UK INFRASTRUCTURE BANK

STRATEGY UPDATE:

Short duration battery energy storage systems

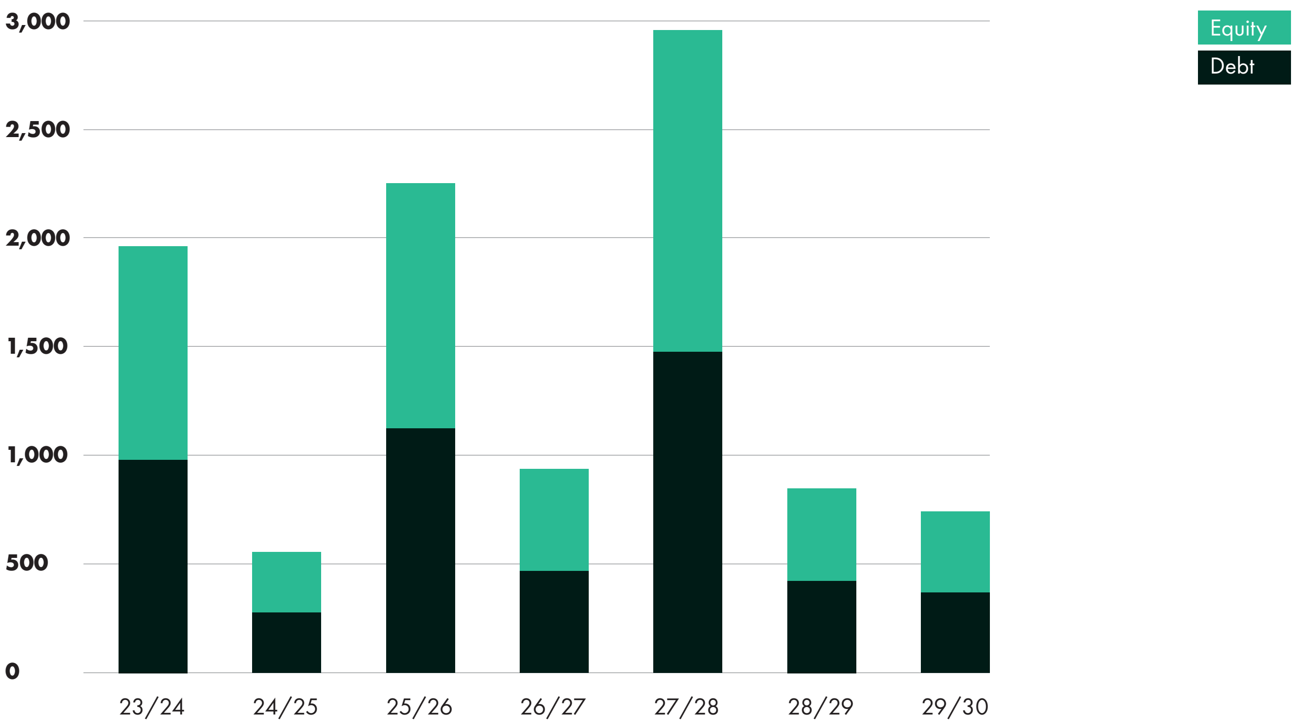
September 2023

Sector summary: short duration battery energy storage systems

Government ambition

- **Government's Smart Systems and Flexibility Plan highlights the importance of energy storage to achieving net zero**, however different forecasts are available on the amount required. National Grid Electricity System Operator's 'leading the way' to net zero scenario has 29 GW of storage in 2030.
- **The debt market provided around £450 million of finance per annum in 2021 and 2022**. Market capacity will need to grow substantially and there is a risk of gaps.

Private financing need (£m)



Data note:
Estimates based on the capital required to fund all short duration battery storage projects that have either received consent or are awaiting consent. Assumes all projects awaiting consent receive it. Debt/equity split assumption based on experience with similar deals.

Storage technologies have a crucial role to play in balancing the evolving electricity system in the transition to net zero and increasing energy security, as highlighted in the Government's Smart Systems and Flexibility Plan.

National Grid forecast that up to 29 GW of storage could be needed by 2030 and up to 51 GW by 2050 – up from around 5 GW today.

Short duration lithium-ion BESS has a big role to play in achieving these deployment levels. They are well placed to provide a fast response to intra-day peaks and troughs in electricity supply and demand e.g. cold evenings of low wind and solar generation.

We have engaged with project developers, commercial lenders, fund managers, and public sector decision makers to understand the availability of, and barriers to, finance for viable projects.

Grid connections are the biggest barrier to deployment, with developers being quoted dates in the 2030s. Our finance cannot address the availability and timing of grid connection slots. We look forward to seeing the detail, and the implementation, of planned reforms to grid connections and network development.

Some commercial banks and equity investors are comfortable with the technological maturity of short duration lithium-ion BESS and its application at grid scale. The revenue picture, however, is more complex, and deters some sources of private finance – though equity investors in particular have been attracted by the returns on offer and an identifiable pipeline of projects to develop.

We think we can contribute to the significant increase in storage deployment required to support the net zero transition by helping address problems with revenue risk and market capacity. Here, we set out how we could help.

Longer Duration Energy Storage (LDES)

LDES is important to supporting the net zero transition by responding to volatility in supply and demand over multiple days or weeks. The Bank has an important role to play in reducing barriers to investment here too:

> We are engaging directly with projects across a range of LDES technologies, where – if necessary – we are prepared to take greater risk than private investors to help first-of-a-kind projects reach a final investment decision.

> The Octopus Sustainable Investment Fund and Equitix funds, to which we have committed capital (subject to match funding), will also explore opportunities to invest in LDES.

As we develop our approach, we look forward to government publishing a consultation on a policy framework to reduce barriers to deployment of LDES.

Problems we want to address

Revenue risk

Short duration lithium-ion BESS projects combine revenues across several markets:

- Capacity Market contracts auctioned by National Grid one or four years in advance for assets to be on standby for periods of peak demand. These contracts, which last either 1 or 15 years, often make up less than 10% of the overall revenue stack.
- The Wholesale Market, whereby BESS assets can generate revenue by taking merchant risk i.e. charging when the electricity price is lower and discharging when it is higher.
- Balancing Mechanism contracts auctioned by National Grid to address imbalances in forecast electricity demand and supply in the hour before it is delivered – the short-term nature of these contracts mean they offer limited revenue certainty for potential project financiers. These revenues have been accessed less often by BESS assets, though this is currently changing.
- Ancillary services contracts offered by National Grid, which BESS assets can compete for, to provide vital functions like stabilising grid frequency. These are contracted and enacted over different timeframes. Ancillary services markets are increasingly saturated, however.

Developers often employ an optimiser, a company which operates the BESS asset in a way which aims to maximise returns across these revenue streams. In some instances, the optimiser provides a revenue floor, offering a degree of revenue certainty on expected returns to the asset owner and debt lenders. Under this arrangement, if prices fall below the floor price the asset owner continues to receive the “floor price”. In return, asset owners forgo upside revenues to the optimiser which has provided the floor. This is not standard for all projects because: there are a limited number of creditworthy and experienced providers of optimisers with a revenue floor; and, having a floor reduces returns for equity investors which can impact deal economics.

The level of revenue risk associated with BESS is greater than for most renewable generation projects. The complexity and uncertainty in the revenue stack and the evolution of the markets set out above means there is still only a limited pool of commercial banks that have lent to UK BESS projects.

Market capacity

Despite the revenue risks, deployment of BESS has increased from almost zero in 2017 to around 3 GW today. This has been primarily supported by equity investment, and a small pool of commercial banks providing debt finance.

The volume and size of projects in the pipeline is accelerating and this trend will challenge commercial debt markets. Based on capacity market agreements, we expect there could be around 4 GW of BESS operational by the end of 2023 and 10 GW by the end of 2026.

The pipeline of projects in Great Britain continues to grow beyond that, with project applications on the rise. In July 2023, there were 36 GW of projects in the Renewable Energy Planning Database with planning applications either submitted, awarded and awaiting construction, or under construction. In August, there were 54 GW of standalone BESS projects in 'scoping' on the Transmission Entry Capacity register.

Since September 2019, the average size of BESS projects has risen significantly. The biggest operational stand-alone project in the UK today is 100 MW. A number of projects over 200 MW reached a final investment decision earlier this year and we are starting to see projects larger than 300 MW seeking finance.

The debt market provided around £450m of finance per annum for UK BESS in 2021 and 2022. We estimate that could increase to an average of at least £1bn per annum by 2030. That would test the capacity and sector concentration limits of existing commercial banks comfortable with short duration BESS. Without new lenders being encouraged into the market, there could be a slowdown in the delivery of the pipeline.

OUR ROLE SO FAR:

Pulse Clean Energy

On 23 May 2023, we announced our first debt transaction in battery storage, with a £62.5 million commitment to support the development of multiple new storage and grid stability facilities across the UK.

Our senior debt formed part of a £175 million financing deal. It will support Pulse Clean Energy Ltd (PCE) in its plans to invest over £1 billion in the deployment of more than 1 GW of battery storage across 20 sites in England, Scotland and Wales over the next three years. This includes the conversion of several existing energy generation sites to more sustainable battery facilities.

In addition, PCE will be constructing its first synchronous condenser project under phase three of National Grid's Pathfinder programme, to help ensure grid stability.

Gresham House and Equitix Storage Equity Funds

On 30 March 2023, following an expressions of interest process, we announced a partnership with two equity fund managers. We committed up to £75 million and £125 million to Gresham House and Equitix new storage funds, respectively, subject to match finance from other sources. Across the two funds, our investment will:

- support co-location projects which bring together the more recognised business model of renewables with that of BESS, thereby helping to crowd in more risk-averse institutional investors;
- maximise the use of limited grid connections, by exploring opportunities where there is underutilised capacity, such as at large commercial sites;
- deliver nascent and longer duration storage technologies as viable projects come forward; and,
- encourage development of new business models to increase adoption of storage across different users, including batteries in the household.

Octopus Sustainable Investment Fund

On 19 May 2022, the Bank announced that it will invest up to £100 million on a match-funding basis in the Octopus Sustainable Investment Fund.

The fund will invest in companies looking to roll out and support sustainable infrastructure projects within the Bank's mandated priority sectors, including in energy storage.

Our solution

We want to help solve these problems and create a sustainable platform for debt finance for short duration BESS projects, widening the pool of commercial lenders in the sector.

We completed our first senior debt BESS transaction in May. Our finance for Pulse Clean Energy supported the emerging portfolio level financing model for short duration BESS (see page 6).

Alongside senior debt and guarantees, we are now also offering our mezzanine loan product to the sector. The key features are:

- **Amount** – finance for a percentage of the total project costs, up to a maximum of 30%.
- **Ranking** – below senior debt and ahead of remaining risk capital i.e. subordinated debt and/or ordinary share capital.
- **Interest & Principal** – deferrable to provide cashflow cushion to senior debt.
- **Pricing** – midpoint between senior debt and equity.
- **Tenor** – in line with senior debt.
- **Utilisation** – to be drawn on a pro rata basis alongside senior debt.

This product aims to accelerate short duration BESS deployment at grid-scale by providing credit enhancement to senior lenders, increasing the pool of capital willing to lend to the sector. It acts as an intermediate capital tranche that permits deferral and catch-up of interest and principal to accommodate a degree of volatility and cyclicality in project cashflows:

- enhancing the base case senior debt service cover ratios;
- improving probability of default ratings for senior lenders; and
- improving loss given default estimates for senior lenders.

We understand commercial lenders looking to enter the short duration BESS sector could find this product attractive and expect project developers will also see the benefit of having a flexible instrument within the capital stack. We think the product will be best suited to projects which:

- have long term capacity market contracts underpinning the stack of contracted revenue;
- have a significant proportion of the revenue stack that would not be covered by a contracted floor;
- are sufficiently large scale (over 100MW), where the finance raise and, therefore the requirement for commercial debt, will be greater than it has been to date.

We are already exploring applying this product to projects. Further detail of our mezzanine product is available on request – we welcome new enquiries from developers, sponsors and wider investors.

We recognise this is a very dynamic sector, so will continue to monitor market appetite and UKIB's evolving role within it. Should alternative products be more appropriate for a given project, we will explore their use (for example senior debt or guarantee).

Get in touch

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