

What Germany can learn

The United Kingdom is arguably Europe's most mature battery energy storage market, with asset owners free to build revenue stacks from grid ancillary services, a capacity market, wholesale markets, and a revamped balancing platform. Baris Serifsoy of GreenCap Partners examines how the British experience can inform Germany's energy storage sector.

As renewable energy penetration deepens and grid stability challenges intensify, battery energy storage systems (BESS) must adapt their business models to remain viable. Over the past few years, we have witnessed a structural shift in the revenue mix. Using the United Kingdom and Germany as examples, BESS revenue streams have transitioned from contracted ancillary services and capacity mechanisms to non-contracted wholesale market arbitrage.

It's worth recapping the BESS landscape in both countries, which differ in structure and market access.

Revenue stacks

In the United Kingdom, market participation is relatively centralized. BESS assets access well-defined services in frequency response and capacity markets, which have supported early commercialization. The bulk of the frequency response comes from dynamic containment (DC) services, where contracted volumes hover around the 1 GW mark per day and some additional hundreds of megawatts in dynamic regulation (DR) and moderation (DM). In capacity markets like the 40 GW-plus T-4 auctions, BESS remains a small share at about 5% of derated capacity, but these contracts – up to 15 years – are a valuable part of the revenue stack.

Germany operates a more decentralized model. There is greater emphasis on balancing services like frequency containment reserve (FCR), automatic and manual frequency restoration reserve (aFRR, mFRR). These are procured over short time frames, often weekly or monthly, limiting revenue certainty. The FCR market totals around 550 MW, while aFRR and mFRR each add several hundred megawatts of balancing potential. Notably, Germany has not implemented a capacity market – a deliberate choice not

to pay for “mere availability” that instead prioritizes real-time flexibility and undistorted price signals.

The United Kingdom has been a front-runner in this transition. Early revenues were dominated by DC services, and to a lesser extent, the capacity market. However, as more batteries entered the market, competition in ancillary auctions intensified. Modo Energy reports that DC auction bids more than doubled from 20 to 25 units in 2021 to more than 50 by 2023. The rise in competition drove prices down sharply – from over GBP 17 (\$22.43)/MWh in early 2021 to around GBP 3/MWh in mid-2024. As clearing prices fell, the economic case for ancillary-only strategies eroded.

In response, operators shifted to wholesale trading, capitalizing on intraday volatility and more frequent negative pricing hours. This was driven largely by rising renewable output. Between 2021 and 2024, it is estimated that the wholesale arbitrage portion of the UK revenue stack shifted from 7% to 34%.

German BESS operators also shifted toward trading. In 2021, revenues were 90% FCR-driven. By 2024 it was 65%, with aFRR and FCR contributing roughly one-third each, and trading making up 35%.

Islands apart

There is a distinct difference that lies behind the similar percentage shifts between the two countries. UK BESS operators – while benefitting from more opportunities to generate income from arbitrage trading – reached this revenue mix mainly due to the large drop in ancillary revenues. Only toward the end of 2024, did revenues recover somewhat.

In contrast, Germany's market was able to expand the arbitrage component of its revenue mix without a dramatic collapse in FRR and FCR revenues. This relative stability in contracted revenues is largely attributed to Germany's integration within the European Union power market.

BESS operators in Germany can participate in cross-border balancing markets, allowing them to monetize flexibility across several interconnected countries. Despite physical interconnectors, the UK operates its balancing markets largely in

Annual negative energy price hours (UK vs. Germany, 2021–24)

Year	UK (estimates)	Germany
2021	60	139
2022	90	69
2023	214	301
2024	250	459

Source: Average of Elexon, Modo Energy, Electric Insights estimates (UK); FfE and EPEX SPOT (Germany)

Estimated average revenue mix (%), BESS (UK vs. Germany, 2021–24)

Year	Wholesale arbitrage		Non-wholesale (capacity, ancillary, other)	
	UK	Germany	UK	Germany
2021	7%	10%	93%	90%
2022	8%	20%	92%	80%
2023	23%	30%	77%	70%
2024	34%	35%	66%	65%

Source: GreenCap analysis, company filings, industry interviews, Enspired

from British BESS

isolation from continental Europe.


Germany's multi-country access also increases market depth and helps to mitigate the impact of local saturation in any one service.

The divergence is also apparent in absolute revenue. UK BESS revenue peaked in 2022 at close to €200,000/MW per year, but this collapsed to less than €40,000 in early 2024, although the fourth quarter of 2024 saw an improvement toward €75,000 (annualized). This shows arbitrage was only a partial substitution for the decline in contracted revenues.

By contrast, Germany's BESS market has delivered consistently higher revenues, at times over €400,000/MW on an annualized basis in the most active quarters. Even though revenues cooled off in 2024 toward the €200,000/MW per year-range due to normalizing aFRR capacity prices, overall levels remain very lucrative compared to the United Kingdom.

Valuable lessons

The UK has been a front-runner in the commercialization and deployment of merchant BESS models and has a significant lead in terms of operating utility-scale BESS capacity. It can offer important lessons for Germany and other European markets – particularly around auction design, revenue stacking, and the limitations of oversaturated ancillary services.

But extrapolating the UK experience should be done with caution. The German BESS market is smaller, but the UK's relative market insularity and smaller system size have all contributed to volatility and rapid saturation effects that may be less pronounced in continental Europe. As such, projections for future BESS revenues and business models in Germany must consider the deeper and more integrated nature of the EU power market and its capacity to absorb flexible assets. 

Baris Serifsoy

About the author

Baris Serifsoy is a partner at Green-Cap Partners, a London-based corporate finance and M&A boutique focused on European renewables. He has more than 20 years of experience in finance and was previously a managing director at UBS AG. He holds a doctoral degree in finance from Goethe University Frankfurt and is a CFA Charter holder.



Advertisement

pv magazine FOCUS

Optimizing Solar Energy Use

SESSION 1 | ENGLISH

Optimizing large-scale battery storage projects: What revenue models are available and how can risks best be addressed?

SESSION 2 | GERMAN

Optimizing energy at home: High self-consumption, smart interfaces, and profitable market integration



May 8
2025



**The smarter E Europe,
ICM Conference Center**
Munich



REGISTER FOR FREE