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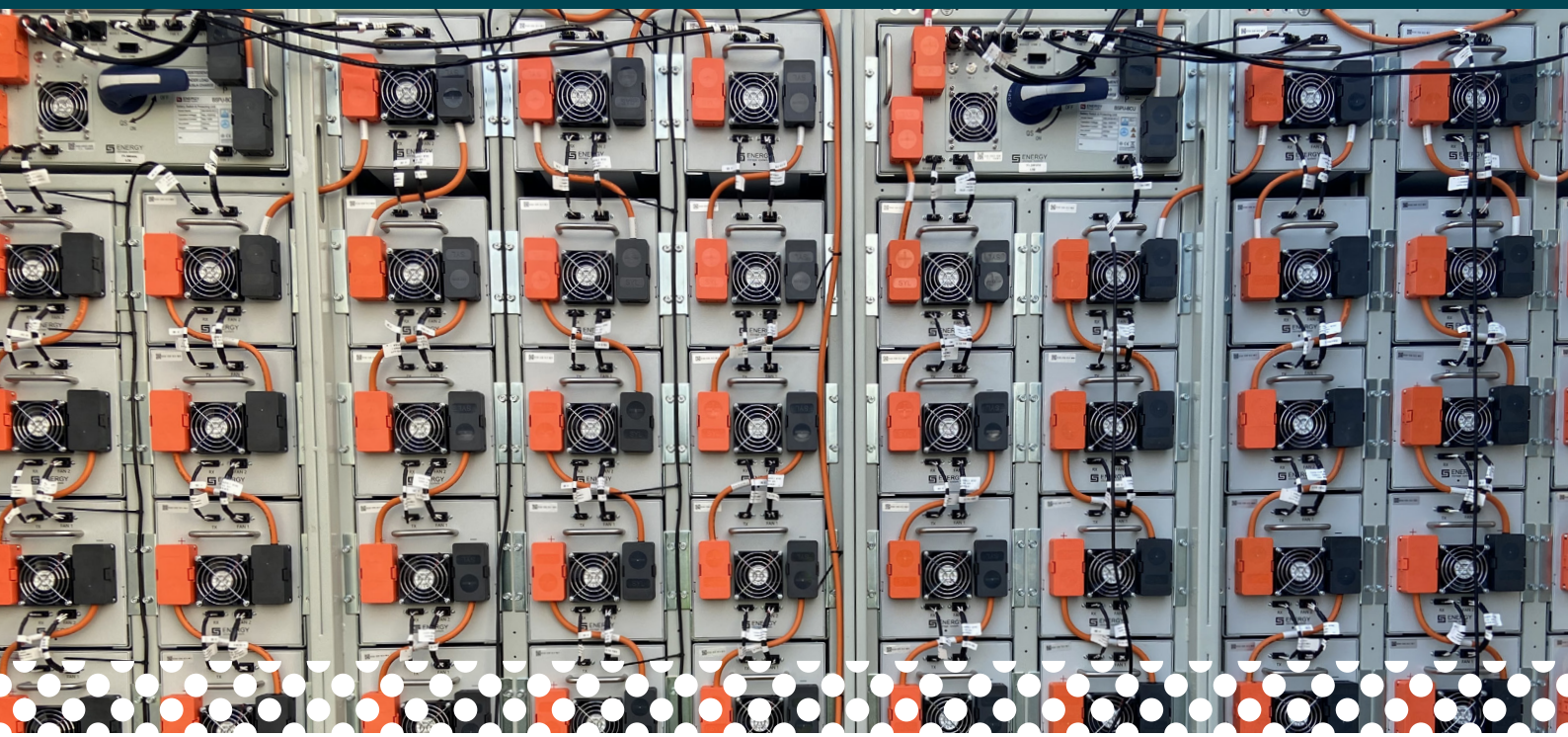

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Batteries in the energy transition

An acute need for energy storage, able to balance supply and demand, is needed to maintain grid reliability as energy markets restructure under the energy transition. Battery storage systems provide one of these crucial bridges.

Key takeaways

1. Worldwide megatrends, including the ongoing global energy transition, the rise of AI & digital assets, and the need for stable and affordable power prices, provide positive growth signals for the battery storage sector.
2. Battery energy storage systems can be structured in a variety of ways to meet investors' risk-return expectations, including through taking a proactive approach selling into the energy market in an aim to earn higher investment returns.
3. Careful consideration and the implementation of safeguards are critical to manage risks and build a more stable path to long-term infrastructure-style returns.

The explosive growth of renewable energy globally has driven an acute need for energy storage that can balance energy supply and demand and assist in maintaining grid reliability. While the renewable energy sector has made enormous strides in the last decade, becoming the quickest-to-deploy form of energy with the lowest levelised cost of energy (LCOE) across all commercially available technologies, battery energy storage systems (BESS) provide a crucial bridge for variability in their generation profiles and stand in as dispatchable capacity during a contingency event. BESS can be built as standalone assets or co-located with generation sources such as solar or wind, with co-location potentially influencing operational performance and investment return metrics for the generation component.

Though the exact nature of BESS revenue streams will vary based on market, at a high level, options for standalone BESS include the following:

- **Shifting energy** from periods of excess supply (charging during this period) to periods of short supply (discharging), helping to balance the market while generating profits from the energy price spread for asset owners;

- Providing **ancillary services** to the electrical grid, including frequency reserve services that are procured by Transmission System Operators (TSOs) and deployed in the event of grid destabilisation; and

- Participating in the **capacity market**, where the BESS is remunerated by the TSO for committing capacity on a forward basis to ensure sufficient capacity availability.

These options, depending on specific market rules, are not necessarily mutually exclusive, which allows asset owners to optimise their revenue strategies by participating across options to achieve their desired risk-return. IFM's experience in this sector has shown that taking a comprehensively considered approach to structuring battery investments, including what risks to take and how to implement appropriate safeguards, can support the pursuit of risk-adjusted returns from BESS.

Drivers for growth in BESS

Critical to achieving energy transition

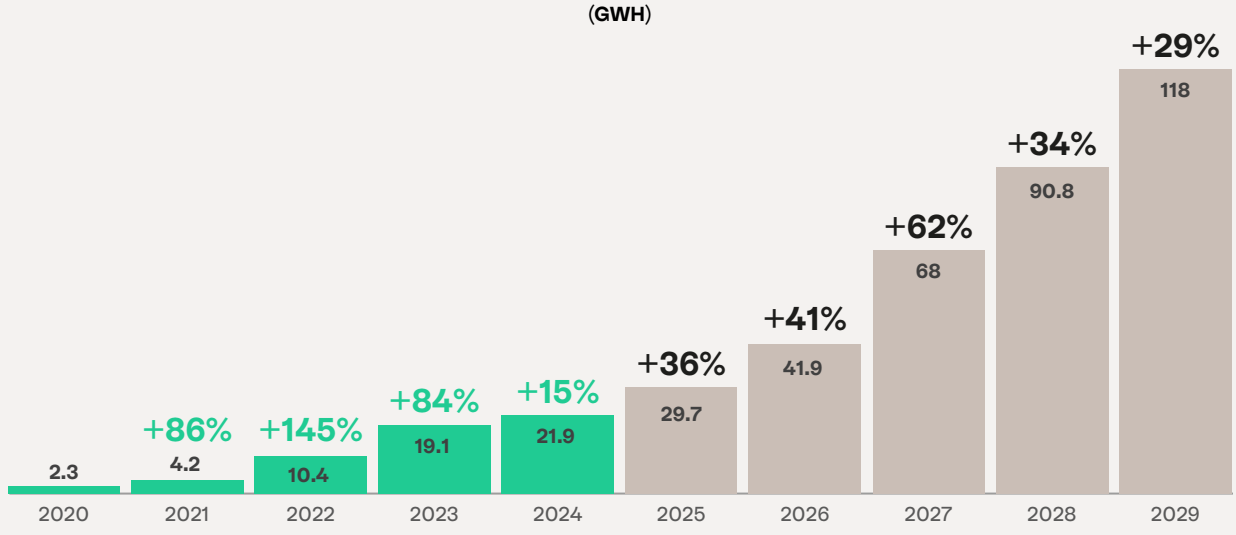
Achieving a complete transition of the world's energy supply will require significant investment in energy storage to balance variability and ensure grid reliability. Even in developed markets such as the European Union, where household installations caused BESS capacity to almost double annually from 2021 – 2023 in response to the energy price crisis, growth in 2024 remained solid – albeit at markedly slower pace – at 15%, as grid-scale installations compensated for a decline in the residential sector.[1] Looking ahead, growth is expected to re-accelerate from 2025 in response to new renewable energy capacity and favorable economics when compared to conventional power.

Growth will likely be even more pronounced in comparatively less mature markets such as Australia, where new storage capacity has traditionally been small relative to new generation capacity; for instance, a Q1 2025 report by Australia's Clean Energy Council noted that, from 2017 to Q1 2025, c. 18 GW of renewable generation capacity was commissioned, compared to c. 2.2 GW of energy storage over the same period. In contrast, the same report found that the current pipeline of projects (in financial commitment or under construction) showed c. 12.5 GW of new generation and c. 12.5 GW of new storage.[2]

In the US, where policy has created headwinds and uncertainties for the development of new solar and wind assets through the passage of the One Big Beautiful Bill Act (OBBBA) which phases out solar and wind tax credits by mid-2026, BESS assets have emerged as relative winners as their tax credits are not scheduled for phase out until 2033. Although some headwinds still remain, including around import tariffs and foreign entity of concern (FEOC) rules for tax credit qualification, the differential treatment of BESS relative other renewable energy assets under the OBBBA suggests that batteries are viewed as an important part of the future US energy supply due to their ability to provide baseload power,[3] indicating the potential for the future growth of the sector. Moreover, some developers of US BESS assets have been able to mitigate immediate headwinds through proactive risk management, including through importing critical battery modules and storing them in the US, further increasing the likelihood of deployment for near-to-medium-term pipeline projects.

FIGURE 1

ANNUAL NEW BESS CAPACITY IN EU 27, UK AND SWITZERLAND (2020 – 2029F)[1] (GWH)



[1] Solar Power Europe – European Market Outlook for Battery Storage 2025 – 2029 (assumed Medium Scenario)
[2] The Clean Energy Council – Quarterly investment report: Large-scale renewable generation and storage
[3] Troutman Pepper Locke – "Brave New World – What's Next for US Energy Storage After OBBBA and Amid Continued Tariff Risk?"

> **We believe batteries, either as co-located, behind-the-meter assets or standalone feeding into the broader electricity network, represent a crucial component of this solution.**

Strong contender for filling new energy demand from AI & digital assets

Anticipation of exponential growth in artificial intelligence technology has fueled a boom in data center development and construction, which in turn has created an enormous future need for energy as these sites are commissioned. This need is so pronounced that the power markets in the US and EU could return to a growth stance after over 15 years of relative stagnation.

A combination of renewable energy and BESS presents a compelling economic case to fill these energy needs, due to their low LCOE (Figure 3) and significantly faster time-to-market compared to competing forms of energy generation (Figure 4). We believe batteries, either as co-located, behind-the-meter assets or standalone feeding into the broader electricity network, represent a crucial component of this solution as data centers require a dependable source of power around the clock, making it difficult to rely solely on renewables.

FIGURE 2

US + EU27 NET ELECTRICITY PRODUCTION (1990 - 2030F)[4,5,6,7]

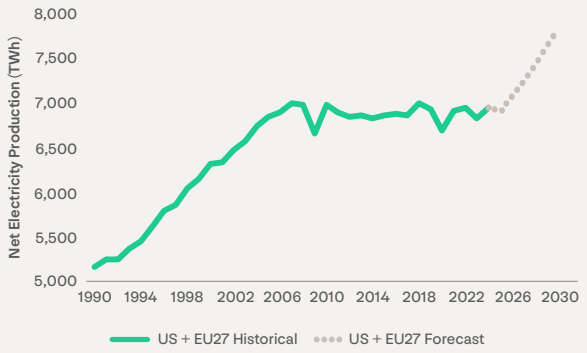


FIGURE 3

LEVELIZED COST OF ENERGY (JUNE 2025)[8]

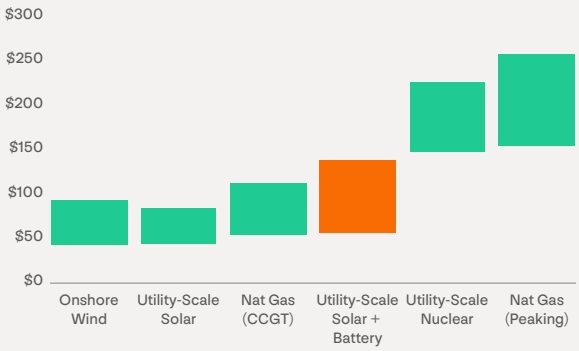
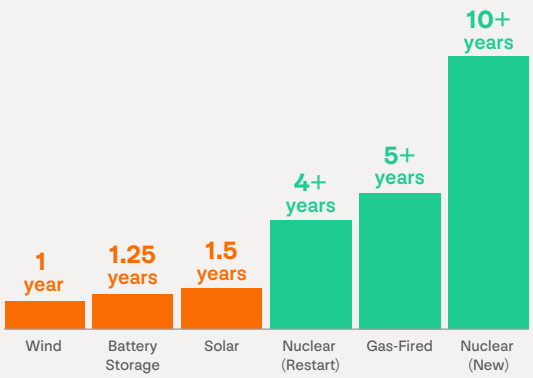


FIGURE 4

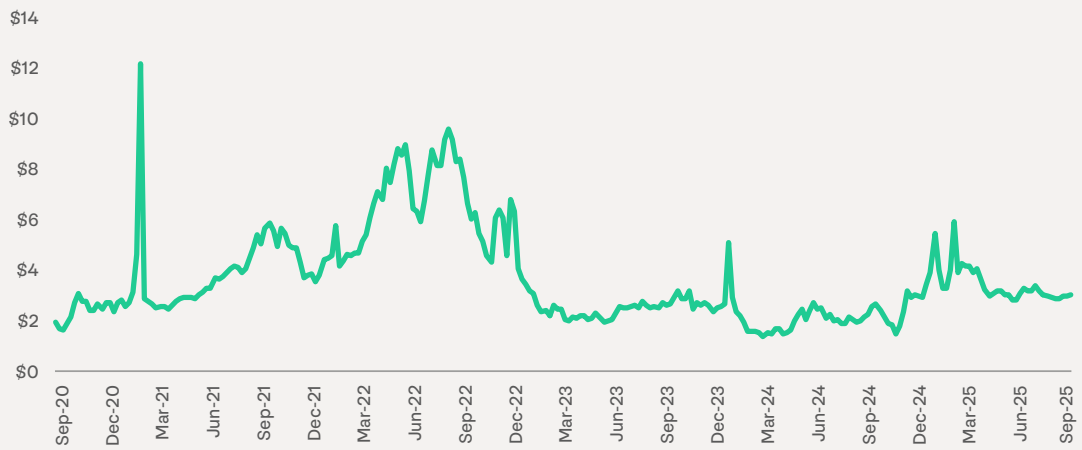
TIME-TO-MARKET[9]



[4] US historical data: U.S. Energy Information Administration – August 2025 Monthly Energy Review
[5] U.S. growth forecast: Data centers and AI: How the energy sector can meet power demand | McKinsey
[6] EU27 historical data: Eurostat - Net electricity generation by type of fuel - monthly data (September 2024)
[7] EU27 growth forecast: Data centers could boost European power demand by 30% | Goldman Sachs (February 2025)
[8] Lazard – Levelized Cost of Energy (June 2025)
[9] HASI Investor Presentation, August 2025

FIGURE 5

WEEKLY HENRY HUB PRICE[10]



Acting as a fossil fuel hedge

Renewable energy and battery storage can potentially provide a strategic hedge against volatility in fossil fuel prices as their operations are not directly linked to movements in global commodity prices. As an example, consider the weekly average Henry Hub price of natural gas over the last 5 years, as detailed in Figure 5.

The price of natural gas has tended to shift materially due to difficult-to-control factors, including cold weather freezing well-heads (impacting domestic production) at the same time that additional heating would be required; pipeline constraints during periods of heavy demand; and geopolitical disruptions including the COVID-19 pandemic, the 2022 invasion of Ukraine and potential import tariffs on energy.[11]

In contrast, renewables do not rely on fossil fuels as a critical energy input, providing a natural hedge against commodity price volatility during periods where renewables are able to satisfy electricity demand on their own. BESS can take this one step further by shifting periods of excess renewable energy supply into periods of low renewable supply (which, as of today, generally coincide with periods of high electricity demand), directly improving capture rates and reducing the need to utilize fossil fuel generation as the marginal generator. All else equal, this would be expected to reduce the impact that commodity price volatility has on wholesale electricity prices.

BESS as infrastructure

In markets with well-developed frameworks, BESS assets can be structured in a number of different ways to match the desired risk-reward profile. On one end of the risk-reward spectrum, assets can be structured as core infrastructure with stable, predictable cash flows and returns via tolling agreements that provide guaranteed fixed payments; on the other end, some operators may attempt to target higher returns by operating the batteries and participating in the merchant market, including through spot market arbitrage (charging when power prices are low and discharging when power prices are high) and providing reserve services to TSOs.

While taking the latter approach creates the opportunity to earn greater returns, careful consideration and implementation of thoughtful safeguards (including contractual protections, such as a revenue floor agreement) is critical to delivering risk-adjusted returns.

Obtaining financing can also be challenging on a fully-merchant basis, which could potentially require greater levels of equity investment to realise an asset, increasing an investor's risk exposure. Lastly, a deep look at the asset's specific characteristics can help identify opportunities to earn attractive potential returns without underwriting merchant risk, as had been done with the Prospect Power BESS asset developed and sold by Swift Current Energy, a portfolio company majority owned across funds managed by IFM Investors.

Though the options available to asset owners will vary by market, a high-level example of the options in European markets is set out in Table 1.

[10] U.S. Energy Information Administration – Natural Gas
[11] Stout – Why Henry Hub Gas Spot Prices Surged in February

TABLE 1

EXAMPLES OF REVENUE STRUCTURES IN EUROPE

Type	Description
Contractual structures	
Tolling agreement	• Owner leases asset to a third-party, who either operates the asset during the life of the agreement (under a physical tolling agreement) or has the right to nominate charge and discharge schedules (under a virtual tolling agreement) • Owner receives fixed payments, while third-party retains any excess profits generated • Partial contracting is possible (i.e. for a set percentage of BESS capacity) to retain some merchant upside
Revenue floor	• Owner enters into an agreement with counterparty to guarantee a floor level of revenue at the asset • If revenues drop below the floor, the counterparty pays up to the shortfall amount • Incentive for the counterparty can vary, including a fixed payment (similar to insurance) or upside sharing
Merchant revenue streams	
Spot market arbitrage	• Asset captures value from price volatility by buying electricity (charging battery) when prices are low and selling electricity (discharging battery) when prices are high (within constraints of battery duration)
Reserve markets	• Market participants bid (i.e. day ahead or 2 days ahead) to provide reserve power, which TSOs can draw on if needed to stabilize the grid • Remunerated for providing reserve capacity, with further activation payments if the battery is drawn by the TSO • Batteries must be kept in a required state of charge while providing reserve power, and thus cannot simultaneously participate in spot market arbitrage
Other potential markets	
Inertia market	• Growth in renewable energy has created a need for standalone inertial response, which was previously provided passively by the spinning turbines in conventional power plants
Capacity market	• BESS is remunerated with availability payments for providing guaranteed capacity availability, on top of income generated from other merchant revenue streams
Reactive power	• BESS provides reactive power, providing voltage support without necessarily discharging energy

While the revenue opportunities on their own can be quite attractive, their value for energy transition-focused investors would be limited if sustainability and circular economy considerations were not taken into account. In many developed BESS markets, significant work has been done on this front, with a full decommissioning / waste management plan being required under broad market regulations such as the EU Sustainable Finance Disclosure Regulation (SFDR), as well as generally under location-specific environmental protection guidelines required to obtain necessary development permits.

While a positive start, work is ongoing globally to further improve the sustainability characteristics of BESS, including through increasing the recyclability of battery modules and reuse of other key components.

CASE STUDY

IFM Investors' experience in BESS

IFM has gained significant experience the BESS sector through Nala Renewables and Swift Current Energy, both portfolio companies of funds managed by IFM, which are active in the BESS sectors in Europe and North America, respectively.

Nala Renewables

Nala Renewables is a global power and renewable energy business that acquires, develops, builds and operates solar, wind and power storage projects. Formed as a joint venture with a strategic partner with energy trading capabilities, one of the original opportunities contributed was a 25 MW BESS project in Balen, Belgium. Construction began in 2022, with the project first producing revenue from 2023.

Leveraging the respective strengths of each of Nala's shareholders has been key to optimising value and returns from the project. Our partner utilized their commodities trading knowledge to structure a revenue floor contract with the asset, which provided greater cash flow certainty and allowed Nala to raise project financing, all while enabling Nala to retain the potential upside from participating in reserve markets and spot market arbitrage. At IFM, we drew upon our expertise in infrastructure to develop a comprehensive set of operating procedures and initiatives that have resulted in significant improvements in operating performance.

Nala is now actively seeking to leverage its operating experience to expand its market footprint in BESS, including in Finland following the recent acquisition of a 50 MW under-construction BESS asset and an agreement to acquire a ready-to-build BESS portfolio that is expected to be over 250 MW once operational.

Swift Current Energy

Swift Current Energy is a US-based developer, builder and operator of solar, wind and BESS assets across the country. Majority owned across funds managed by IFM, the company originally comprised of a small team operating primarily on a "develop-and-sell" model but has grown significantly under IFM ownership and developed into a full-fledged IPP platform with over 1 GW of assets in operation.

One of the projects developed by Swift Current Energy was Prospect Power, a 150 MW BESS project in Virginia that has an executed long-term toll agreement (with escalation) for the entirety of its capacity with an investment-grade counterparty. Securing this agreement was a major milestone for Swift Current Energy that demonstrated the value of understanding the specific characteristics of the asset (including its location in PJM and interconnection position) and their value to potential counterparties, which is expected to enable this asset to deliver attractive infrastructure returns without taking on additional merchant risk. Moreover, Swift Current Energy adopted a proactive approach to risk management and imported its battery modules from a Tier-1 supplier in advance to mitigate uncertainty regarding the implementation of new tariffs and preserve forecast project returns. The value of these efforts was realized in December 2025, when Swift Current Energy successfully sold Prospect Power to a third party.

Case studies are provided for illustrative purposes only and should not be relied on to make an investment decision.

Key takeaways for investors interested in BESS

Balancing the desire for high returns with risk management

- Operating a BESS on a fully-merchant basis exposes investors to significant volatility – both positive and negative – with potentially limited ability to mitigate downside risks should the electricity market take an unexpected turn
- Although structuring and securing long-term revenue contracts, whether that be a full tolling agreement (see Swift Current Energy's Prospect Power project that was sold in December 2025) or a revenue floor agreement (see Nala Renewables' Balen asset), can be complex and take time, they can provide important backstops that allow investors to achieve their desired risk-reward balance
- Revenue contracts also help increase a project's financeability, which can reduce the amount of equity capital at risk for any particular project

Operating the asset post-COD and executing on the investment business plan

- BESS assets, given their technical and operationally flexible nature, generally require a more active day-to-day management approach vs. other typical energy transition assets
- If desired, day-to-day operations can be outsourced to specialized service providers for a fee, but having in-house expertise remains critical for structuring operating guidelines and procedures (in accordance to each investor's risk appetite) and verifying that these policies are implemented and followed on an ongoing basis

Sourcing new BESS opportunities

- Investing via a platform with dedicated management teams and staff, as funds managed by IFM have done via Nala Renewables and Swift Current Energy, allows for the accumulation of in-house specialized expertise and continuity over time across asset developments
- Dedicated, on-the-ground staff can generate more comprehensive analyses of potential asset sites and early-stage development projects compared to a top-down research approach
- Those insights can reveal significant advantages later in the project lifecycle, including in obtaining revenue contracts with high-quality counterparties (as was done on SCE's Prospect Power)

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