



Storage Wars - How Batteries Can Give Businesses a Commercial Edge

As the government looks to make power generation in the UK more efficient, re-engineering the way we consume energy as a nation is going to play a key role. Known as demand-side response, essentially the idea is to use dynamic pricing to encourage large energy consumers to use less power at peak times, smoothing out consumption and reducing the maximum generation capacity needed across the grid.

This will make better use of electricity-generation resources by reducing the need for power stations that currently sit unused for most of the year, only to be 'switched on' during peaks in demand. It will also lessen the UK's dependence on polluting fossil-fuel generators and reduce the overall cost of powering the country.

For businesses, Behind the Meter (BtM) energy storage will play an important role in negotiating this changing landscape and keeping energy costs under control. BtM energy storage means just that – installing batteries that can store and discharge energy on a business' own site, so that energy doesn't need to be used as and when it is purchased from the grid. This allows large consumers to buy power from the grid at the most affordable rate and store it for use during peak times. It also allows them to store any energy generated on site so that it can be exported at peak times when the best rates are on offer.

This is a strategy that has become economical only in the past two years or so. Already the UK has seen strong growth in both utility-scale storage and, to a lesser extent, distributed micro-storage of the sort that could help businesses save or even make money. The energy market moves rapidly, as do the benefits available to companies, so agility and up-to-date awareness of any forthcoming changes are both essential to any energy storage strategy.

Here, we'll look at the positive impacts battery storage strategies can have, and which are likely to be available and attractive to energy managers of large commercial buildings or industrial sites.

The potential benefits of battery storage

Running your operations from stored power rather than

directly from the grid during high-demand periods can allow you to avoid the higher tariffs payable for energy during those timeframes.

There are three mechanisms network operators can use to charge large power-consumers more for using power at peak times – peak-rates, triads and the Capacity Market Levy.

1) Peak-rates

Peak rates vary between different agreements between customers and networks but typically cover daily periods totalling between two and four hours. Using stored power during these times will allow you to avoid the higher charge.

2) Triads

Triads are more complex. They comprise the three half hours of highest demand, separated by at least ten days, each winter. The network calculates additional charges for each large energy user based on their consumption during those periods. To be sure to evade the charges, you would need to avoid consumption during all potential peak times throughout the winter, which would add up to four hours per day. Of course, these periods are likely to overlap with the peak rates mentioned previously. The benefits of avoiding triads are only available for a limited time, however, as Ofgem recently announced that the charges will be gradually phased out between now and 2020.

3) Capacity Market Levy

The Capacity Market Levy was added in 2017. The charge is typically based on consumption during the biggest winter peak, so avoiding it requires a similar approach to triad avoidance.

Side-stepping energy prices is a major benefit of a battery storage, but there is potential for business to go further than that – batteries can also be an earner in their own right.

Storage as a revenue generator

Few businesses will have the capacity to work directly with the network, as most grid services require a minimum power output of 1-3 MW, which few BtM schemes will have. However, these revenue schemes can

be accessible through aggregators – companies that use smart grid technologies to combine medium-size assets into a package for selling services to the grid.

There are five main mechanisms available for sharing your storage capacity. Some of these are being used more actively than others at present, and a good energy management consultant will be able to advise on the feasibility of participating for any business with specific requirements.

1. Firm Frequency Response (FFR)

Historically lucrative, the minimum power output for this scheme was reduced from 10MW to just 1MW in 2017, greatly increasing the number of tenders received.

2. Short Term Operating Reserve (STOR)

This is a power storage reserve operated by National Grid to manage short-term supply losses or localised constraints. It operates over six 'seasons' per year, for which storage suppliers can bid for contracts. This has been growing in popularity, with the number of successful contract applications rising from around a third in 2015 to around 80 per cent in 2017. Participants will need to be able to respond to demand requests within five minutes, and provide power for a minimum duration of half an hour.

3. Capacity market

Since 2017, this has offered long-term contracts of up to 15 years, with auctions for capacity held four years ahead of the requirement coming online, with a subsequent auction held one year ahead. The next of these auctions is expected to be held in March 2019, and this will be confirmed later in the summer. Participating in this scheme is most cost effective for batteries which can provide their peak output for four hours continuously, due to rules limiting the capacity usage of batteries over shorter durations.

4. Wholesale markets

These require a membership fee for participation and work on the basis of day-to-day trading of capacity. Both

this and the balancing mechanism below work best for a site which can support a large battery of a few hundred kilowatts, and 24-hour operation, such as a waste-water treatment works.

5. Balancing mechanism

This is an ad-hoc market, with no forward commitments and highly dynamic prices. The need for short-term bidding means frequent communications and a 24-hour control room are required.

Looking further ahead

Two new frameworks that could draw big headlines in the years ahead but which are currently in the early pilot stages are Demand Turn-Up and Virtual Power Plants.

The **Demand Turn Up** service encourages large energy users and generators to either increase demand or reduce generation at times of high renewable output and low national demand. This typically occurs overnight and during weekend afternoons in the summer. Having only launched in 2017, there are currently no energy storage participants, although this could well change in the years ahead.

Virtual power plants meanwhile involve direct trading between batteries and consumers in a virtual utility scheme. We have already seen examples of this, including Tesla's recently launched scheme in Australia, and this is set to be an important space to watch for the future

Where to start

For any business considering whether it could benefit from energy storage, there are two fundamental questions to ask at the outset.

Understanding what electricity supply contract and metering arrangement is in place is key, as it will determine whether energy is purchased at a flat variable rate.



Only businesses that buy according to a variable rate will be able to avoid peak time pricing by storing energy purchased off peak for use during periods of high demand. It may be possible to negotiate a new agreement with the network, however this may incur costs of its own, for example if new metering needs to be installed.



Once that is established, you need to determine the optimum size of batteries to make a business case. This is a complex calculation that will yield a different result based on your consumption and generation patterns, and the agreement you have with the network. The final step is to look at the prices available from

The second is whether the business is generating any power on site, and whether it has an export connection. If so, storage may allow you to maximise the revenue you can make from using on-site generated power or selling it to the grid.

storage technology providers. These are currently around £300-£700/kWh for a commercial BtM system depending on battery size and chemistry, but prices have been falling rapidly. The challenge, then, is to work out potential return on investment based on the options available, factoring in the risks associated with future price changes.

Next steps

For those looking to make savings or bring in revenue from energy storage, the first step is to carry out a grid review. This means investigating existing grid agreements for contracted import and export of any capacity. The next is to carry out a feasibility study based on the following factors. Firstly, your critical vs non-critical load. Examples of critical load might include freezers in supermarkets, servers or airconditioning, which need to be always on. Non-critical loads are processes that can be scheduled for any time of day in order to benefit from favourable pricing.

Ultimately, energy prices are set to rise rapidly in the years ahead as the government looks to re-engineer the way the UK generates and consumes power. Those businesses that can take advantage of the new opportunities the emerging system is making available will gain a significant commercial advantage over those that are hit by the price increases.

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