O (01/23/2026)	496p
Severn Trent (SVT.L)	E (01/23/2026)	2,900p
Snam SpA (SRG.MI)	U (03/16/2021)	€6.14
Terna - Rete Elettrica Nazionale SpA (TRN.MI)	U (12/06/2022)	€9.66
United Utilities Group PLC (UU.L)	E (01/23/2026)	1,280p

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* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Diversified Utilities / IPPs

COMPANY (TICKER)	RATING (AS OF)	PRICE* (06/02/2026)
David Arcaro, CFA		
AES Corp. (AES.N)	E (03/06/2026)	US\$14.68
American Electric Power Co (AEP.O)	O (03/10/2020)	US\$127.11

Constellation Energy Corporation (CEG.O)	O (03/25/2026)	US\$272.65
MGE Energy, Inc. (MGEE.O)	U (11/17/2021)	US\$74.40
NextEra Energy Inc (NEE.N)	O (09/06/2022)	US\$85.68
NRG Energy Inc (NRG.N)	E (12/09/2022)	US\$133.51
Public Service Enterprise Group Inc (PEG.N)	O (07/02/2020)	US\$78.32
Solaris Energy Infrastructure (SEI.N)	O (12/02/2025)	US\$71.92
Talen Energy Corp (TLN.O)	O (03/12/2025)	US\$385.51
Vistra Corp (VST.N)	O (03/25/2019)	US\$157.97

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* Historical prices are not split adjusted.

INDUSTRY COVERAGE: India Utilities

COMPANY (TICKER)	RATING (AS OF)	PRICE* (06/02/2026)
Girish Achhipalia		
Adani Energy Solutions Limited (ADAI.NS)	O (02/05/2026)	Rs1,530.60
Adani Power Ltd (ADAN.NS)	O (09/18/2025)	Rs235.93
JSW Energy Limited (JSWE.NS)	O (02/20/2025)	Rs588.55
NTPC (NTPC.NS)	O (11/21/2019)	Rs367.40
Power Grid Corporation of India (PGRD.NS)	E (09/26/2024)	Rs282.15
Tata Power Co (TTPW.NS)	E (08/04/2025)	Rs414.90
Torrent Power Ltd (TOPO.NS)	E (02/11/2025)	Rs1,423.90

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INDUSTRY COVERAGE: S. Korea Utilities

COMPANY (TICKER)	RATING (AS OF)	PRICE* (//)
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