

Battery storage – a disruptive technology in the power sector

February 2019

Introduction

The development of battery storage and “smart” infrastructure has the potential to improve grid efficiency. Battery storage is expected to play an increasing role in the operation of the UK grid, but changes in the regulatory environment and increased competition means that projects have to adapt and develop business models for the different revenue streams available.

Revenue streams and regulation

Battery storage projects can benefit from different revenue streams such as frequency response services, capacity market, non-commodity cost avoidance and price arbitration. These different revenue streams require active management over the life of the project and involve conflicting demands on the operation and health of the battery whilst maximising revenues in the different power markets.

These different revenue streams are impacted by falling prices for frequency response services, suspension of the capacity market following procedural issues with the state aid approval, the application of de-rating factors and potential changes arising out of Ofgem’s targeted charging review. The challenge is to develop a business model which provides a reliable revenue stream and return on capital in this evolving regulatory environment.

Business models

The different business models for battery storage projects include:

- Behind-the-meter batteries owned and operated by a service provider, who pays rent or a share of the revenues and cost savings.
- Large-scale front-of-meter projects.
- Co-location of batteries with renewable generation projects.

In addition, electricity suppliers may be able to use a network of electric cars and small household batteries

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together with “smart” infrastructure to manage electricity usage during peak demand and share cost savings and revenues with the customers.

Observations

The intermittent nature of renewable generation will require the grid to have a greater degree of flexibility, with the market and regulations having to adapt in response to this. It is expected that battery storage will play an increasing role in contributing to a more efficient grid. The Government has announced that it will seek to reduce the regulatory burden on battery storage, but the evolving regulatory environment remains a challenge for investors. We expect investors will continue to develop business models in response to this. We also expect to see more co-location with renewable generation.

The development of “smart” infrastructure, small-scale renewable generation and networks of household batteries is leading to a shift towards de-centralisation. It is often more efficient for generation and storage to be installed where it is needed, with embedded batteries and generation reducing the need for transmission across long distances. This is likely to lead to investment in portfolios of smaller projects.

In addition, the rise of electric vehicles has the potential to provide additional flexibility with the batteries in such vehicles being used to smooth out demand.

Lastly, the complex nature of the different revenue streams associated with battery storage projects represents a challenge for debt financing. It may be that tolling structures can be used to get around this, with the project receiving a fixed availability payment as opposed to carrying the risks associated with the implementation of a trading strategy. The developers may then have more freedom to implement a trading strategy without the constraints that may have otherwise been imposed by the debt providers.

Case study: Arsenal

We worked with Arsenal Football Club in connection with the battery storage project at the Emirates Stadium. This was an example of how a behind-the-meter battery can be used to avoid peak prices and provide a source of revenue. In addition to helping Arsenal Football Club reduce its electricity costs, the battery will be used by an aggregator to perform firm frequency response services and to trade in the wholesale markets. This innovative trading strategy was developed in response to the evolving regulatory environment and different revenue streams available.

