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DECENTRALISED ENERGY & SMARTER GRIDS

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NATIONAL GRID SYSTEM NEEDS AND PRODUCT STRATEGY: IMPLICATIONS FOR BATTERY STORAGE

With the release of the National Grid's System Needs and Product Strategy last month, there has been renewed interest in the energy storage market. In previous bulletins we have looked at the different ways in which energy storage can be supplemented and how this can be integrated in smarter grids.

In this bulletin, we look at the National Grid's System Needs and Product Strategy and examine how this may impact the market for energy storage, in particular on the battery storage industry.

BACKGROUND

For those looking to increase the proportion of decentralised generation technologies in the overall energy mix both in the UK and internationally, storing energy is seen as the proverbial "holy grail". When combined with cheap, accessible and reliable energy storage technologies, intermittent generation sources (such as wind and solar) become significantly more attractive and may have the potential to compete with traditional baseload power generators.

Energy storage also provides benefits beyond just the renewables industry. With changes in system needs and greater volatility in energy demand, grid operators are increasingly reliant on technical response services to assist them in balancing and managing the grid. In the UK, the independent system operator ("ISO") is National Grid. It procures ancillary services such as "Enhanced Frequency Response" (EFR) and "Short Term Operating Reserve" (STOR) from third parties, within which energy storage plays a part. While these are referred to as 'products' by the National Grid, they are in fact the service procurement needs of the ISO and represent a potentially significant opportunity for developers and investors.

There are a number of technologies that exist for the storing of energy, each with their own advantages and disadvantages. Not all of these technologies are new or cutting edge; currently by far the widest deployed grid-available energy technology worldwide is Pumped Hydroelectric Energy Storage. However, of all the currently available technologies, it is battery storage that is currently receiving the most interest.

FINANCEABILITY OF BATTERY STORAGE

Battery storage has had a bumpy ride in the UK. With an initial flurry of interest in the sector, battery storage developments are yet to hit the cross-hairs of mainstream debt financiers. Whilst this is likely to have been for a variety of reasons, there are some common themes in the commentary surrounding the industry.

Length of contracts

One of the primary issues seen to be holding back investment has been the length of contracts that National Grid have been willing to award in relation to its products. For some products, this has been as little as 12 months. Financiers will naturally look at the guaranteed future income of any project before agreeing to lend. Financiers will ask themselves: "will this project generate sufficient income over a sufficiently long period of time to enable the upfront debt requirement to be serviced?". The answer, more often than not, has been: "No". While there is usually a residual market that can be brought into play at the expiry of locked-in contracts, concerns regarding the residual market for the output of a particular asset can add to the uncertainty (for example EFR – see box). Consequently none but the most sophisticated of developers are able to attract finance for such projects, particularly debt finance.

Revenue stacking

When faced with these concerns, the concept of "revenue stacking" is pointed to as a potential solution. Revenue stacking refers to the ability of certain assets to create value across more than one market. For example, by deriving revenues from the EFR market and the "Capacity Market". The asset is able to generate income from multiple sources. The attractiveness of this is self evident; obtaining revenue from more than one source simultaneously can boost the profitability of the asset (the streams are theoretically added together) and the resilience of the financial model (by spreading risk across a number of contracts and counterparties). Examples of revenue stacks that have proved successful include EFR plus Capacity Market and EFR plus Triad Avoidance[1].

[1] Note that the Triad Avoidance Benefit component of embedded benefits has now been cut significantly.

However, the reality of revenue stacking has not entirely measured up to the theory. On a technical level, designing assets that can successfully target two or more different markets is no mean feat. The task is certainly not insurmountable, but it may take significant time and resources to get the right balance – resources which are likely to pinch the investment/revenue even more for the everyday developer. Even where assets are designed to be able to adapt to different markets, the interface between those markets can be problematic. For example, under STOR contracts, penalties are levied when an asset is unavailable, notwithstanding that the asset was not required during a particular period. Successfully deriving the most revenue available from the stack in such situations requires operators to make real-time commercial decisions regarding which service/contract to target at any given time. Again, creating value in these situations is not insurmountable, but as actual revenues are not forecastable, it increases investment risk. It is this risk that has so far left debt financiers with little appetite for investment.

Regulatory issues

Regulatory hurdles also remain a concern: currently energy storage isn't recognised as a separate class of asset under UK energy regulations. This means on larger projects transmission network use-of-system (TNUoS) charges can potentially be levied on energy storage projects twice, as both a generator and as a consumer. However, the government has recently announced that it will introduce legislation to define storage as a distinct subset of generation which is likely to alleviate some of these concerns. [2]

BRIGHT SPARKS

That's not to say that it's all doom and gloom. A handful of assets in the UK have been able overcome these issues and develop successful (and desirable) projects. The two battery storage assets recently acquired by Foresight Group[3] are examples of where EFR and Capacity Market revenue streams have been sucessfully stacked. However, when faced with a financial model that bears so many question marks, debt funders have been less than enthusiastic to provide funding.

Enhanced Frequency Response

Certain energy storage products cater to a particular ISO need, such as Enhanced Frequency Response. This seeks to ensure grid frequency stays at (or within ±1% of) the nominal system frequency in the UK: 50.00Hz. Frequency is a continuously changing variable that is determined and controlled by the second-by-second balance between system demand and total generation. If demand is greater than generation, the frequency falls, while if generation is greater than demand, the frequency rises.

The only technologies able to be involved in Enhanced Frequency Response are those that can achieve 100% active power output within 1 second or less of registering a frequency deviation. Battery storage is perfectly placed to meet this requirement (although demand reduction and thermal generation have also been successfully tendered). Payments are based on a combination of availability and speed of response, rather than solely on quantities exported into grid. The value of an EFR asset will therefore not be based entirely on its output capacity, but also how quickly and reliably it can deploy that capacity.

Accordingly, while the National Grid may value the service quite highly, it could be difficult to realise value on investment when the National Grid contract expires. That is, unless on expiry of the EFR contract (currently after 4 years) the asset has the technical capability to acquire another EFR contract or enter other markets; for example by "going merchant" and participating in energy arbitrage – buying when energy is plentiful and prices are low, and selling when energy supply is restricted and prices are high.

[2] See details here
[3] See details here

SYSTEM NEEDS AND PRODUCT STRATEGY

It is for the above reasons that the National Grid's System Needs and Product Strategy document is an important first step in invigorating the UK battery storage market. The System Needs and Product Strategy ("SNAPS") Consultation Paper was released on 14 June 2017 as part of the National Grid's ambition for the future of balancing services. Whilst not entirely focussed on battery storage, it reveals National Grid's recognition that balancing services are generally considered to be "not accessible to all potential providers, complicated, unclear and not future-proof".

The Consultation Paper itself comprises two sections: (1) "System Needs" and (2) "Product Strategy". In the "System Needs" portion of the document, National Grid seeks to explain the issues underpinning its third party product needs as the ISO – broadly being Inertia and Rate of Change Frequency, Frequency Response, Reactive Power, and Black Start. For those looking for clues into future markets for innovative grid-based technologies this may present some interesting insights, but it is primarily of technical interest.

However, the meatier portion of the document is that related to "Product Strategy". It is here where National Grid reveals its plan to simplify its entire product suite through a three stage programme over the next 18 months. There are a number of reasons to be optimistic that it will assist in resolving some of the issues presenting developers and funders in the battery storage market:

Longer contracts

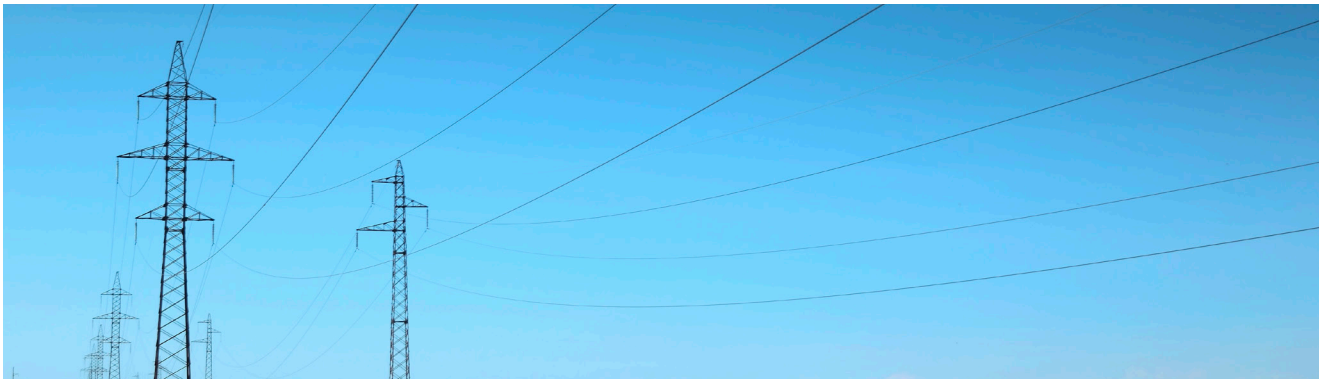
As mentioned above, length of contract is often cited as one of the primary concerns holding back investment in battery storage. Although opinions differ across the market, 4 years for an Enhanced Frequency Response contract is generally not seen as a long enough period to provide sufficient certainty to obtain debt financing. While Capacity Market contracts can be awarded for longer periods (12 years), these are only one layer of the revenue stack.

SNAPS suggests that National Grid is willing to change this horizon: "there may be merit in providing a long-term route to market in the current climate to instil confidence in balancing services' revenue streams, particularly if and while short-term markets are developing". If the outcome of its consultation leads to an overall increase in the length of contracts awarded for ancillary services, this will undoubtedly have an impact on the attractiveness of battery storage as a class of investment, particularly against the backdrop of falling costs associated with battery technology.

Product groupings

The simplification of product grouping is also on the agenda for SNAPS. Currently the National Grid procures 16 different ancillary services products, many of which overlap. Contracts are then awarded for the particular service, with no reference to any other service that the particular asset may be able to provide. In effect, National Grid has left it up to developers to figure out how best to design their assets to allow "stacking" of revenue streams. This leads to a complexity that some would say is unnecessary, given the opportunities for streamlining.

SNAPS proposes to consolidate these separate products into 4 different complementary products: Frequency Response, Voltage Control, Reserve Products, and System Security Products. The products within these four categories will be grouped together based on similar technical and operational characteristics. If implemented, the intention appears to be that storage assets could be designed in a way that allows them to tender or bid to National Grid for a "product group", rather than for particular products individually. Caps, collars and trade-offs between different products will also be taken into consideration, providing clarity as to the standard to which assets will be assessed. This will potentially make it easier for developers to mix-and-match revenue streams and to develop assets accordingly, rather than being incentivised to satisfy the technical requirement of just one or two core products. It may be that a number of "sweet spots" naturally emerge that strike the right balance between battery technology capabilities and contractual offerings.



THE FUTURE

The above is all well and good for those conversant in the details of the energy storage market, but it may beg the question for those less so: how does this help me?

Landholders

If a landholder is actively marketing a site for development, that landholder may see renewed interest from battery project developers – but not immediately. The timelines for the simplification process are still indicative and are sometime in the future. If SNAPS does indeed lead to increased interest in battery storage developments, the opportunities for siting those developments will naturally increase, at least for those with a site which naturally lends itself to a battery storage project over-and-above a diesel or gas gen-set.

Industrial

One of the other winners from SNAPS may be the aggregators. Aggregators are businesses that develop decentralised generation and demand-shifting capabilities, and then combine these resources to create synthetic capacity to bid into the National Grid tenders. By drawing upon diverse sources of generation, aggregators may be perfectly placed to address all parameters in a "product group" bid. This may have a direct impact on commercial enterprises as aggregators look to aggressively expand their resources – whether that be purely Demand Side Response ("DSR") capabilities, or DSR combined with on-site storage. Operators of high demand industrial premises are in the best position to take advantage of aggregators' ongoing and increasing demand for resources.

Developers

Developers are naturally best placed to take advantage of any changes implemented as a part of SNAPS. Developers should ensure they engage with the SNAPS consultation process and make their perspectives on these issues heard. Once the dust has settled on the consultation, the task for developers will be figuring out how to best take advantage of any changes in the National Grid product suite. If all goes to plan, debt finance may add an additional source of funding that has previously been difficult to attract.

TIMELINES

Submissions to the survey on SNAPS closed on 18 July. The National Grid has said it will be engaging with the industry over the next few months and publishing its post-consultation recommendations for a balancing services product strategy at the end of September 2017.

National Grid's timeline anticipates completion of the key work areas (with the exception of "Black Start" products) by September 2018. We expect this should give sufficient time for industry to have its say and for the new product strategy to be considered by the market prior to any tendering opportunities arising. Indeed some would say the timelines are perfect for the data on technology used in existing projects to have filtered back to the project developers – some have expressed concerns that the current lithium battery technology used in most new battery storage projects is not robust enough to deal with the stresses placed on it when used at grid level.4

Whatever the result, the SNAPS process is a good reason for both funders and the energy industry to take a fresh look at the opportunities presented by the battery storage market.

HOW WE CAN HELP

Ashfords is currently assisting clients on the following range of balancing services projects:

- Advising in respect of battery storage on supermarket sites intended to be coupled with Firm Frequency Response (FFR), amongst other revenue streams.
- Advising on a battery storage project to be underpinned by FFR and Capacity market revenues, including in respect of connection and subcontracting arrangements.
- Advising on the contractual and property arrangements for a number of projects deriving revenue under STOR contracts.