Europe's Battery Energy Storage Opportunity

Shaping the Future European Grid

September 2025

Executive Summary

Europe's power markets face structural imbalances that create outsized opportunities for battery storage integration. Expensive gas imports, surging solar and wind output, limited grid flexibility, and the loss of baseload power exacerbate power price volatility and keep energy costs high. At the same time, around-the-clock demand from data centers is expected to double by 2030. **Batteries can turn persistent and more extreme price volatility in Europe into steady profits.**

A well-optimized 10MW/20MWh battery in Europe could earn an average of €200,000/MW annually, which can vary widely by country. The average yearly revenues could nearly cover a battery system's total upfront costs in just a few years. Price arbitrage alone could generate up to €1.2M a year in some markets today.

Batteries don't need extreme price swings to profit in all of Europe. Capacity markets and grid services can also generate enough revenues for batteries. A 10MW battery in Belgium could have earned nearly €3M from frequency regulation services in 2024.

Grid service and capacity markets may see rising competition and saturation as more batteries come online, however. Still, Europe's power market fundamentals will likely ensure persistent price volatility and long-term value for batteries.

By 2030, the region will lose 800 terawatt-hours (TWh) of baseload power while adding five times more renewables than battery storage, according to BloombergNEF (BNEF) modeling. At the same time, data centers will require almost 100TWh of new around-the-clock generation.

Europe also benefits from access to best-in-class Chinese batteries at half the cost of U.S. projects, plus billions in government subsidies to guarantee long-term storage value.

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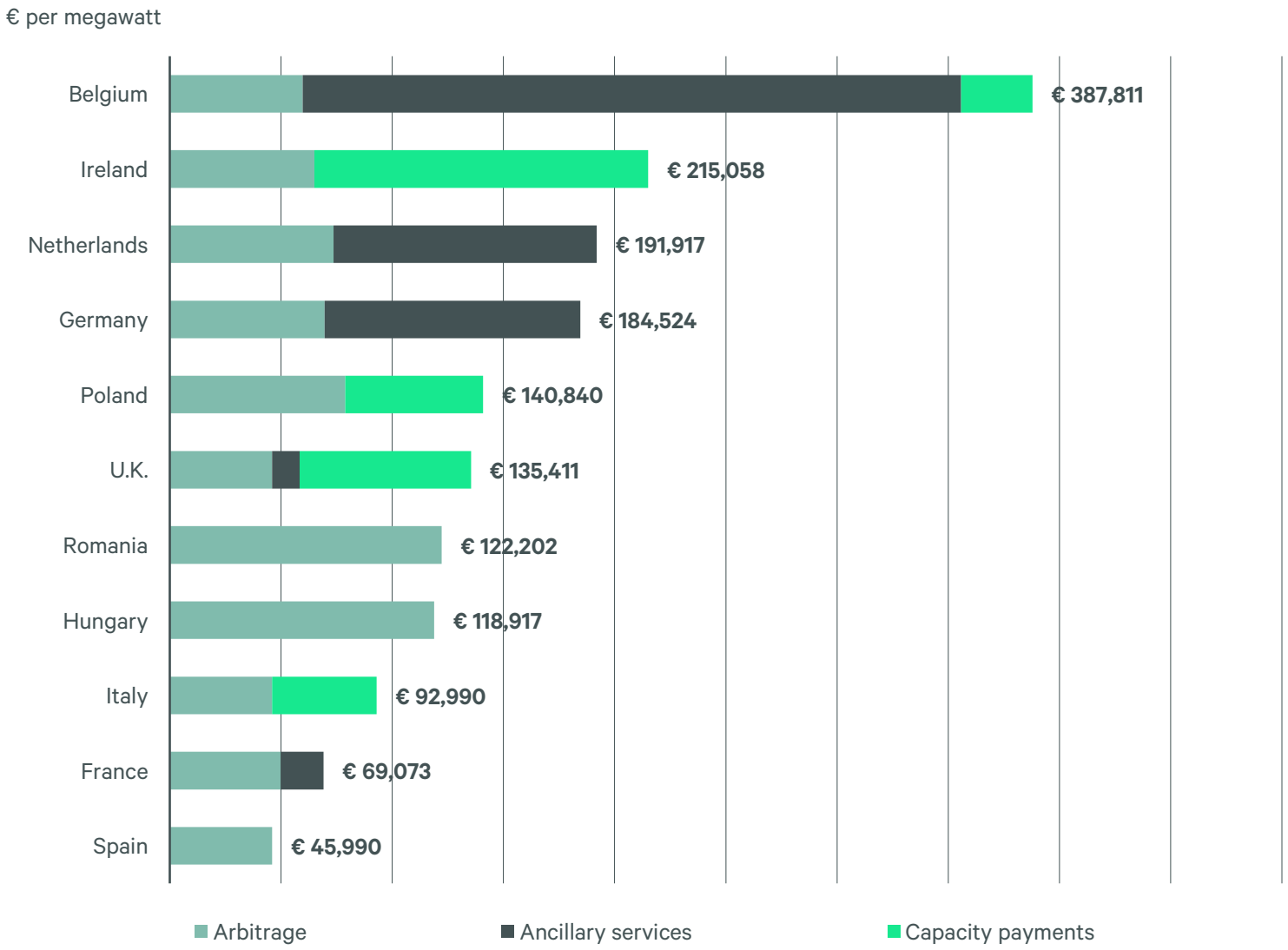
Figure 1) Illustrative one-year revenues for a 10MW/20MWh battery in Europe, € per megawatt



Source: CBRE, ENTSO-E, BloombergNEF. Note: Excludes subsidy payments. Ancillary services include grid service payments for frequency response. Energy arbitrage revenues assume full-year 2024 values, capacity payments assumptions using 2024 auctions across Europe, and grid services use January to June 2024 average frequency response payments, and assume batteries are selected for 80% of the hours in a year.

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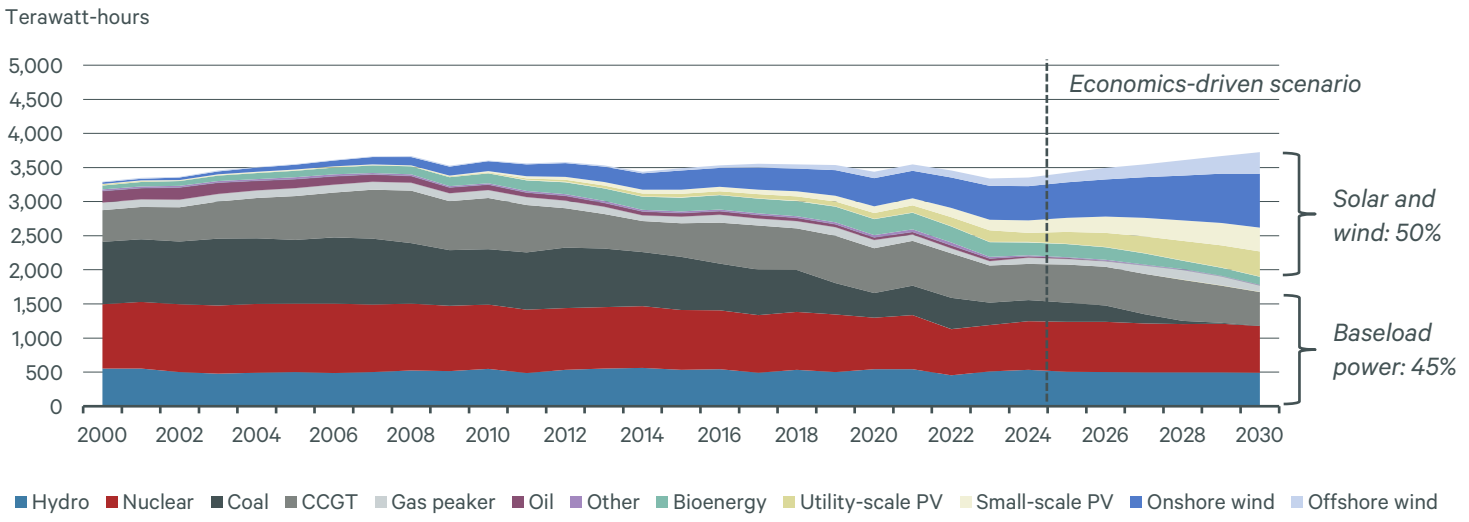
Europe's Power Transition: From Baseload to Batteries

Baseload generation such as coal and gas plants struggle to compete in Europe due to high fuel costs and carbon prices. More periods of low power prices when renewable output is high also accelerates nuclear power plant retirements. This creates a downward spiral, where losing baseload power exacerbates supply-demand imbalances and forces more power plant closures.

Europe is on track to lose 800 TWh of coal, nuclear and gas net generation by 2030, roughly one-quarter of all electricity produced in the region last year, BNEF modeling shows. By 2030, baseload power will account for just 45% of all electricity in Europe, down from more than 70% in 2019. All coal plants in Europe will close by 2030 under current economic conditions, while nuclear power will also drop below 20% of all electricity produced, down from 24% in 2019. Many European power markets peak in the winter months. This likely leaves countries with solar-heavy grids, little wind and falling baseload power exposed to more power price spikes.

Renewables will fill the supply gap in Europe but can't provide the same level of reliability alone. Europe's emissions goals and reliance on expensive gas imports make it hard to economically build new gas-fired combined-cycle and peaker plants. This leaves battery storage and demand response as probably the only ready-to-deploy flexibility solutions for Europe.

Figure 2) Europe's electricity generation by technology and fuel



Source: CBRE, BloombergNEF. Note: PV stands for photovoltaic. CCGT stands for combined-cycle gas turbine.

BNEF expects **renewables, including rooftop solar, to generate 50% of all of Europe's annual electricity by 2030**, up from 30% last year and just 17% in 2019. Solar and wind already exceed 50% of total monthly generation across countries such as Germany, Greece, the U.K., and Spain. With rooftop solar, renewable penetration is likely even much higher in Germany, Belgium and the Netherlands. What's more, monthly renewable penetration swings of 20-30 percentage points force baseload power plants into costly stop-start cycles.

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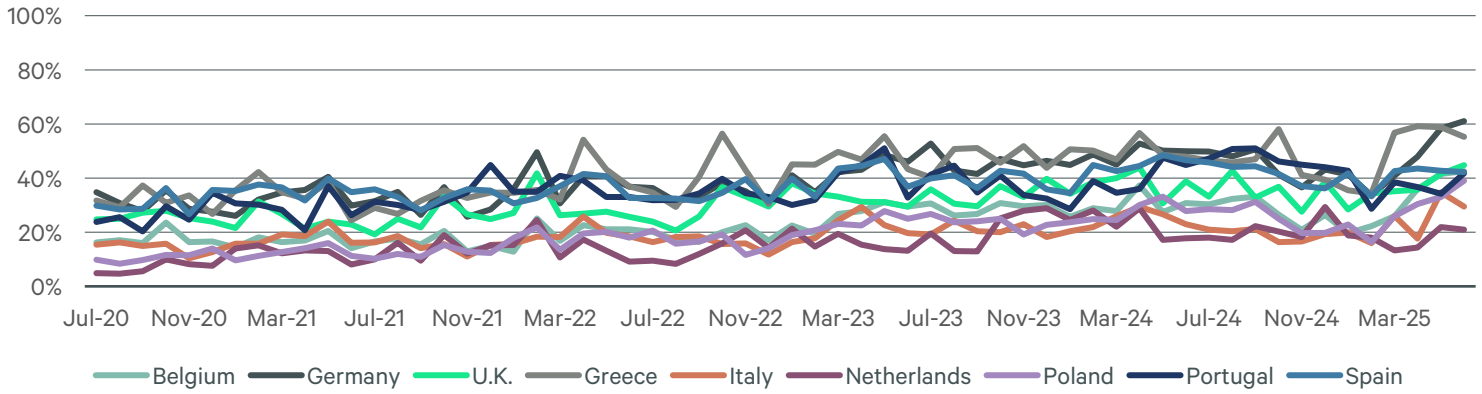
Figure 3) Monthly solar and wind generation as a share of total electricity by country



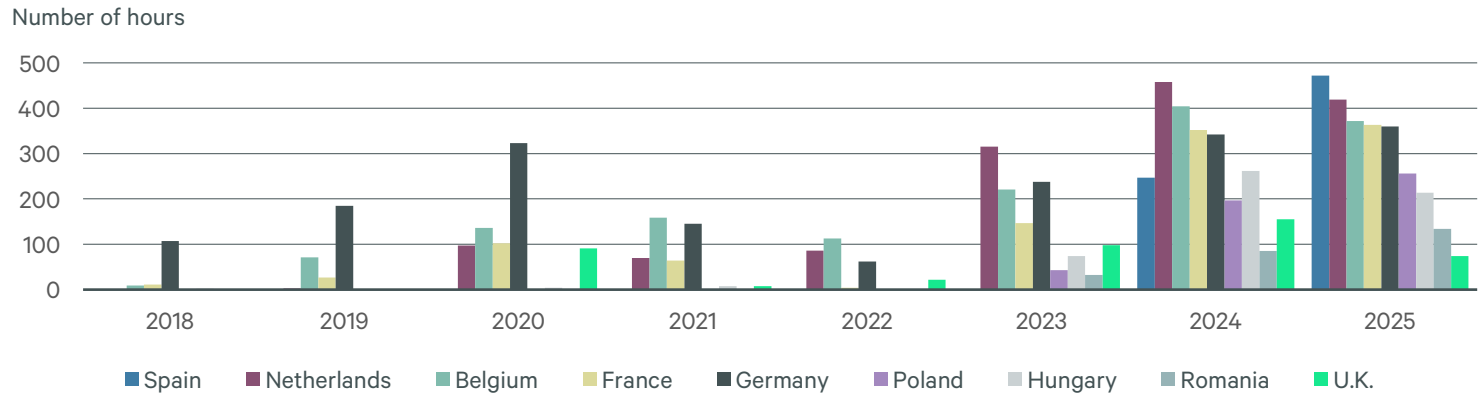
Source: CBRE, BloombergNEF. Note: Excludes behind-the-meter solar generation. As of June 2025.

Supply intermittency also means batteries can get paid to charge in Europe's renewable-heavy markets, when excess solar and wind push electricity prices below zero. **A 10MW system could have earned €106,000-€170,000 last year from negative pricing** alone in Belgium, Germany, and the Netherlands.

As of July of this year, European countries have had on average 300 hours of negative prices, already well above the average 57 hours in 2022. Renewable oversupply will triple from 3-5% today to 11-15% by 2030, according to BNEF, as Europe builds five times more renewables than storage.

Some grid operators can't easily curtail excess output, especially residential solar, while nuclear and coal plants are also too expensive to shut down during oversupply periods. Coal-heavy Poland and nuclear-heavy Hungary, France and Belgium struggle to contain negative prices as a result.

Figure 4) Count of hours with negative wholesale power prices in Europe



Source: CBRE, ENTSO-E, Ember.

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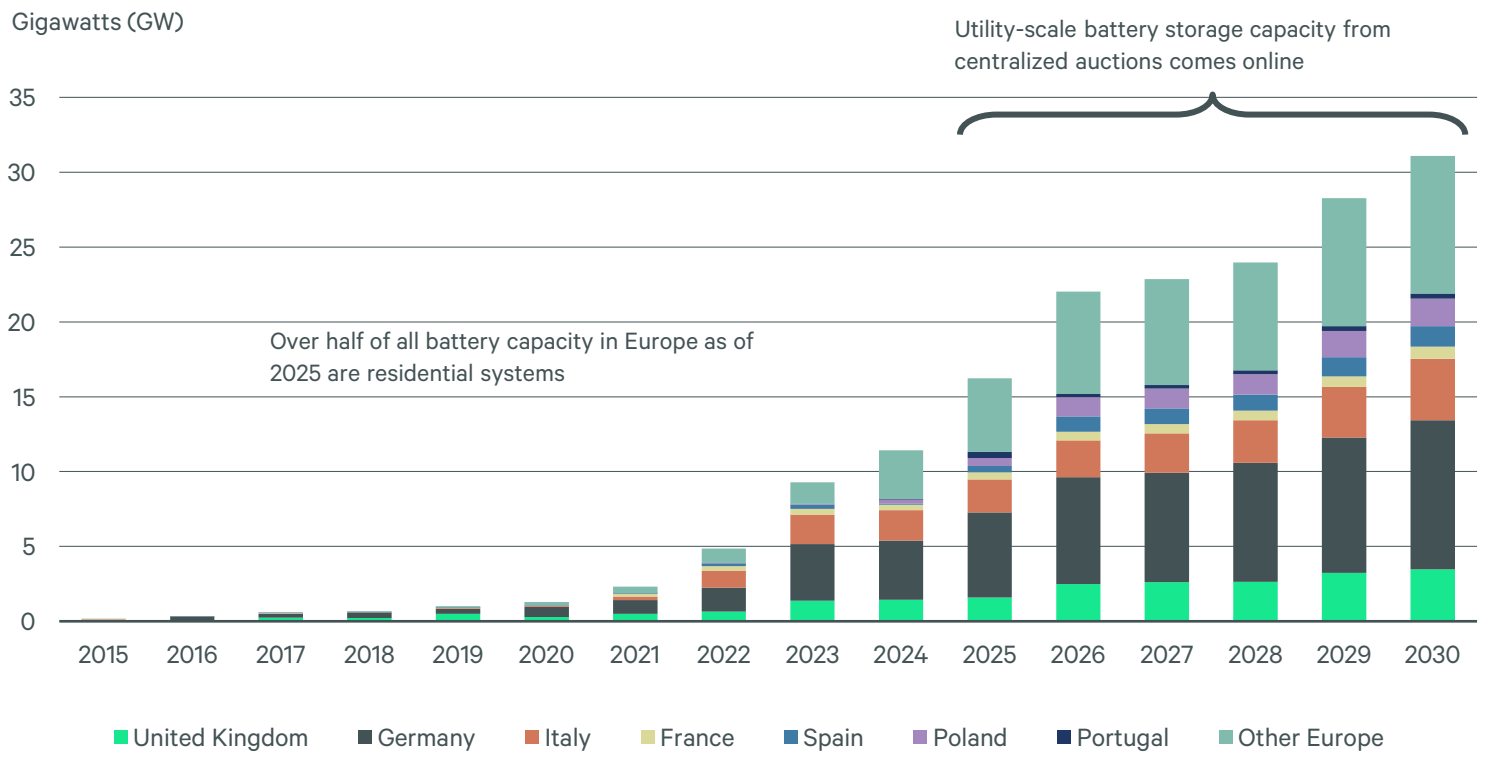
First-Mover Advantage: Europe's Untapped Battery Markets

Installed battery capacity, excluding residential systems, represents less than 2% of peak demand in most European countries. Early-movers can capture more revenue streams for batteries before competition grows. Over half of all battery storage capacity in Europe as of 2025 are residential systems paired with rooftop solar, which don't compete with bigger batteries for most revenue streams.

Batteries will be profitable in the long term as more baseload power shuts down, renewable penetration rises and subsidies remain. But returns will likely moderate as the market matures. More governments plan to run auctions for large-scale batteries, but some of these projects face slow grid interconnection approvals and expensive grid fees.

In contrast, distributed projects built on-site at industrial facilities could benefit from faster grid interconnection approvals and lower fees. Faster approvals give smaller projects more time to profit from subsidies, high price spreads and grid payments, before big batteries from centralized procurement auctions come online.

Figure 5) Battery storage capacity additions in Europe



Source: CBRE, BloombergNEF.

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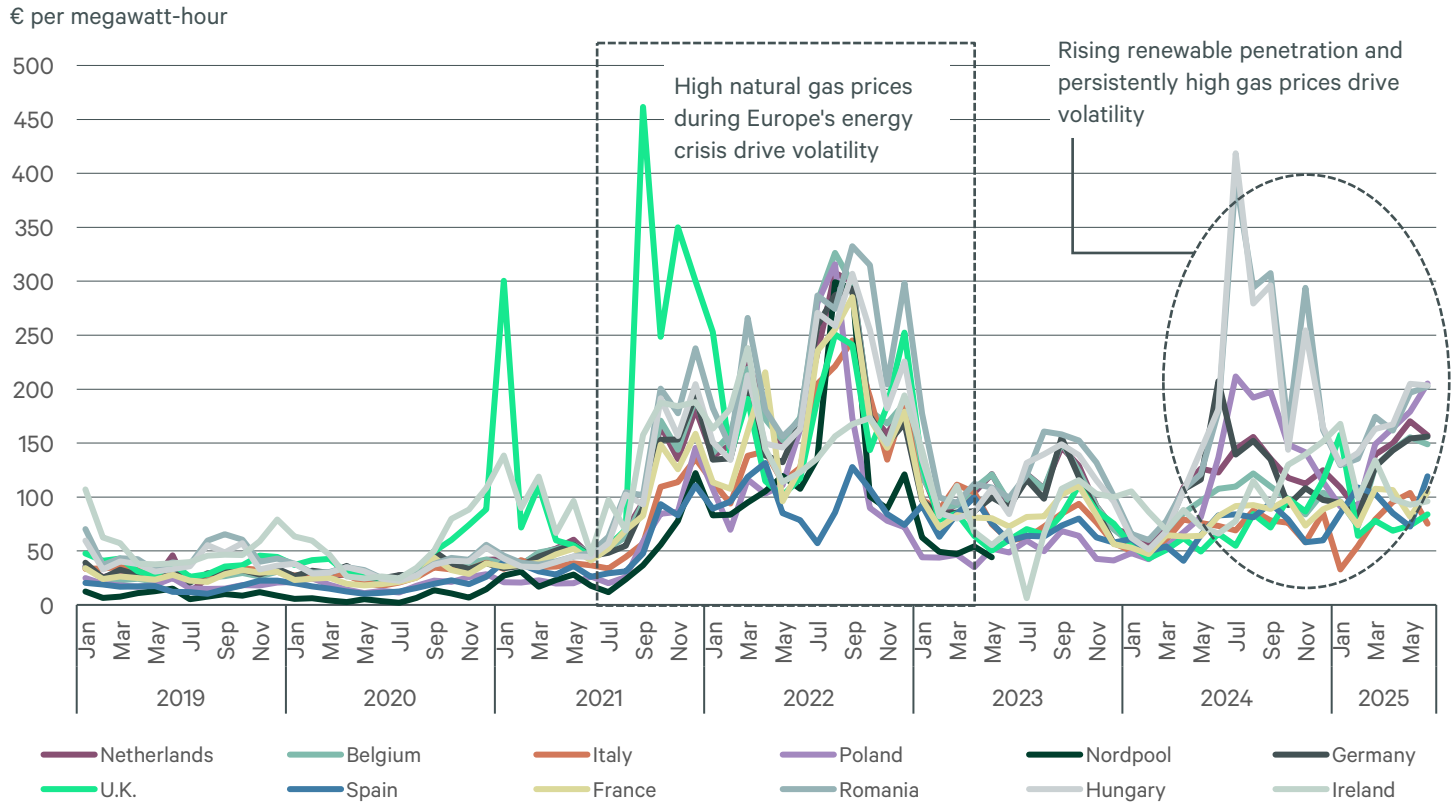
Power Price Volatility Creates Arbitrage Opportunity for Batteries

While gas prices have fallen from their peaks, volatility is still high and has grown fast this year. Power price spreads averaged €90/MWh across European countries last year, 257% higher than before gas prices surged during the 2022 energy crisis. Through July of 2025, the average spread reached €111/MWh, 50% higher than for the same period in 2024, according to data from transmission operator ENTSO-E.

Power price volatility will persist as Europe adds another 700 gigawatts (GW) of renewables from 2025 to 2030, according to BNEF forecasts, and just 130GW of batteries for the same period. Rising around-the-clock electricity demand in the region, especially from new data centers, will put more pressure on European grids during hours of high demand and low renewable generation. Both S&P and BNEF predict that European data center demand will double by 2030.

Figure 6) Monthly average of hourly power price spreads for European countries



Source: CBRE, BloombergNEF, Ember for 2024 and 2025 values, ENTSO-E. Note: Power price spread is the difference between the highest and lowest power price in a day.

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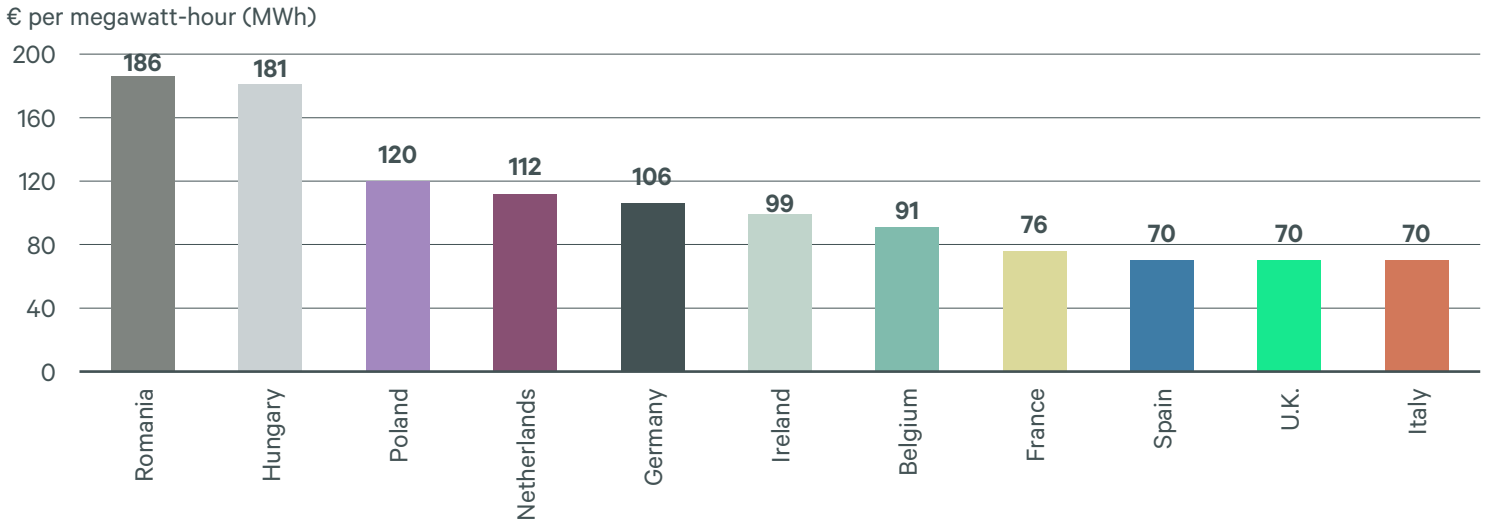
Figure 7) Average hourly power price spreads by country in 2024



Source: CBRE, Ember, ENTSO-E. Note: Power price spread is the difference between the highest and lowest power price in a day.

Volatile Markets

Structural volatility in **Romania and Hungary** offered the highest arbitrage potential last year, with hourly price spreads averaging over €180/MWh in 2024. **Poland, the Netherlands, and Germany** also exceeded €100/MWh spreads last year.

Germany

In Germany, power price volatility is still high despite the recent surge in residential batteries, and it's not expected to fall as it adds more solar to the grid.

Solar already floods the market during the day, driving prices below zero, while expensive gas power and high evening demand cause evening prices to spike.

According to Modo Energy, there's 3.7GW of large-scale battery capacity in the pipeline too. However, expensive grid fees and slow construction timelines make many such big projects infeasible during the preliminary development phases.

Contained Markets

Modest demand growth and high battery penetration have contained volatility in some markets. Battery projects in these countries rely on capacity payments and government incentives instead. But these same low power prices are also attracting new data centers that will likely raise demand and volatility.

Italy

A boom in residential battery installations, combined with low electricity demand growth, has likely helped contain price spikes. But the country is still attracting plenty of new battery projects thanks to capacity payments and generous long-term subsidies, on top of remaining arbitrage opportunities.

United Kingdom

In the U.K., installed utility-scale battery capacity accounts for 15% of the country's peak demand, by far more than any other country in Europe. While storage has likely contained volatility in the U.K., lucrative capacity and grid service payments still encourage new battery build. A 10MW/20MWh battery there would earn about €1.4M a year alone, of which two-thirds would come from capacity markets and ancillary grid service payments.

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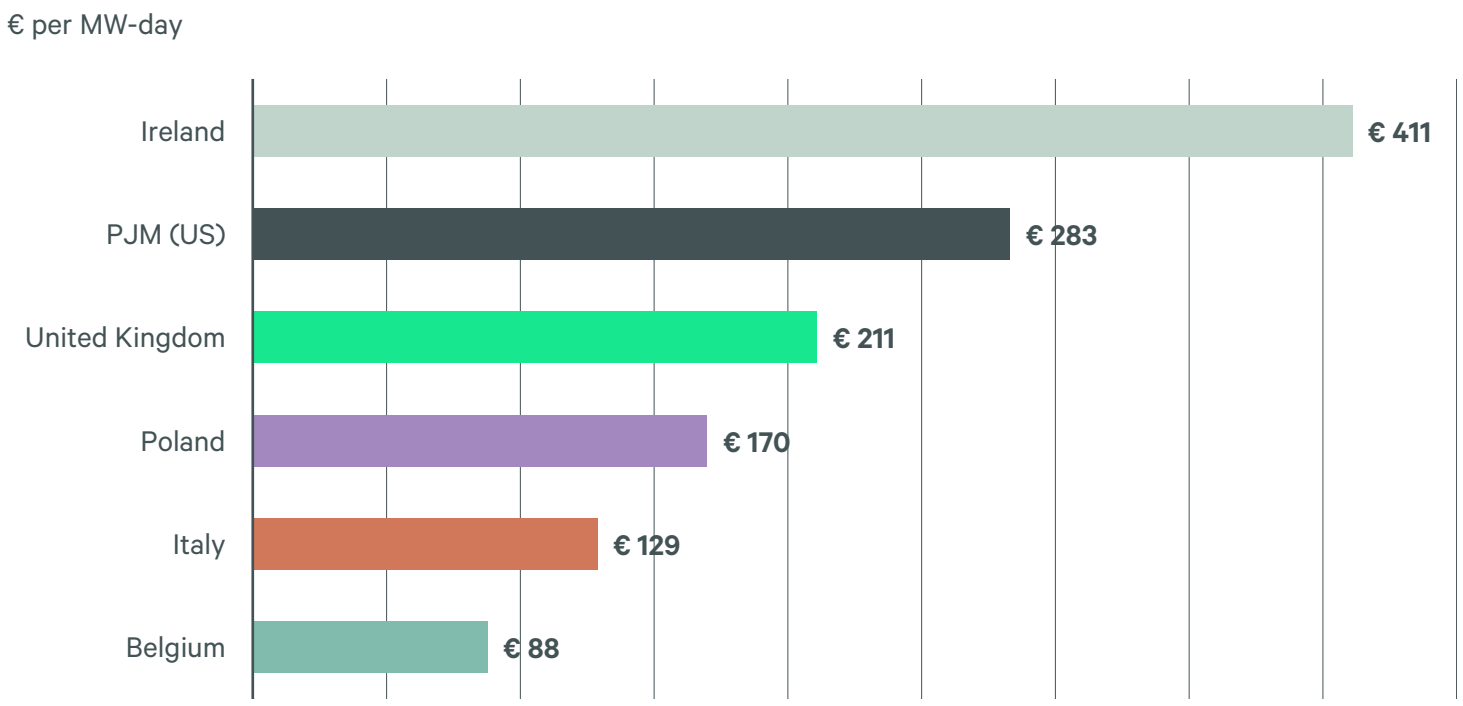
Beyond Power Price Arbitrage: The Value of Grid Services

Beyond arbitrage profits, batteries in Europe earn capacity and grid service payments, creating business plans that don't depend on one single income source.

The U.K., Italy, Ireland, Poland, and Belgium hold yearly capacity auctions that pay batteries for being available during high-demand hours. A 10MW battery participating in recent auctions would have earned between €0.3-1.5M a year in the last round of auctions, depending on the country. Spain and Germany plan to launch their own capacity markets between 2026 and 2028 too.

Figure 8) Capacity payments for battery storage in Europe, 2024 values



Source: CBRE, U.K.: NESO 2024 capacity auction results, Ireland: SEM-O 2024/25 capacity auction results, 2024 average GBP/EUR exchange rate used, Belgium CRM 2025/26 capacity auction results, Poland: URE 2024 auction results, Italy: Terna 2025 capacity auction results. Note: PJM market in the U.S. for reference only, assuming 2024 USD/EUR exchange.

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Frequency Regulation Services Drive Grid Reliability and Revenues

At least eight European countries, led by Germany and France, pay batteries for **frequency regulation** services too. According to estimates from battery revenue forecaster Modo Energy, grid services account for half of all revenues for utility-scale batteries in Germany.

Spain plans to add its own payment mechanism in 2026 as well. Spain and Portugal together installed just 350MW of non-residential battery storage as of 2024, less than 1% of their peak demand. Batteries could have likely prevented the recent blackout there by stopping dangerous voltage spikes. Portugal now plans to spend €400M to add new large-scale battery storage and improve grid management.

The Frequency Containment Reserve (FCR) market in Europe, a grid service program to maintain grid stability, already has more supply than demand. But demand from the new automatic Frequency Restoration Reserve (aFRR), a similar program, is nearly three times larger. Unlike FCR, which only pays for capacity availability, aFRR also pays for energy dispatched. This favors longer-duration battery projects of two to four hours.

In 2024, FCR paid on average €17/MW/hour, according to ENTSO-E, Europe's transmission operator. A 10MW/20MWh battery that earned FCR payments for 80% of the hours in 2024 could have made over €1M. If aFRR prices resemble the FCR market in the early years of adoption, batteries could make well over half of all their yearly revenues by participating in grid services.

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Government Subsidies Guarantee Long Term Value for Batteries

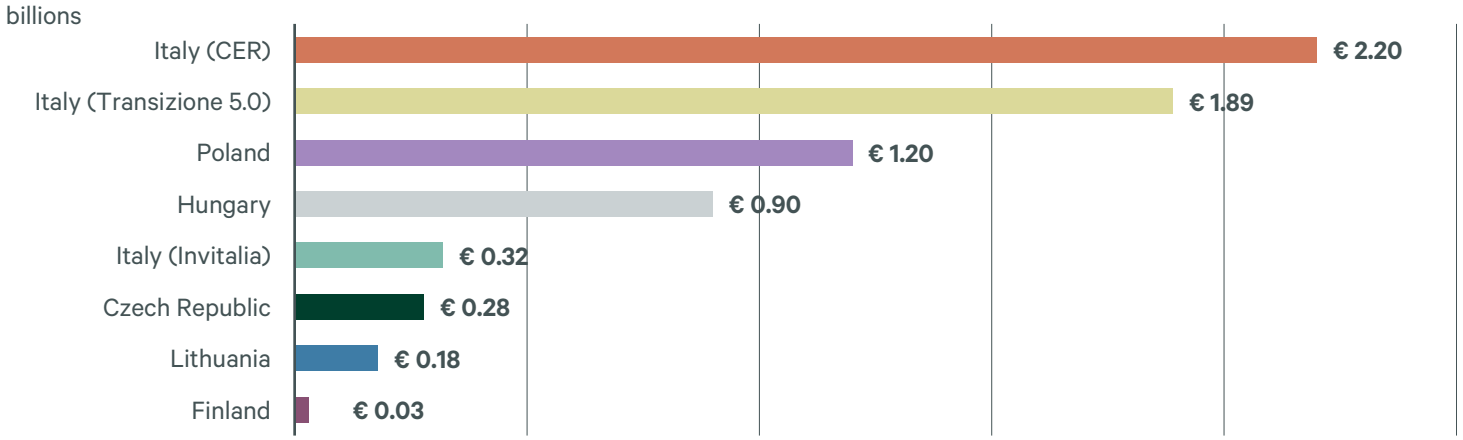
More countries are using existing European Union (EU) and state funds to subsidize battery storage. Government incentives provide long-term revenue certainty and make batteries profitable in places where market revenues alone can't generate attractive returns.

Subsidies will likely be available for a long time. The EU could allocate part of the **€40 billion Innovation Fund**, financed through the EU emissions trading scheme, to support battery adoption and industrial decarbonization through 2030. Subsidies also provide much-needed revenue certainty to raise financing in countries where investors don't feel comfortable funding battery projects despite lucrative power price volatility. Examples include Hungary or Romania.

Italy leads with nearly **€18 billion** earmarked just for large-scale battery projects via centralized auctions, by far the biggest state investment available in Europe. This dwarfs even the generous tax credits that drove Italy's residential battery boom starting in 2022. Greece, Germany, the Netherlands, Croatia and Spain have also turned to centralized auctions to subsidize utility-scale batteries, with Spain planning to **spend €700M**. Faced with ambitious renewable goals, these countries want to contain price volatility and integrate solar and wind. Others, such as coal-heavy Poland, turn to battery storage to limit reliance on expensive gas.

Commercial and industrial sites can tap into at least €7 billion Euro subsidies available as of July 2025 to install on-site batteries either directly connected to the grid or behind-the-meter. Italy is making more incentives available than any other country. Many subsidy schemes target investments that lower a site's energy consumption, making battery storage eligible. But incentive programs and rules vary by country, requiring tailored project structures for each market.

Figure 9) Battery subsidies available as of July 2025, excluding centralized auctions



Source: CBRE. Note: Some programs target all types of project investments that lower a company's energy consumption, including battery storage. CER stands for the community energy program in Italy and only applies to solar projects, Invitalia is a specific program in Italy too. Some programs are for grid-connected batteries only, but minimum size requirements of 1-2MW make a front-of-the-meter customer-sited battery potentially eligible. Amounts available for each program can vary from initial budget.

Appendix

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Countries ready for battery storage integration

Country	Opportunities	Considerations
Germany	– Biggest market potential in Europe, high power price volatility despite the recent boom in residential battery adoption – Plenty of more solar expected to come online – New capacity market planned for 2028	– Including residential batteries, storage already accounts for 21% of peak demand, so the risk of saturation is possible – Big pipeline of new battery capacity expected to come online by 2028
Poland	– One of the highest power price spreads in Europe and fast-rising solar penetration – Reliance on expensive gas and coal-heavy power system	– Possible policy gridlock could slow meaningful market reform, including extending the capacity market
Romania	– Extreme power price volatility and negative prices despite low (<20%) renewable energy penetration – Solar and wind capacity expected to rise	– No capacity or grid service programs available – Lenders often only provide financing if subsidies are available
Hungary	– Extreme power price volatility and negative prices are a result of high solar penetration, lots of inflexible nuclear and reliance on expensive gas and power imports during peak demand hours	– No capacity or grid service programs available – Lenders often only provide financing if subsidies are available
Italy	– Over 20 billion in subsidies available for batteries in Europe through various programs – Very high solar penetration expected to rise further	– Very low power price volatility likely due to falling demand, and a recent surge in residential batteries equivalent to 15% of peak demand – Expected utility-scale and residential battery additions could contain price volatility further

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Countries to watch for one-off opportunities

Country	Opportunities	Considerations
United Kingdom	– Mature capacity markets provide long-term payments, on top of some power price volatility due to reliance on expensive gas – Ambitious climate goals will force gas retirements, adding more need for flexibility	– Very big fleet of utility-scale batteries already crowds out capacity market, grid services, and volatility
Spain	– Non-existent battery storage market and very high solar energy penetration can soon introduce more volatility in the system, especially if nuclear plants retire – Planned capacity payments and grid service programs could pay generous amounts to batteries, especially after the recent blackout	– Very low power price volatility despite high solar penetration because of flat to falling electricity demand – Recent large-scale centralized auctions have already attracted plenty of battery capacity – Unclear regulatory framework to compensate behind-the-meter batteries
Belgium	– By far the most lucrative grid service payments, combined with fast-rising volatility, negative prices and solar energy penetration	– Plenty of large-scale battery capacity relative to peak demand is already under construction and could crowd out market revenues
The Netherlands	– Very frequent, and severe negative price hours because of high rooftop solar penetration, leading to extreme power price spreads	– Plenty of large-scale battery capacity relative to peak demand is already under construction and could crowd out market revenues

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