

Banking on Renewables- Led Volatility

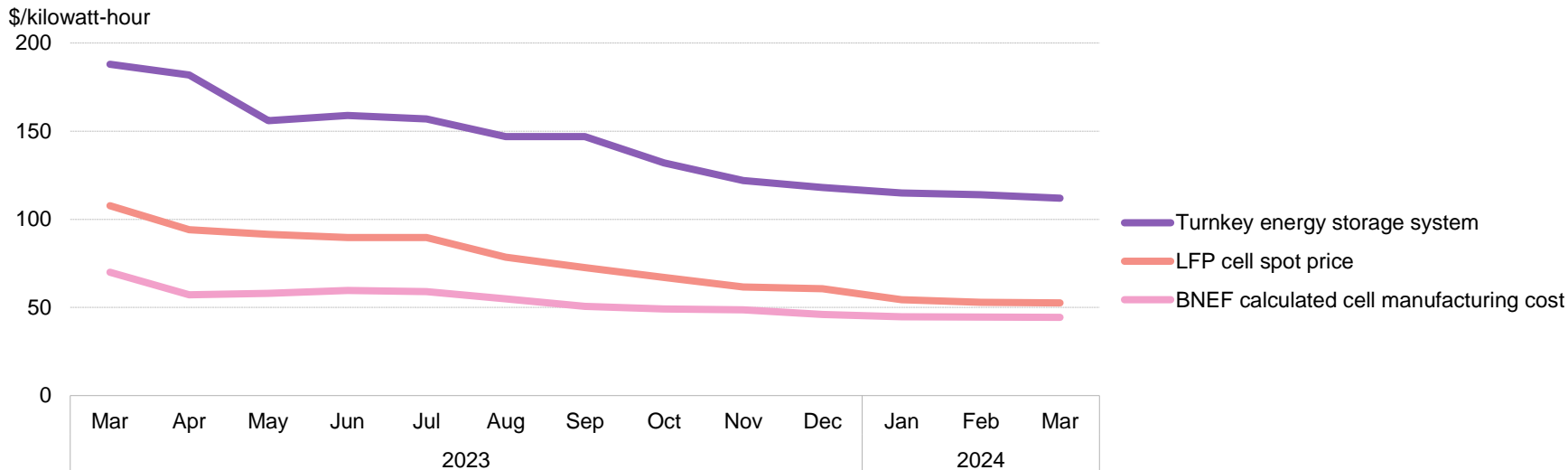
Next up for energy storage

Nelson Nsitem

February 18, 2025

Energy storage system prices are at record lows

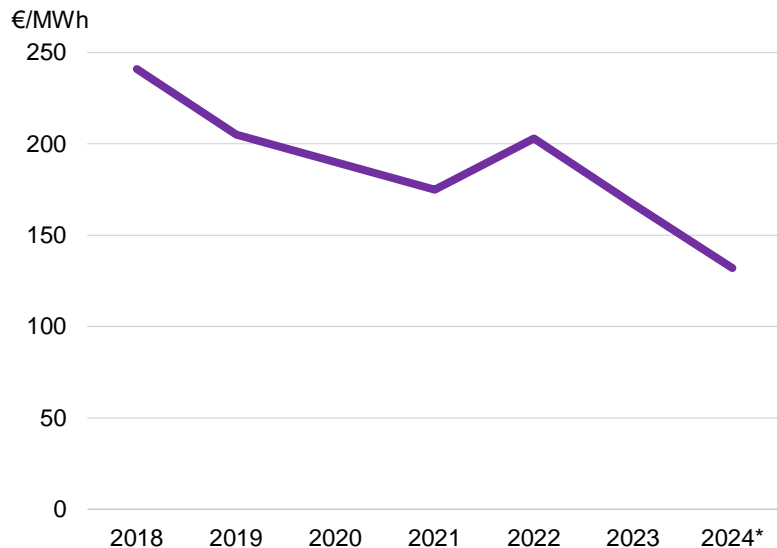
China lithium iron phosphate (LFP) turnkey energy storage system vs battery cell price and manufacturing cost



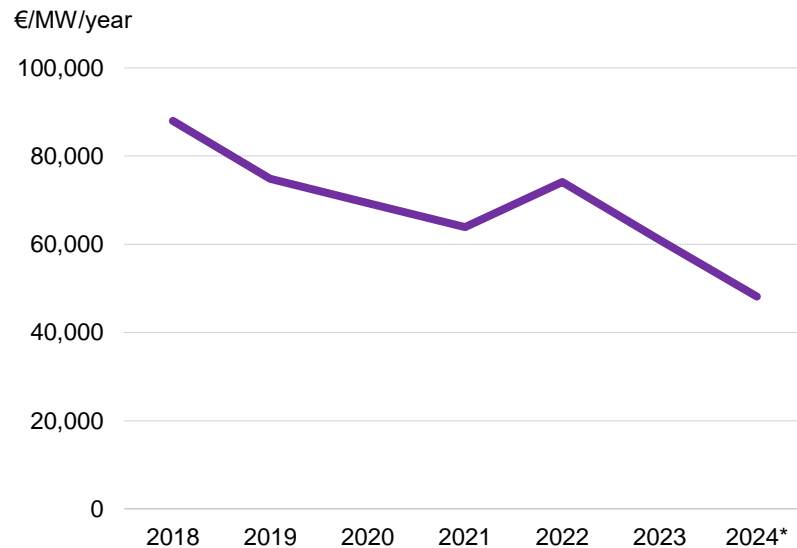
Source: ICC Battery, BloombergNEF. Note: The cell mentioned here is in prismatic format and excludes taxes. LFP spot price comes from the ICC Battery price database, where spot price is based on reported quotes from companies, battery cell prices could be even lower if batteries are purchased in high volume. Estimated cell manufacturing cost uses the BNEF BattMan Cost Model, adjusting LFP cathode prices with ICC cathode spot prices. The cost here refers to manufacturing cost which is different from price and does not include company expense, delivery cost, subsidy, and margin.

Required revenues are also dropping

Power price spread required by two-hour battery project, by year of development

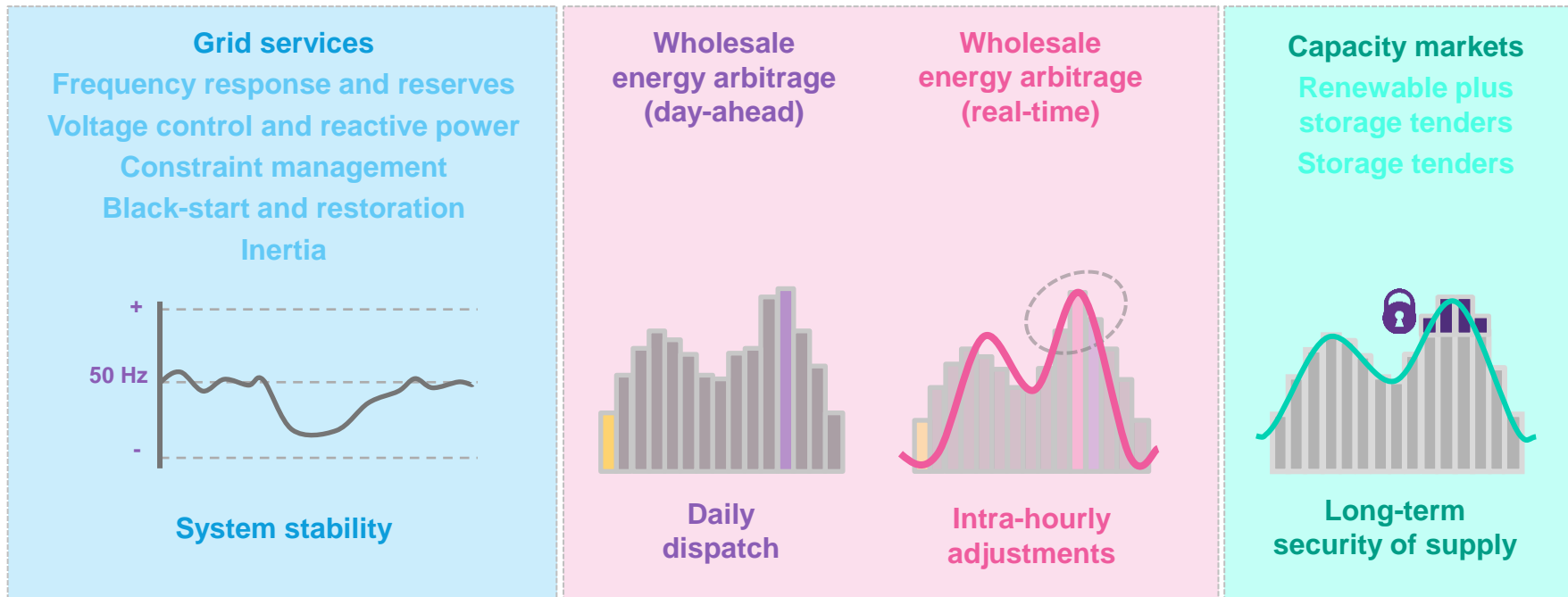


Capacity payment required by two-hour battery project, by year of development



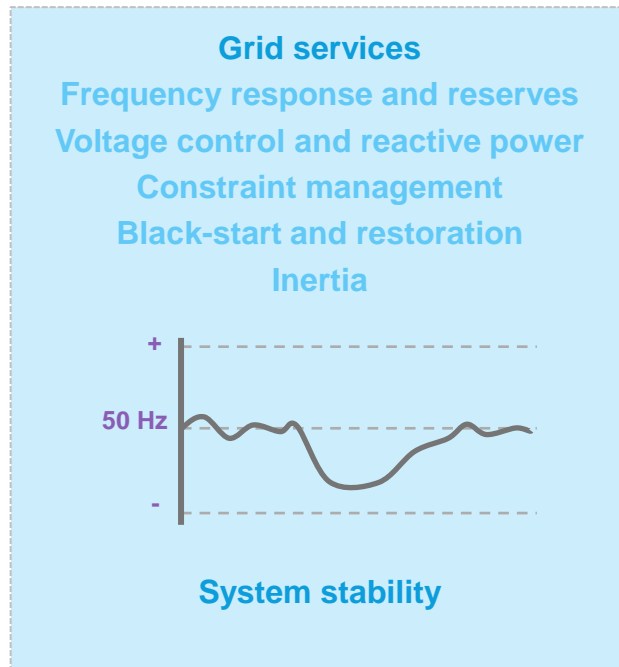
Source: BloombergNEF. Note: Required spread for a two-hour battery project assuming revenues cover costs of just capex of €360,000/MWh. Assumes 90% round-trip efficiency, 85% depth of discharge.

Energy storage revenue streams



Source: BloombergNEF

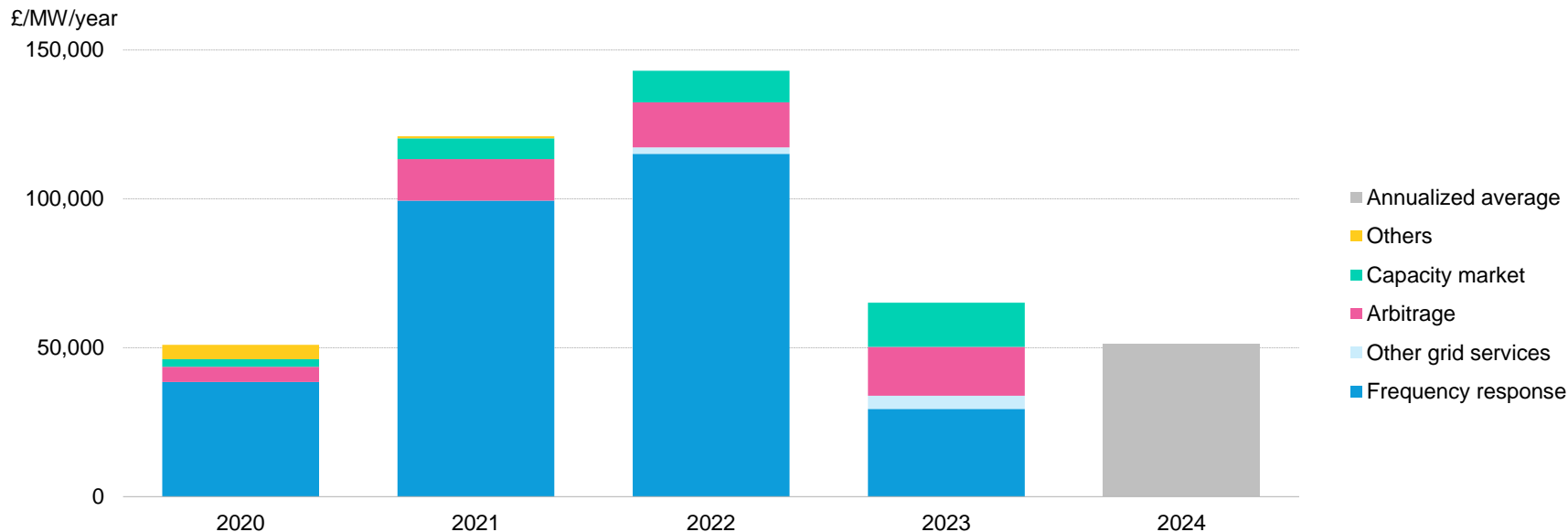
Energy storage revenue streams



Source: BloombergNEF

UK energy storage revenues declined as frequency markets saturated

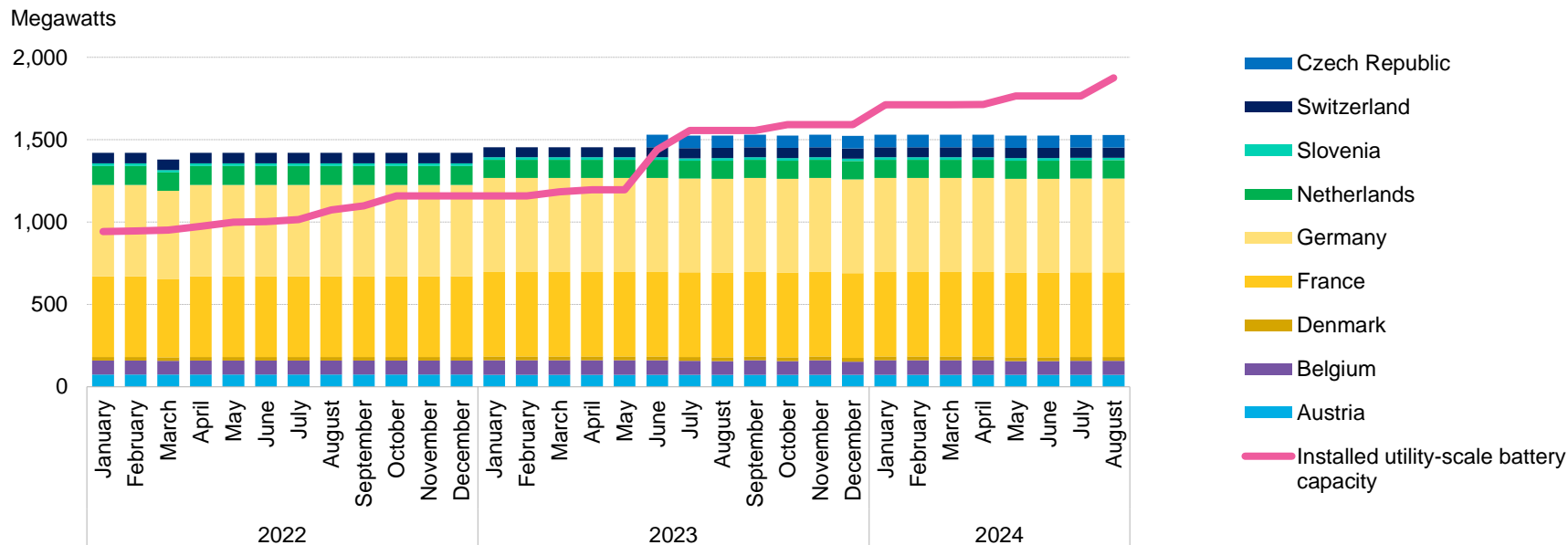
UK energy storage portfolio sample revenues



Source: BloombergNEF, Gresham House. Note: 2024 shows annualized average revenues: revenue levels from January to May 2024 are assumed to be sustained through to the end of the year.

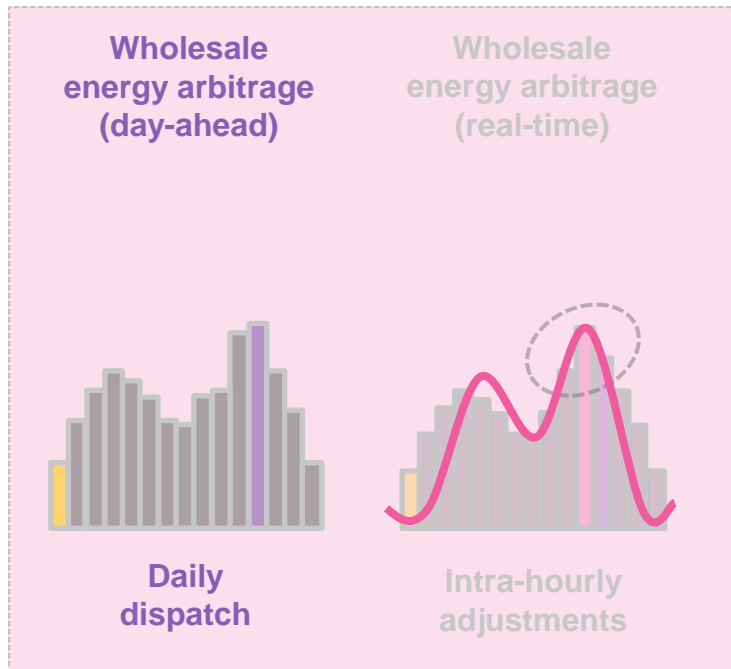
Frequency response prices in Europe are likely to fall due to oversupply

Installed utility-scale battery capacity versus frequency response demand in EU countries with shared procurement



Source: BloombergNEF. Note: FCR refers to Frequency Containment Reserve.

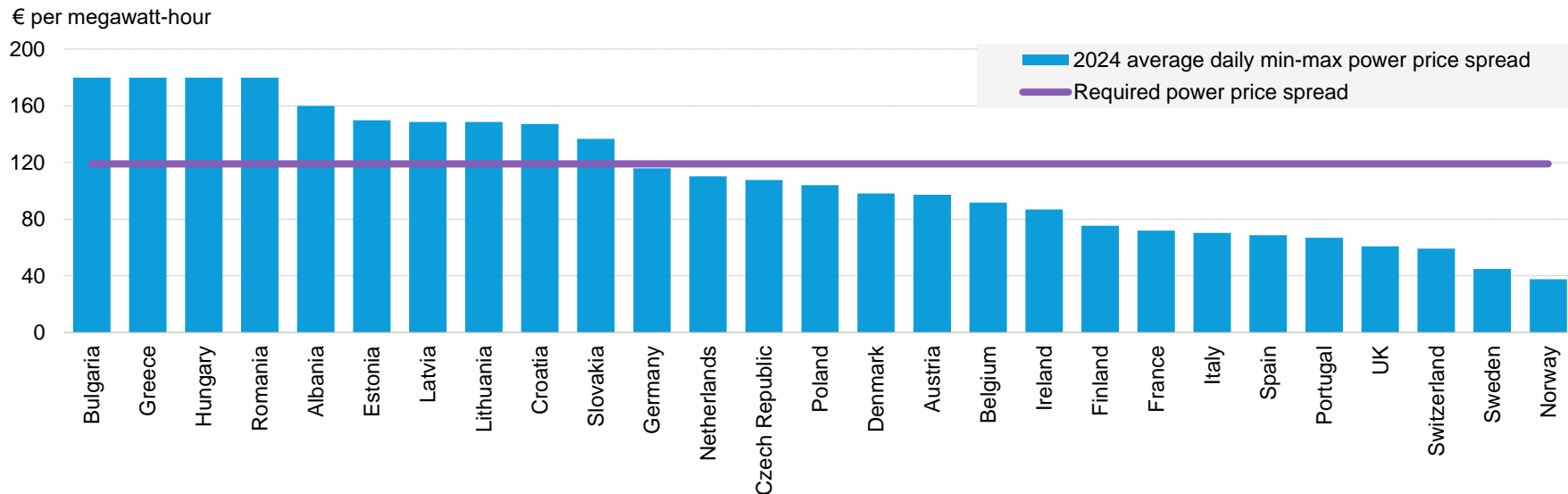
Energy storage revenue streams



Source: BloombergNEF

Power price spreads are now large enough in some markets

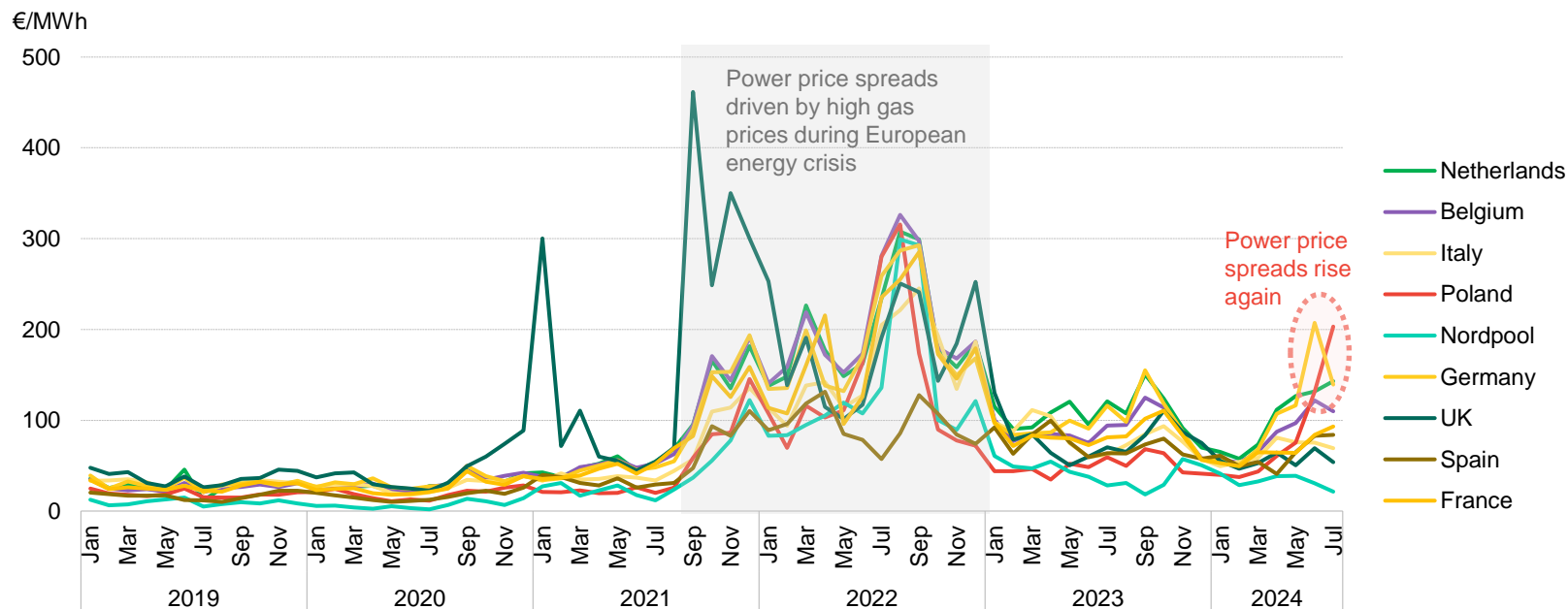
Required vs min-max power price spread for two-hour batteries in select European markets, Jan-Jul 2024



Source: BloombergNEF. Note: Required spread for a two-hour battery project assuming revenues cover costs of just capex of €360,000/MWh. Assumes 90% round-trip efficiency, 85% depth of discharge and an average of 1.5 cycles per day over the project's life. See [Appendix A](#) for other assumptions.

Renewables-led power price volatility is emerging in Europe

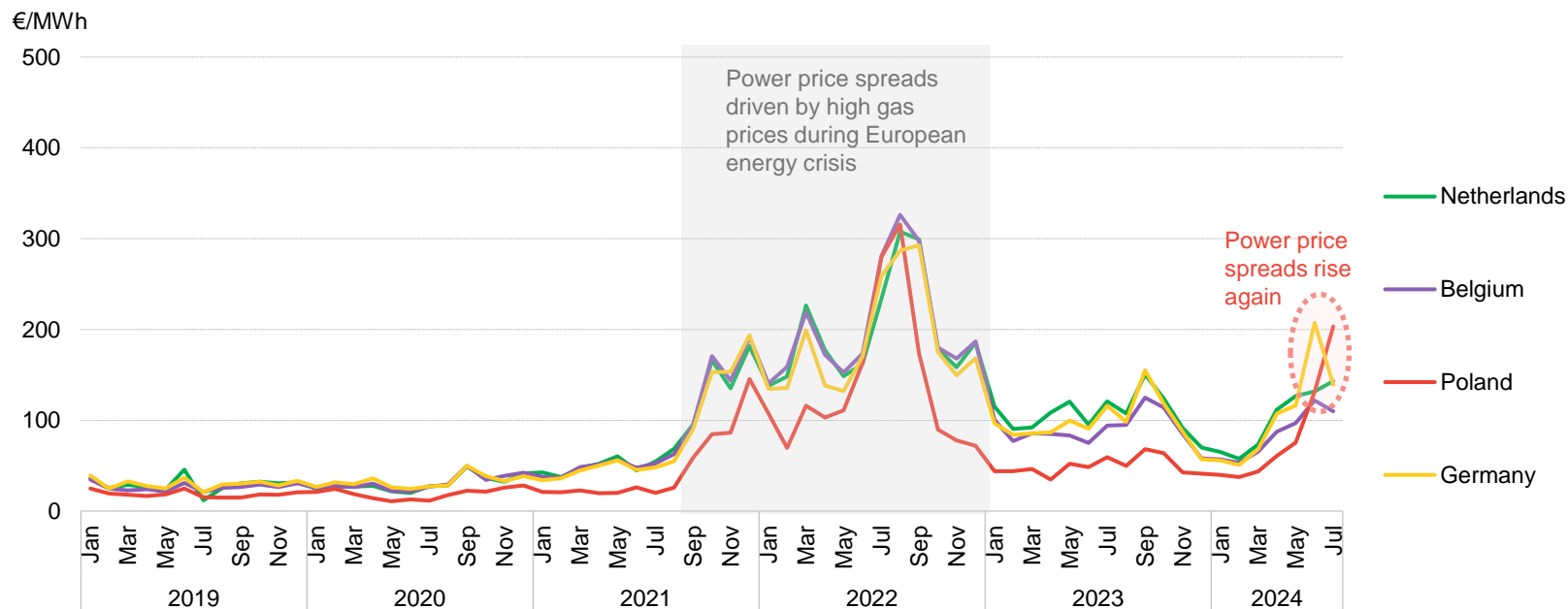
Min-max power price spreads across Europe, 2019 to 2024



Source: BloombergNEF

Renewables-led power price volatility is emerging in Europe

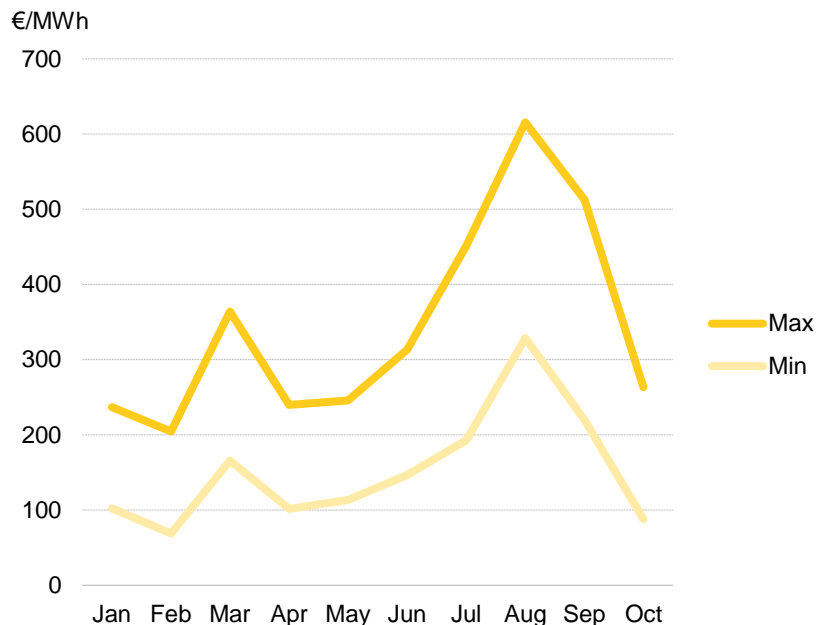
Min-max power price spreads across Europe, 2019 to 2024



Source: BloombergNEF

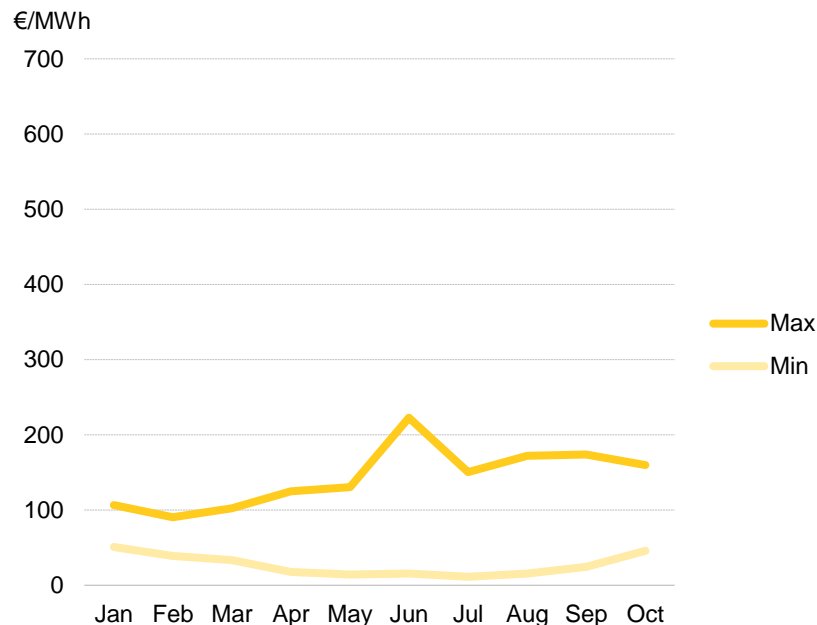
Minimum and maximum power price spreads in Germany

Min-max power prices in Germany, 2022



Source: BloombergNEF

Min-max power prices in Germany, 2024

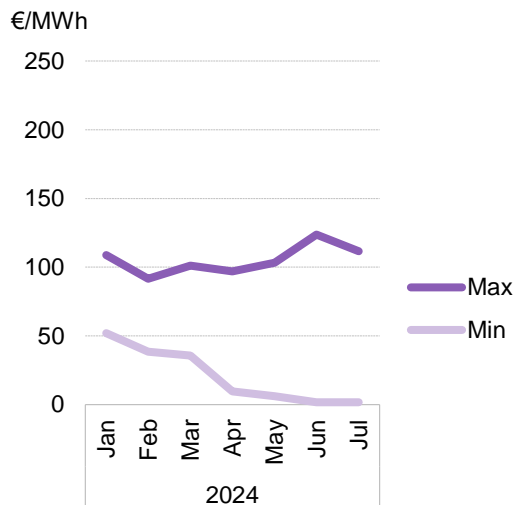


Source: BloombergNEF

What's driving the spreads across some European markets?

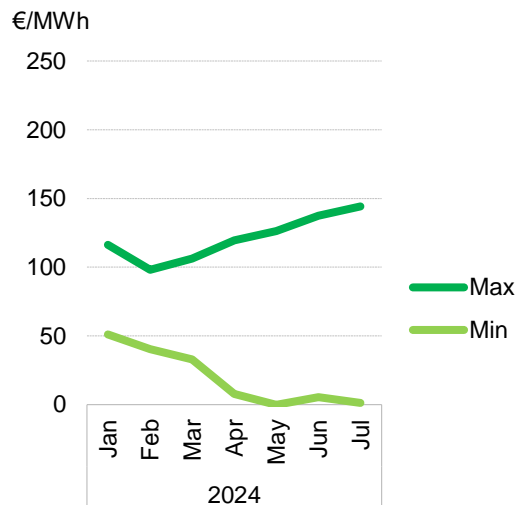
Minimum and maximum power price spreads in select European markets

Belgium



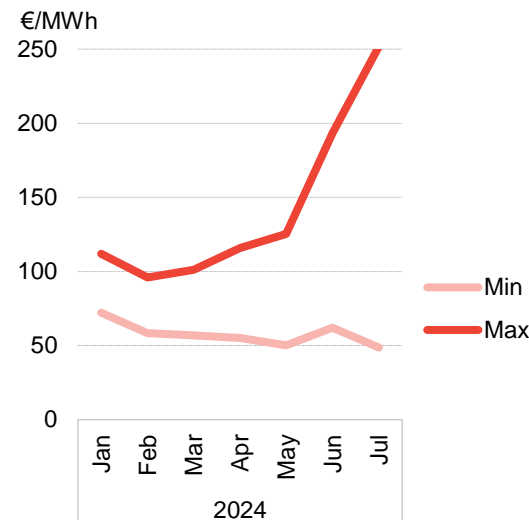
Source: BloombergNEF

Netherlands



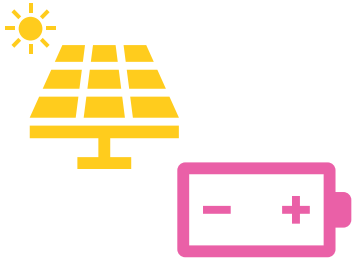
Source: BloombergNEF

Poland



Source: BloombergNEF

How to realise solar plus storage investment



Technology



Regulation

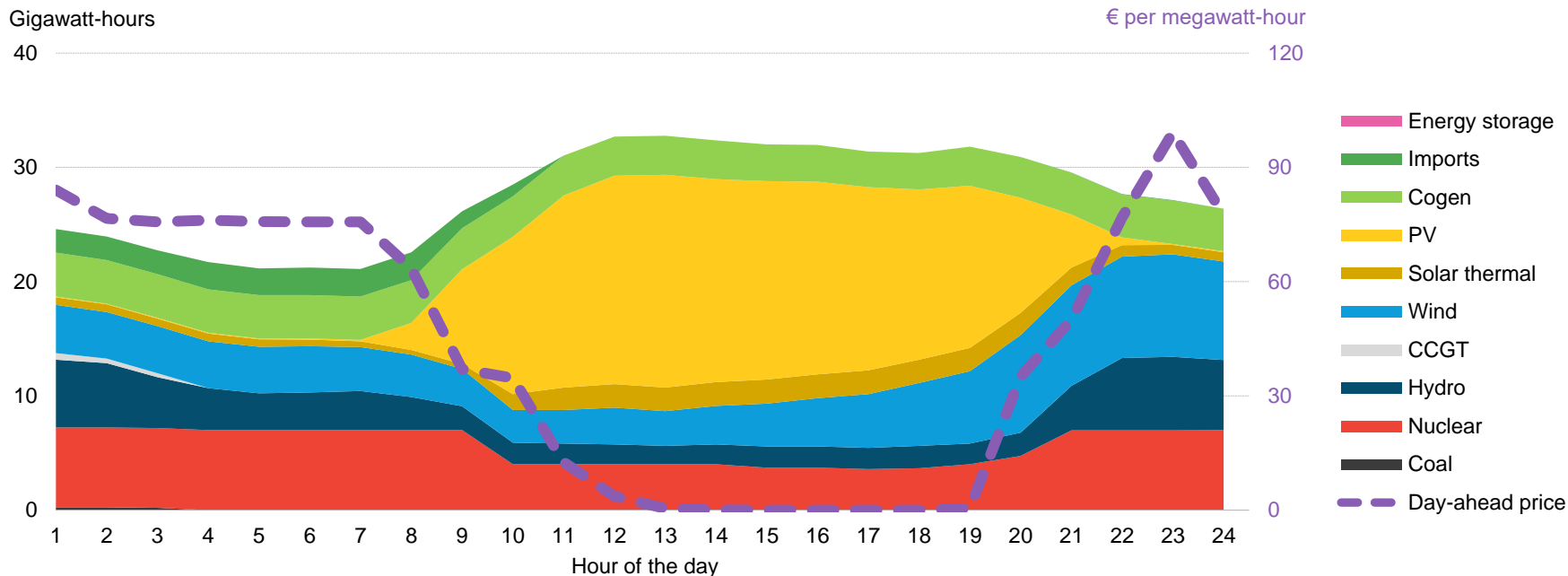


Financing

Source: BloombergNEF

Solar will keep cannibalizing its own revenues

Spain's hourly generation by technology and hourly prices on June 22, 2024

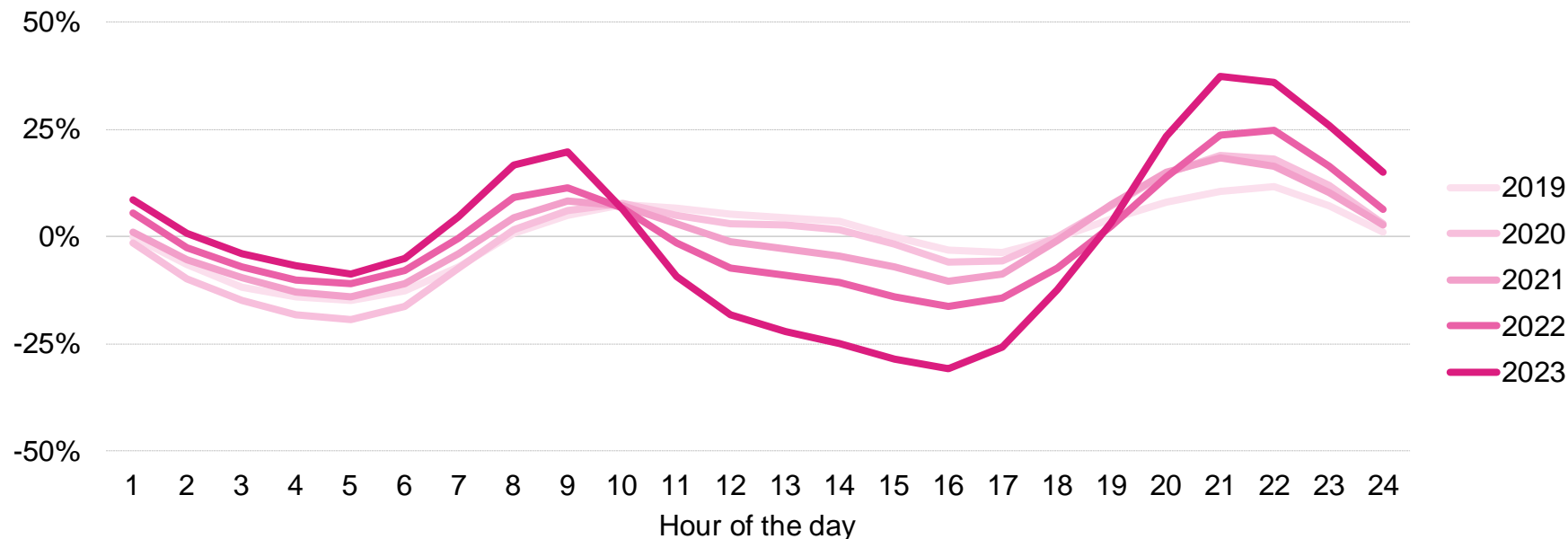


Source: BloombergNEF. Note: 'Cogen' is cogeneration, PV is solar photovoltaics, and CCGT is combined cycle gas turbine.

Duck curves are gradually but inevitably forming

Power price profile in Spain

Hourly price profile (percentage deviation from mean)

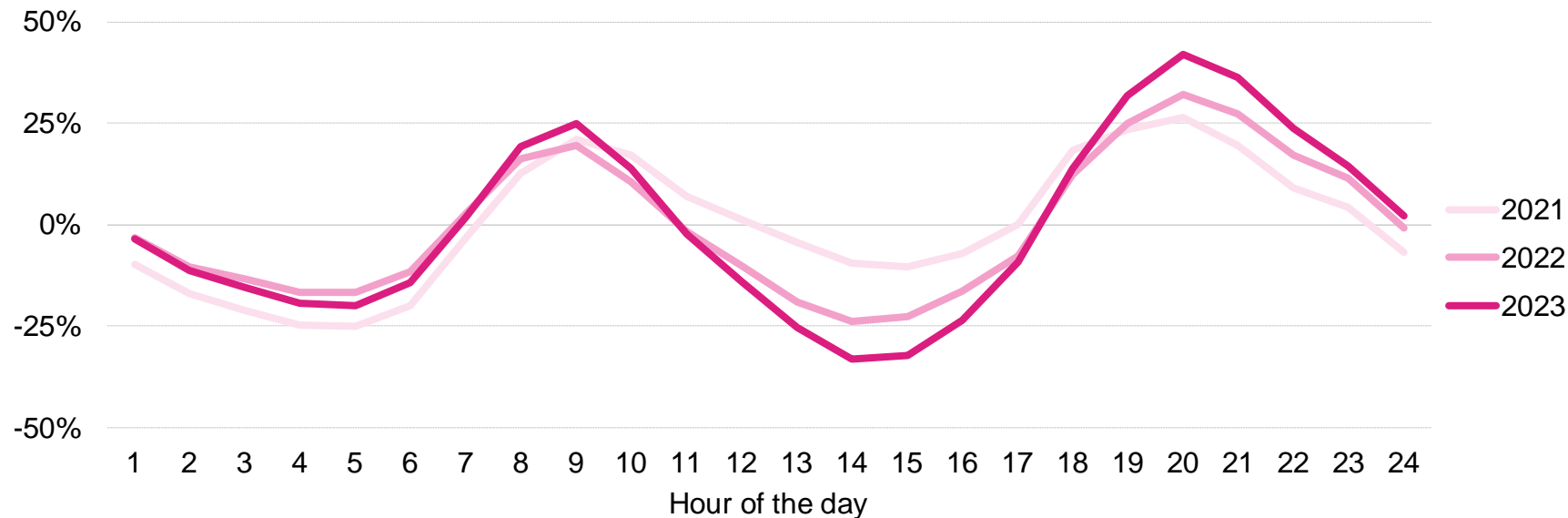


Source: BloombergNEF. Note: Data in Central European Time (CET).

Duck curves are gradually but inevitably forming

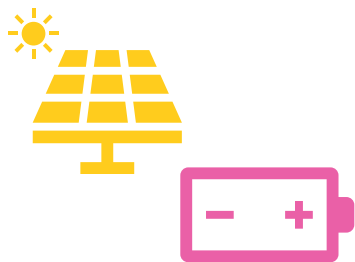
Power price profile in the Netherlands

Hourly price profile (percentage deviation from mean)



Source: BloombergNEF. Note: Data in Central European Time (CET).

How to realise solar plus storage investment



Technology



Regulation

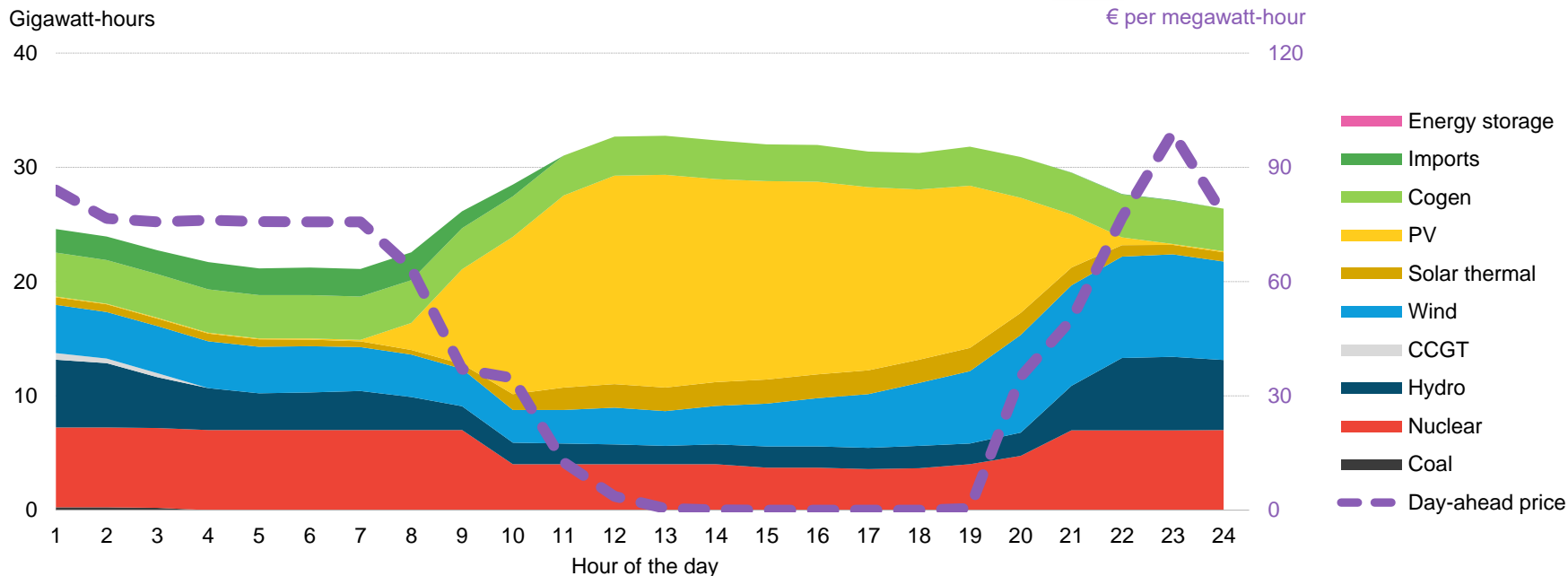


Financing

Source: BloombergNEF

Solar keeps cannibalizing its own revenues in Spain...

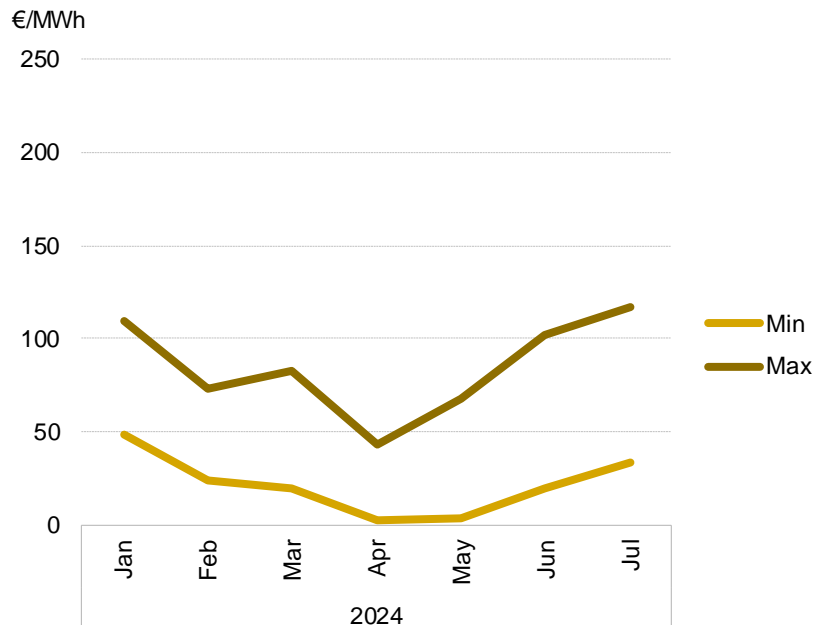
Spain's hourly generation by technology and hourly prices on June 22, 2024



Source: BloombergNEF. Note: 'Cogen' is cogeneration, PV is solar photovoltaics, and CCGT is combined cycle gas turbine.

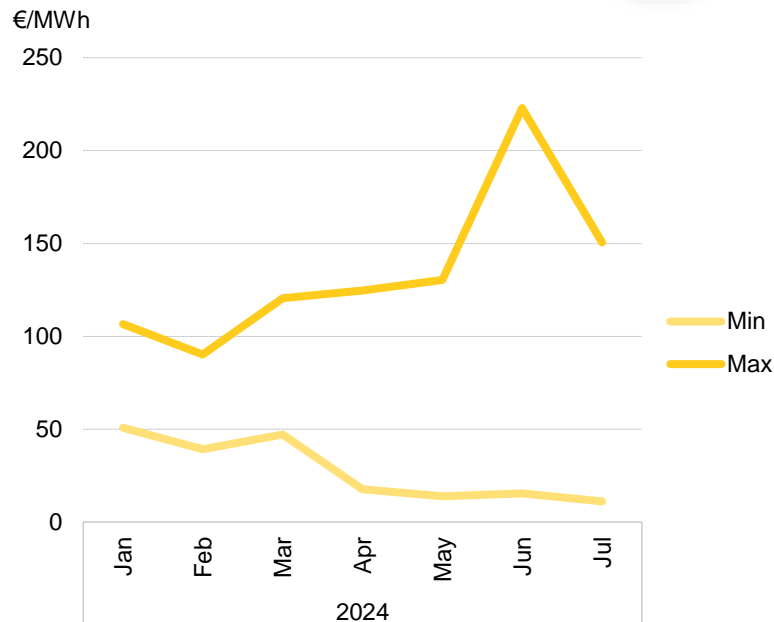
But not enough to drive stand-alone storage build

Min max power prices in Spain, 2024



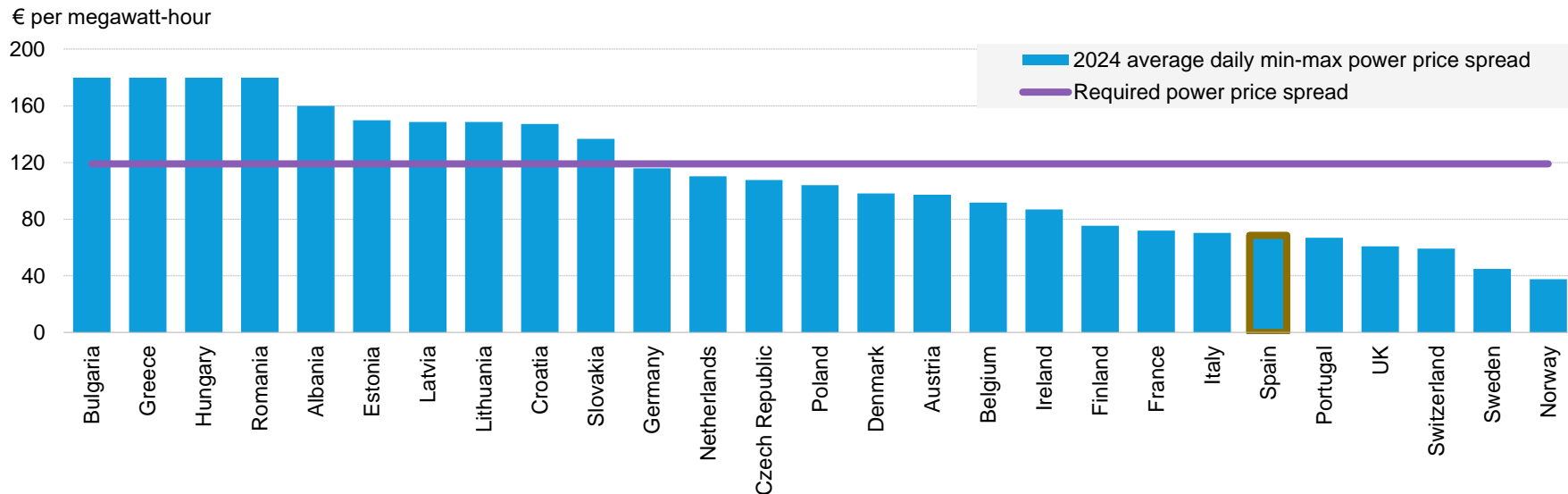
Source: BloombergNEF, Red Eléctrica de España (REE).

Min max power prices in Germany, 2024



But not enough to drive stand-alone storage build

Required vs min-max power price spread for two-hour batteries in select European markets, Jan-Jul 2024

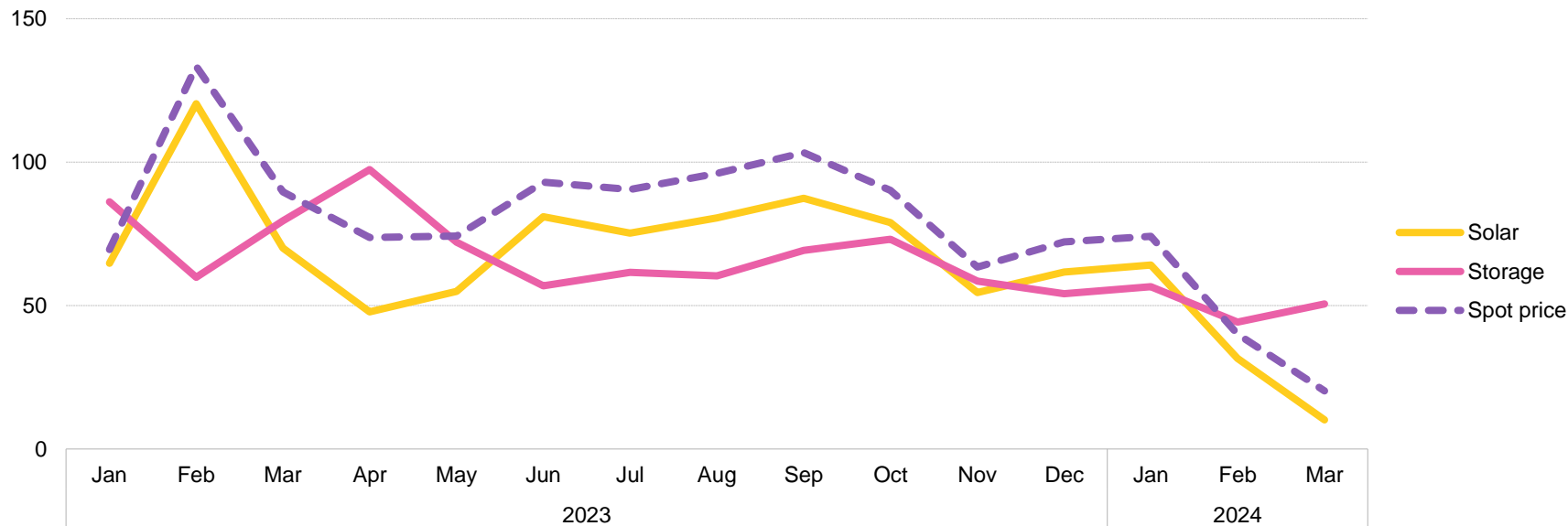


Source: BloombergNEF. Note: Required spread for a two-hour battery project assuming revenues cover costs of just capex of €360,000/MWh. Assumes 90% round-trip efficiency, 85% depth of discharge and an average of 1.5 cycles per day over the project's life. See [Appendix A](#) for other assumptions.

Storage build is being driven by opportunities to co-locate

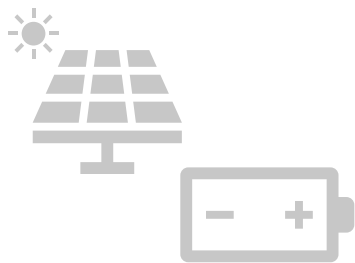
Solar and storage realized power prices in Spain 

€ per megawatt-hour



Source: BloombergNEF, Red Eléctrica de España (REE).

How to realise solar plus storage investment



Technology



Regulation

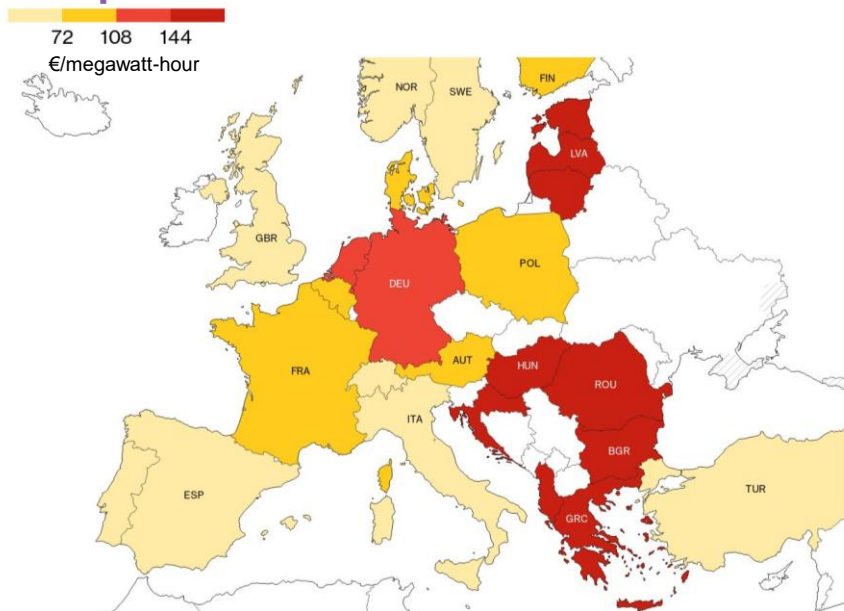


Financing

Source: BloombergNEF

Growth in government support is concentrated in higher-spread markets

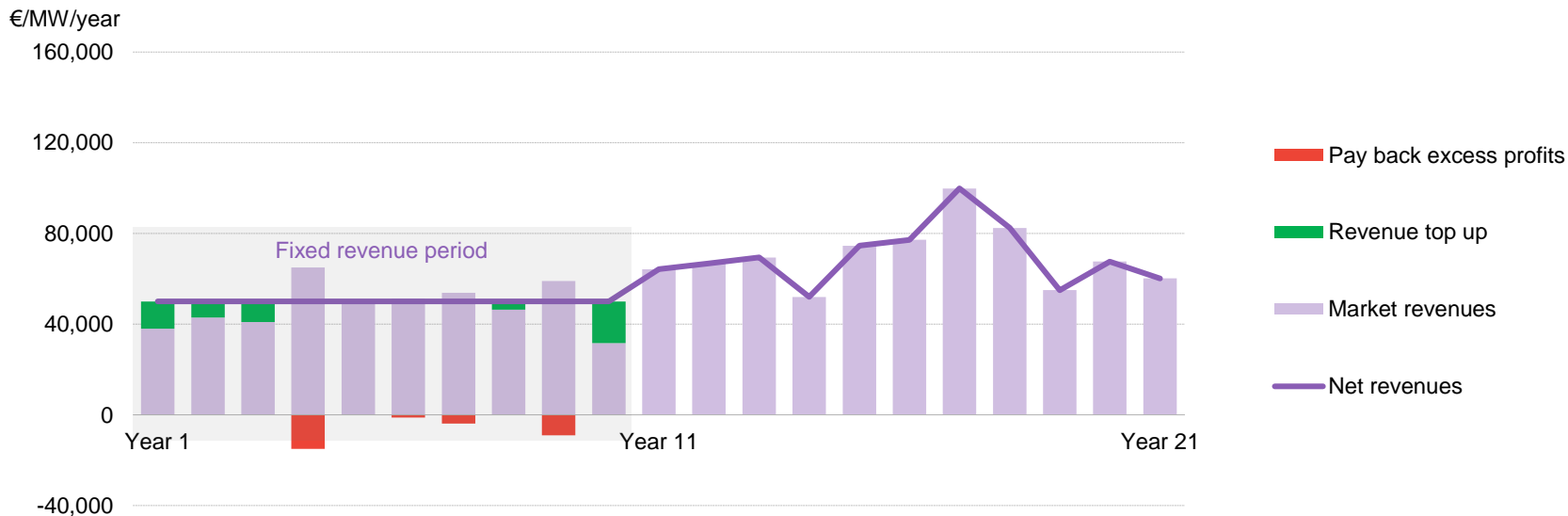
Min-max power price spreads across Europe in 2024



Source: BloombergNEF, European Commission.

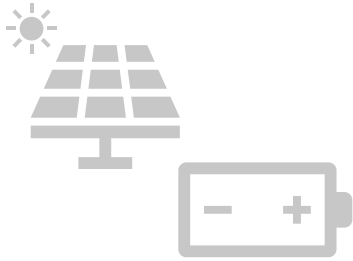
Two-way contracts for difference are preferred by EU countries

Illustrative energy storage revenues with two-way contract for difference (CfD)



Source: BloombergNEF. Note: net revenues in the first ten years are equal to the CfD bid price.

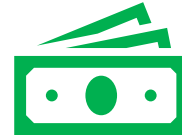
How to realise solar plus storage investment



Technology



Regulation



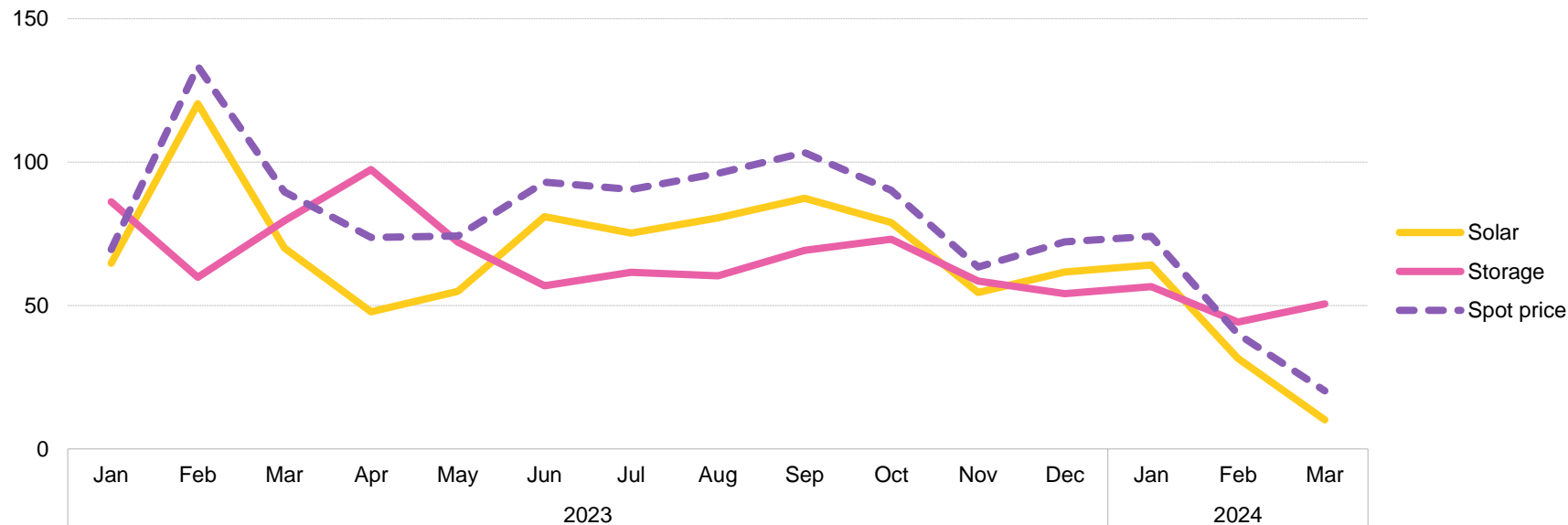
Financing

Source: BloombergNEF

Energy storage can hedge the risk of solar price cannibalization

Solar and storage realized power prices in Spain

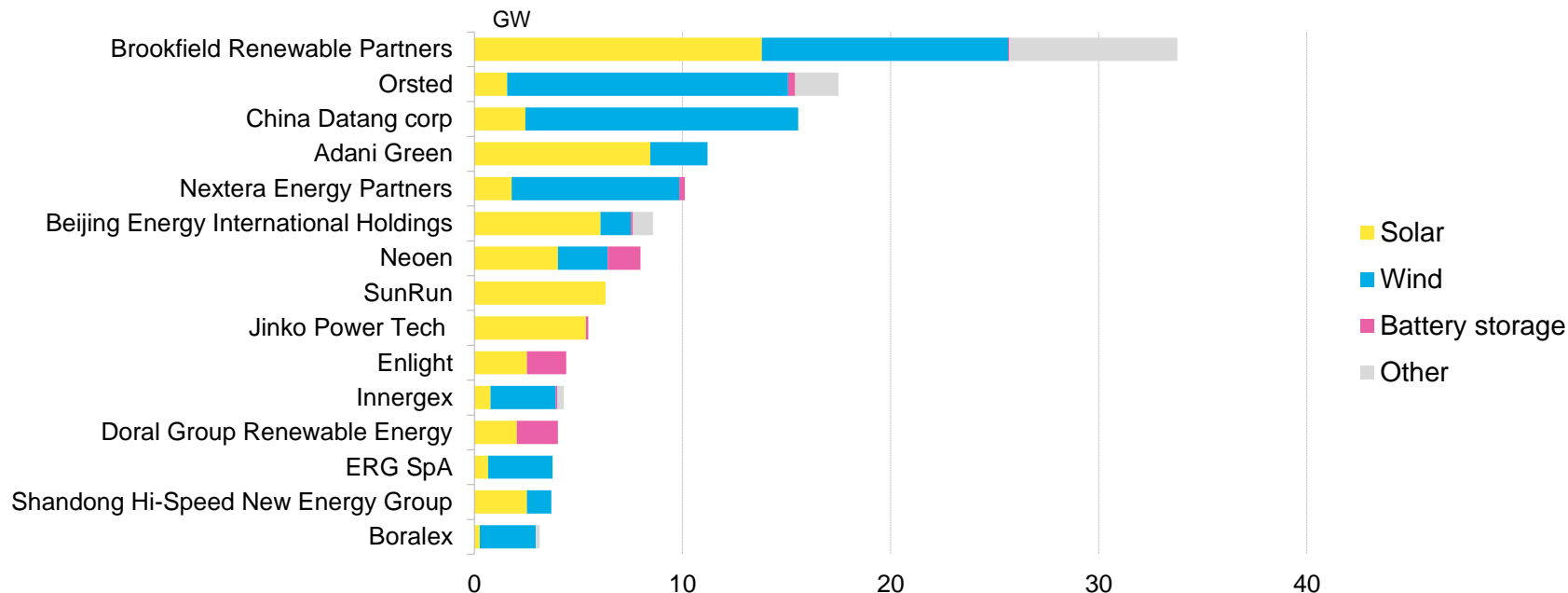
€ per megawatt-hour



Source: BloombergNEF, Red Eléctrica de España (REE).

Listed solar and wind funds are increasingly adding batteries to their portfolios

Portfolio composition of the top 15 publicly listed solar and wind funds, IPPs and developers, by portfolio size



Source: BloombergNEF, company filings

Copyright and disclaimer

Copyright

© Bloomberg Finance L.P. 2025. This publication is the copyright of Bloomberg Finance L.P. in connection with BloombergNEF. No portion of this document may be photocopied, reproduced, scanned into an electronic system or transmitted, forwarded or distributed in any way without prior consent of BloombergNEF.

Disclaimer

The BloombergNEF ("BNEF"), service/information is derived from selected public sources. Bloomberg Finance L.P. and its affiliates, in providing the service/information, believe that the information it uses comes from reliable sources, but do not guarantee the accuracy or completeness of this information, which is subject to change without notice, and nothing in this document shall be construed as such a guarantee. The statements in this service/document reflect the current judgement of the authors of the relevant articles or features, and do not necessarily reflect the opinion of Bloomberg Finance L.P., Bloomberg L.P. or any of their affiliates ("Bloomberg"). Bloomberg disclaims any liability arising from use of this document, its contents and/or this service. Nothing herein shall constitute or be construed as an offering of financial instruments or as investment advice or recommendations by Bloomberg of an investment or other strategy (e.g., whether or not to "buy", "sell", or "hold" an investment). The information available through this service is not based on consideration of a subscriber's individual circumstances and should not be considered as information sufficient upon which to base an investment decision. You should determine on your own whether you agree with the content. This service should not be construed as tax or accounting advice or as a service designed to facilitate any subscriber's compliance with its tax, accounting or other legal obligations. Employees involved in this service may hold positions in the companies mentioned in the services/information.

The data included in these materials are for illustrative purposes only. The BLOOMBERG TERMINAL service and Bloomberg data products (the "Services") are owned and distributed by Bloomberg Finance L.P. ("BFLP") except (i) in Argentina, Australia and certain jurisdictions in the Pacific islands, Bermuda, China, India, Japan, Korea and New Zealand, where Bloomberg L.P. and its subsidiaries ("BLP") distribute these products, and (ii) in Singapore and the jurisdictions serviced by Bloomberg's Singapore office, where a subsidiary of BFLP distributes these products. BLP provides BFLP and its subsidiaries with global marketing and operational support and service. Certain features, functions, products and services are available only to sophisticated investors and only where permitted. BFLP, BLP and their affiliates do not guarantee the accuracy of prices or other information in the Services. Nothing in the Services shall constitute or be construed as an offering of financial instruments by BFLP, BLP or their affiliates, or as investment advice or recommendations by BFLP, BLP or their affiliates of an investment strategy or whether or not to "buy", "sell" or "hold" an investment. Information available via the Services should not be considered as information sufficient upon which to base an investment decision. Bloomberg makes no claims or representations, or provides any assurances, about the sustainability characteristics, profile or data points of any underlying issuers, products or services, and users should make their own determination on such issues. The following are trademarks and service marks of BFLP, a Delaware limited partnership, or its subsidiaries: BLOOMBERG, BLOOMBERG ANYWHERE, BLOOMBERG MARKETS, BLOOMBERG NEWS, BLOOMBERG PROFESSIONAL, BLOOMBERG TERMINAL and BLOOMBERG.COM. Absence of any trademark or service mark from this list does not waive Bloomberg's intellectual property rights in that name, mark or logo. All rights reserved. © 2025 Bloomberg.

BloombergNEF (BNEF) is a strategic research provider covering global commodity markets and the disruptive technologies driving the transition to a low-carbon economy.

Our expert coverage assesses pathways for the power, transport, industry, buildings and agriculture sectors to adapt to the energy transition.

We help commodity trading, corporate strategy, finance and policy professionals navigate change and generate opportunities.

The BloombergNEF logo is displayed in a large, bold, black sans-serif font. It is positioned on the right side of the slide, set against a background of a light gray dot grid pattern.

Nelson Nsitem, nnsitem1@bloomberg.net

Client enquiries:

Bloomberg Terminal: press [<Help>](#) key twice

Email: support.bnef@bloomberg.net

Learn more:

about.bnef.com | [@BloombergNEF](https://twitter.com/BloombergNEF)