

# Bankability of Energy Storage projects

**ZENOBE**

June 2023

Zenobē designs, finances,  
builds and operates  
**battery-based services.**



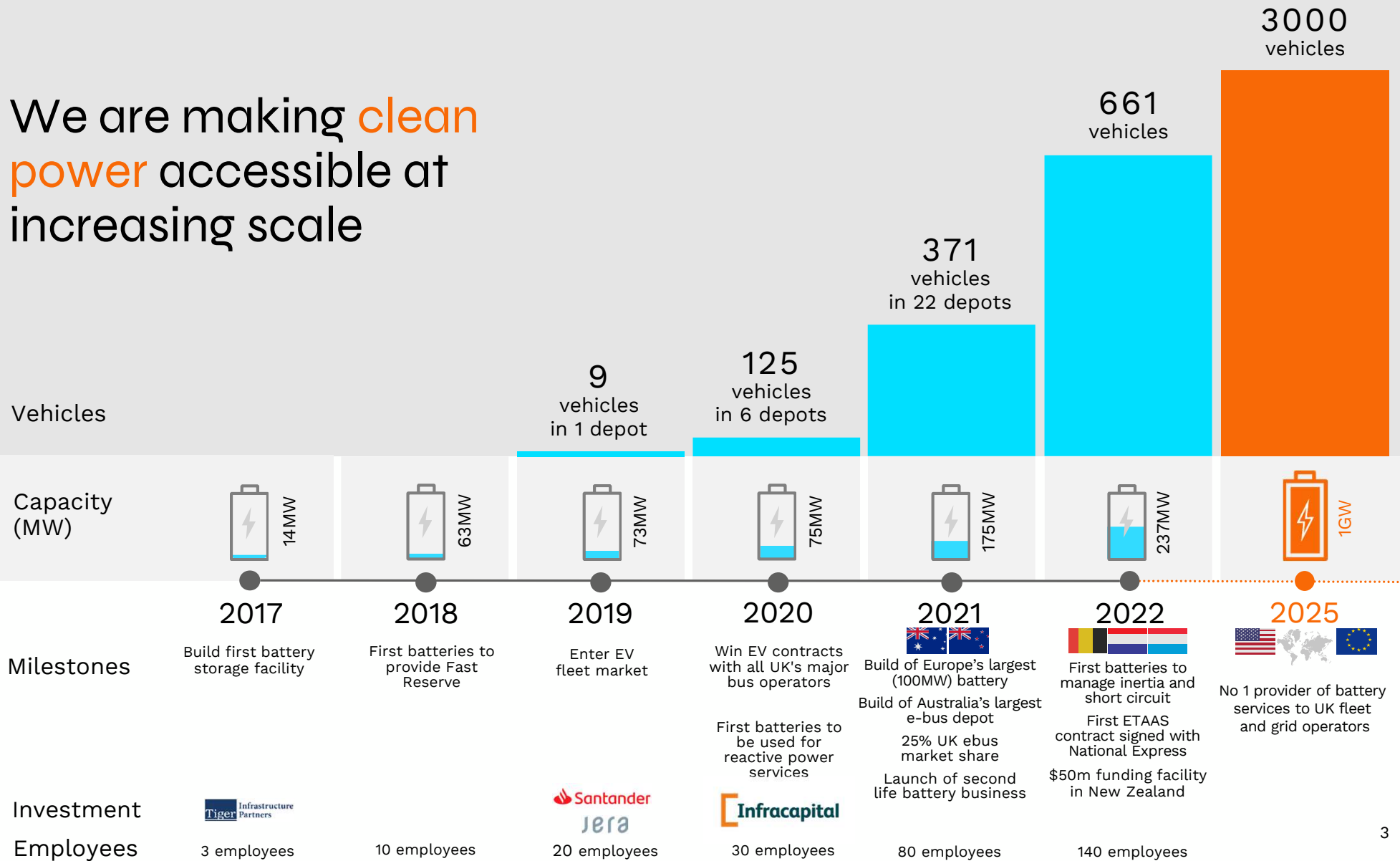
**Our three main business areas:**

- Electric Vehicle Fleets
- Network Infrastructure
- Second-life Batteries

**Our purpose:**

Making clean power accessible

# We are making clean power accessible at increasing scale



# We are powering towards zero carbon across the UK and beyond

## Current portfolio

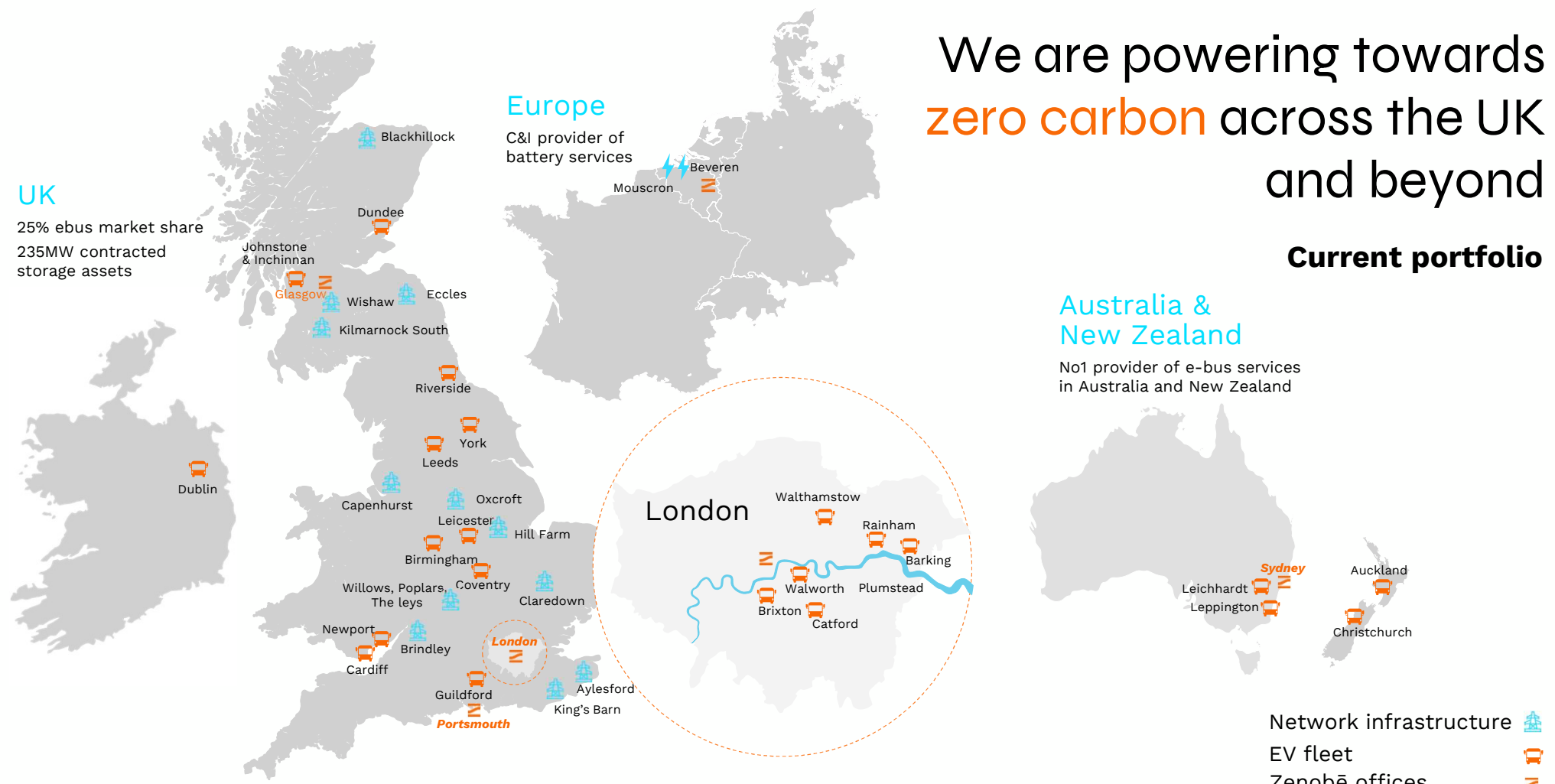
**UK**  
 25% ebus market share  
 235MW contracted storage assets

### Europe

C&I provider of battery services

### Australia & New Zealand

No1 provider of e-bus services in Australia and New Zealand



Network infrastructure

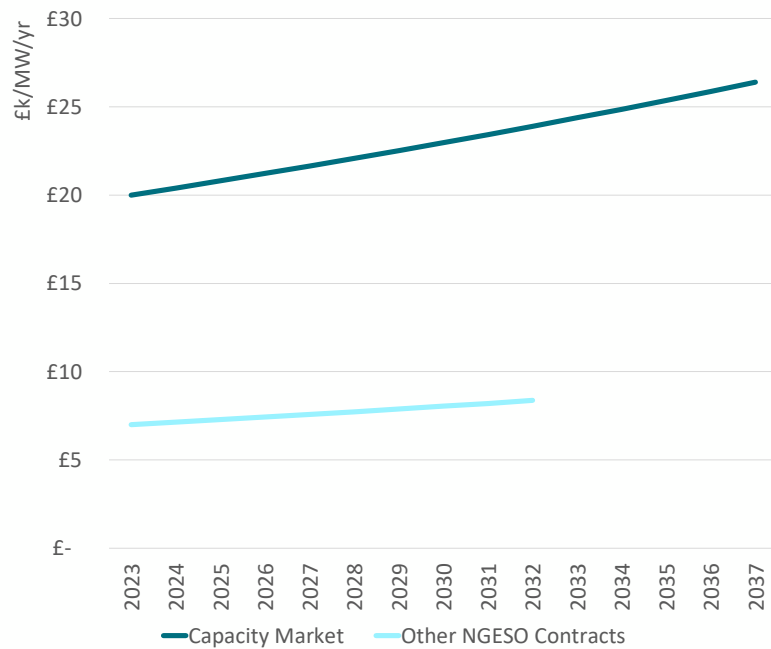
EV fleet

Zenobē offices

| Service                          | Description  | Anticipated development |
|----------------------------------|--|-------------------------|
| <b>Capacity Market</b>           | <ul style="list-style-type: none"> <li>• Growth determined by the increase in peak capacity requirement, driven by the electrification of the UK economy (particularly heating and transport)</li> <li>• <b>T-4 auction clearing price for the 15-year contracts for new-build assets are expected to stay high in the 2020s</b> as the system is short of power capacity and new-build capex is high</li> </ul>   |                         |
| <b>Wholesale Market</b>          | <ul style="list-style-type: none"> <li>• Day-ahead spreads grew rapidly in 2022, due to high gas prices driving volatility. Tightened again in 2023 with gas prices.</li> <li>• Day-ahead volatility correlated with wholesale gas prices and renewable generation, forecasted to stay high in 2020s</li> <li>• Average spreads of £75-100/MWh are forecasted in the 2020s<sup>(2)</sup>, equating to £100-£150k/MW</li> <li>• The Day-ahead wholesale market is <b>highly liquid and the largest UK power market</b></li> </ul> |                         |
| <b>Balancing Mechanism</b>       | <ul style="list-style-type: none"> <li>• Balancing Mechanism market growth driven by increased renewable generation, resolving transmission constraints through “system actions” and resolving energy imbalance through “energy actions”</li> <li>• Total volume of system actions to resolve constraints expected to more than double to &gt;4GW per SP</li> <li>• Revenues will be partly revenue-dependent as constrained sites can charge at negative/lower prices</li> </ul>  |                         |
| <b>Ancillary – Frequency</b>     | <ul style="list-style-type: none"> <li>• Frequency services are driven by increased renewable generation</li> <li>• Dynamic Containment has grown to a 1.5 GW market and ESO are expected to <b>increase the volume requirements for Dynamic Moderation and Dynamic Regulation</b></li> </ul>  |                         |
| <b>Stability Services</b>        | <ul style="list-style-type: none"> <li>• Inertia and short circuit level traditionally provided by thermal synchronous generation e.g. coal, CCGT</li> <li>• <b>Growing opportunity worth &gt;£250m of contracted revenue</b> for stackable contracted revenue for grid-forming battery systems at effective locations on the transmission grid</li> </ul>   |                         |
| <b>Obligatory Reactive Power</b> | <ul style="list-style-type: none"> <li>• Reactive power cost increased due to higher volumes and ORPS price</li> <li>• ORPS annual value expected to decrease in line with forecasted decreases in gas prices but volume will grow, driven by more renewable generation and is only available to transmission-connected assets</li> </ul>  |                         |

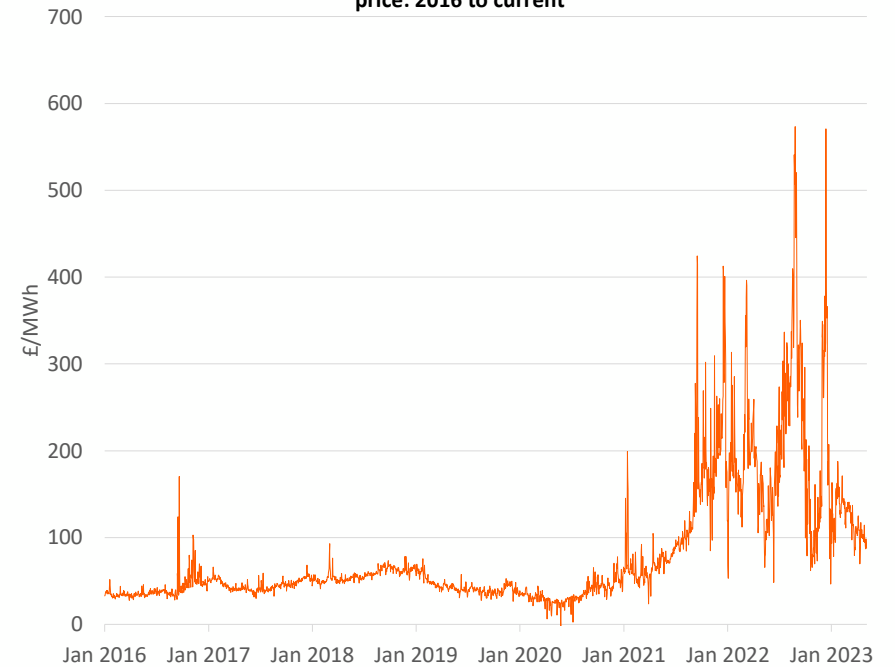
## Contracted

(a.k.a Capacity / Tolling)



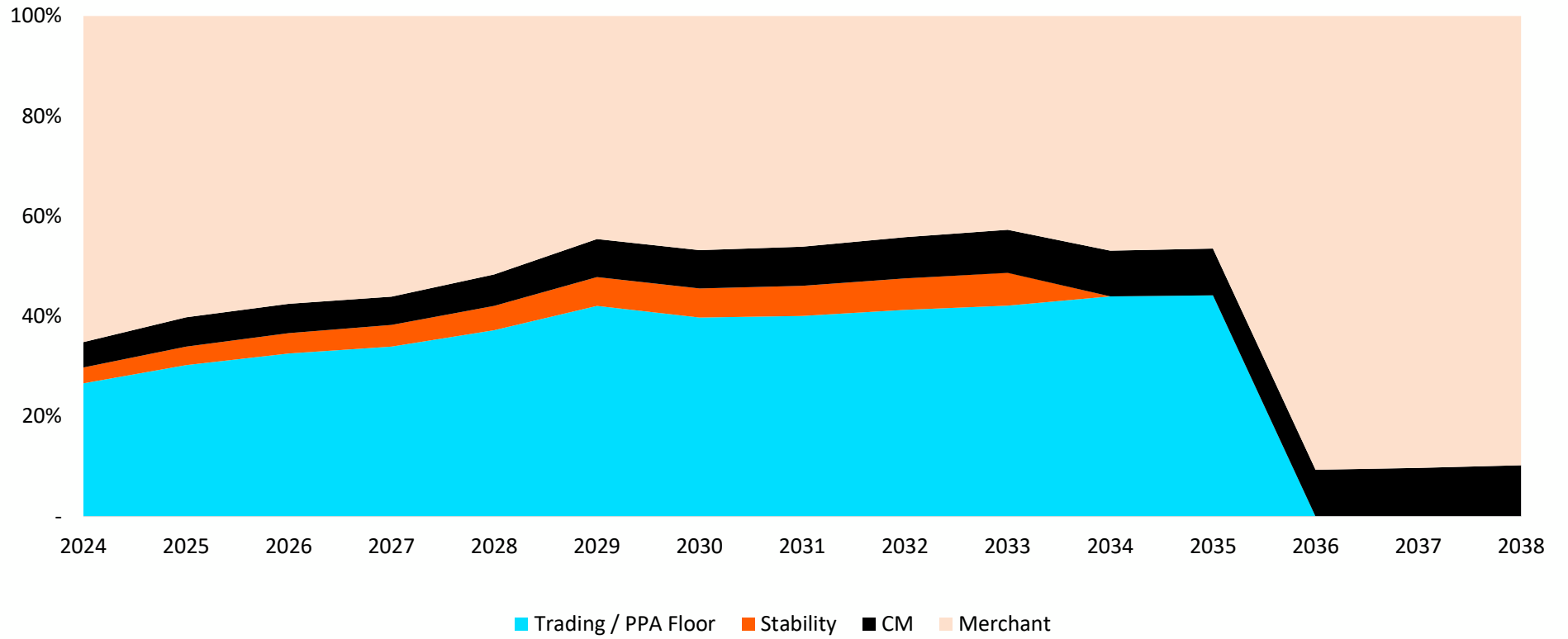
## Merchant

GB Day Ahead electricity spot price: 2016 to current



Source: Day Ahead historic prices from Nordpool N2EX, electricity forward curves (baseload) from OTC Global Holdings & ICIS  
 Note: Shaded grey on both graphs relates to the same time period

### A bankable revenue profile



| Feature                   | Highly Contracted<br>Longer contracts / warranties<br>Non-recourse portfolio / parent support | Highly Merchant<br>Shorter contracts / warranties<br>Non-recourse fewer assets |
|---------------------------|---|--|
| Amortisation Profile      | 10 – 15 years   | 3 – 7 years  |
| Legal tenor               | 5 – 10 years  | 3 – 7 years  |
| Credit Margin             | Ref Rate + 2 – 3%   | Ref Rate + 3 – 5%  |
| Construction Risk         | ✓   | ✓  |
| Debt sizing               | Merchant DSCR vs. Contracted DSCR   | Merchant DSCR  |
| Gearing                   | Up to 70%   | 40 – 60%   |
| Other credit enhancements | DSRF/DSRA<br>Cash Sweeps (high trigger)   | DSRA<br>Cash Sweeps (base case)  |



2021/22 was the turning point for liquidity (c. 3-4 years into sector's history)

| Company   | Zenobē (2019)  | Zenobē (2022)   | Statera (2021)   | Gore Street Energy Storage Fund (2021)  | TagEnergy (2021)   | Gresham House Energy Storage Fund (2022)   | Gresham House Energy Storage Fund (2021)   | Pacific Green Technologies (2022)  | Harmony Energy Income Trust (HEIT) (2022)   |
|-----------|--|---|--|---|--|--|--|--|---|
| Lender    | Santander  | Bank club   | NatWest  | Santander   | Santander  | NatWest  | NatWest  Santander  LLOYDS BANK  | Close Brothers Asset Finance   | NatWest   |
| Financing | >50m   | >£200m  | £55m   | £15m  | £6.4m  | £155m  | £180m  | £28.5m   | £60m  |
| Project   | <ul style="list-style-type: none"> <li>Financing the construction and/or purchase of new grid scale BESS projects (231MW)</li> </ul> | <ul style="list-style-type: none"> <li>Project Franklin</li> <li>Raising &gt;£200m of committed financing for development of two 200MW 2-hr. transmission-connected BESS in Scotland</li> </ul> | <ul style="list-style-type: none"> <li>To build out 400MW (8 x 50MW) of new utility scale flexible assets – gas peaking and energy storage plants in the UK</li> <li>This transaction is backed by a 15-year PPA with Statkraft</li> </ul> | <ul style="list-style-type: none"> <li>A Revolving Credit Facility (RCF) to finance the construction of existing projects and purchase of new projects</li> </ul> | <ul style="list-style-type: none"> <li>Funding package for development of £16m Hawkers Hill Energy Park (20MW/40M Wh BESS facility expected to be operational by June 2022)</li> </ul> | <ul style="list-style-type: none"> <li>Incremental term debt under an accordion arrangement tied to the £180m funding package announced in 2021</li> </ul> | <ul style="list-style-type: none"> <li>Funding package to run over a five year period, consisting of a £150 million capex term loan, a £30 million working capital facility</li> </ul> | <ul style="list-style-type: none"> <li>CLL will provide debt financing of £23 million for the construction of a 99.8MW battery energy storage system that Pacific Green is developing in Kent</li> </ul> | <ul style="list-style-type: none"> <li>99MW energy storage project, dubbed 'Bumpers'</li> <li>Contracting with Tesla for the supply, construction and O&amp;M of Bumpers</li> </ul> |

Source: Baringa research (2022) commissioned by Zenobe

And 2022/23 continued the trend, with liquidity broadening

Home > News > Zenobē secures £235m project finance debt for energy storage in Scotland
   
**News**
  
**Zenobē secures £235m project finance debt for energy storage in Scotland**
  
 By Andy Walker - 16 February 2023
   
 11333
   
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Zenobē's landmark 100MW battery storage asset at Capenhurst, Cheshire, in the UK.

Scotland debt arrangement is largest project finance facility for battery storage projects to be arranged in Europe.

**TOP STORIES**
  
**Pulse secures £175m for UK storage projects**
  
 MAY 24, 2023

Pulse Clean Energy (PCE) has secured a three-year £175 million credit facility with a syndicate of banks – including Santander, UK Infrastructure Bank (UKIB), CIBC and Investec – to finance the development of energy storage projects across the UK.
   
 The UKIB provided £62.5 million of the financing, with the commitment representing its first debt transaction in battery storage.
   
 PCE has plans to invest a total of more than £1 billion in the deployment of more than 1GW of battery energy storage systems across 20 sites in England, Scotland and Wales over the next three years.
   
 PCE's plans include the conversion of several existing energy generation sites to BESS facilities.

**SOLAR POWER PORTAL**
  
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**Feel the Hybrid**
  
 Solar Markets & Finance
   
 Storage

**Field bags £46m in financing to build 110MW portfolio of battery storage assets**

# Bankability Checklist

The usual stuff:

- ✓ Sponsor / mgt team track record
- ✓ Credible OEM and proven technology
- ✓ Bankable supply/operating contracts with strong LDs to motivate performance
- ✓ Full suite of legal, technical and commercial due diligence
- ✓ Debt sizing and stress tests
- ✓ Macroeconomic exposures hedged

BESS-specific requirements:

- ✓ Strong focus on details of warranties and cell degradation profile (UEL)
- ✓ Strong focus on OEM Credit, especially for longer tenor debt.
  - ✓ OEM security package.
- ✓ Track record of optimiser / Route to Market provider (and balance sheet if Floor)
- ✓ Understanding what drives the consultant's volatility forecasts; and sensitivity to renewables penetration and gas pricing.
- ✓ Technical flexibility to perform different services (diversity of revenue stack)
- ✓ Sustainability requirements and end-of-life / recycling

# Lessons for new markets

- ✓ Sponsor / mgt team track record; this implies an open approach to FDI in the early years at least
- ✓ Credible OEM and proven technology; should be established pre-tender (LFP incumbent). Resilience to operating conditions (temp.).
- ✓ Bankable supply/operating contracts; recycle precedent
- ✓ Full suite of legal, technical and commercial due diligence; confirm local advisory capacity
- ✓ Macroeconomic exposures hedged; contracts likely to need to be partly USD-denominated
- ✓ Take lenders across borders
- ✓ Aim to max out UEL for best VfM
- ✓ Note the multiple use cases (which can combine) for best VfM. Location ...

## Variation based on market structure

|                     | Vertically-integrated utilities  | Unbundled networks   |
|---------------------|--|--|
| <b>Offtake</b>      | Likely to need to be fixed volume & price contracts with National Utility / Govt | Some merchant risk acceptable (e.g., wholesale price trading) if clear regulatory framework and advisors able to forecast fundamentals |
| <b>Debt pricing</b> | Credit of offtaker<br>Sponsor relationship with offtaker<br>Strength of contract | Contracted: as left<br>Merchant: Based on observed volatility, with significant buffer. Likely to exceed "infra pricing".              |
| <b>Debt tenors</b>  | Align with offtake tenor   | Suspect will generally start at 5 years on the merchant revenues and increase with track record  |
| <b>Debt sizing</b>  | Comparable to IPPs   | Suspect will generally start conservative c.50% and increase with track record   |

### Other:

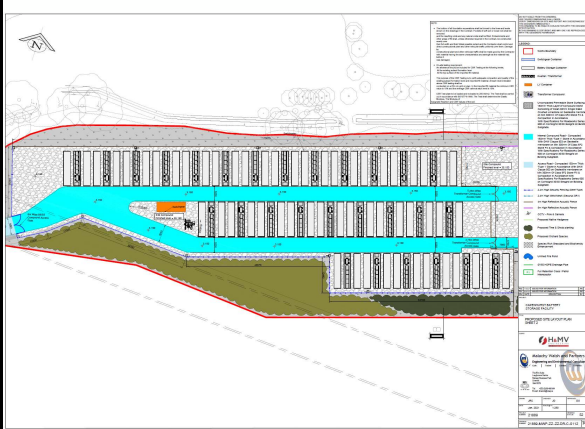
- B2B co-located deals with IPPs: firming generation profile, if clear incremental incentive to firm intermittent generation.
- State-owned companies: may prefer to own asset and EPC/O&M. Complex use cases render this risky at first.



Case studies

# Case Study: Capenhurst 100MW battery – a world first

Working alongside National Grid, we're building the first battery in the world to absorb reactive power direct from a transmission network.



## The Challenge

National Grid needed a reliable reactive power solution for the Mersey region of the UK that would better serve the environment and consumers.

## The Solution

Our innovative technology enables multiple active power, capacity and voltage services to be stacked – delivering the lowest cost to the consumer and a significant reduction in carbon emissions.

The site is about to be energised and will be complete in June 2022.

## The Benefits

- The site will stabilise the grid and deliver clean energy cost effectively
- Secure power supply for the Mersey region
- Cutting an estimated 1 million tonnes CO2 over the next 15 years
- A significant milestone in enabling a sustainable, zero carbon power system as part of the UK's 2050 net zero target

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