UK storage charges ahead

Markets | The UK government has placed energy storage at the forefront of its industrial strategy. David Pratt and Lauren Cook report on how this is creating the right conditions for what many believe will be a boom market in years to come

Energy storage has hit the mainstream in the UK this year after the government placed the technology at the forefront of its industrial strategy, laying out vast sums of money and accompanying rhetoric for the future of storage in the UK.

To back it up, regulatory progress has finally been made while transmission system operator National Grid is looking to build on last year's tenders, which showed a huge presence already in place.

Hype around the UK is growing as a result of progress like this. Utility Enel recently stated that the UK offers "one of the most advanced markets in the world" for utility-scale battery storage systems, while Navigant Research recently placed the UK within the five biggest markets for utility-scale storage.

Across residential, commercial and industrial (C&I) and utility-scale applications, 2017 has already proved to be an important year for energy storage and shows the UK is starting to meet the hype.

Credit: Anesco

"The best scale-up market in the world"

In a market where little more than 800,000 homes out of 27 million were convinced by the offering of solar panels and the attractive tariffs they once brought, UK residential storage has so far proved to be a tough nut to crack.

However, a key trend that has emerged this year is the sheer number of international and domestic companies that believe they are up to the task. Since December 2016, almost 10 battery storage manufacturers and suppliers have looked to create a foothold in the UK alongside those already present (see timeline).

From battery manufacturers selling directly to homes, or utilities looking to take advantage of their existing customers, UK residential storage is filling up with companies seeking to build a mass market, such as British manufacturer Moixa. The technology firm has deployed almost 1,000 systems across the UK, utilising partnerships with distributors to offer solar-plus- storage packages, deploy within social housing and new build, and work with utilities.

These partnerships are proving to be popular targets for storage firms looking to get their products into homes. Moixa CEO Simon Daniel expects around 80% of home storage to be deployed through these mass channels – no doubt a view also taken by E.On given its UK solar-plus-storage launch back in April (see timeline below). As he explains, past deployment of solar in the same way has shown the UK is ready for mass roll-out.

The UK's utility-scale storage pipeline has reached 3.5GW, placing it within the world's top five markets

"We're much more bullish on the potential for storage in the UK because while it is not the best early adopter for storage, it is probably the best scale-up market in the world because of the way organised, multi-thousand projects for solar and other technologies were deployed and funded historically," he says. "There are probably about 50,000-plus batteries deployed in Europe today, but

December 2016	February 2017	April 2017	July 2017	August 2017
Sonnen partners with distributor CCL to expand UK sales	Solarwatt begins trials of MyReserve home storage Leclanche reiterates commitment to UK in preparation for new product	Utility E.On launches its solar and storage offer Mercedes Benz Energy Storage Home units enter UK	Nissan and Eaton begin shipping xStorage second life batteries SolaX Power begins shipping LG Chem batteries	IKEA confirms it has begun offering LG Chem and Sonnen batteries

Timeline of UK storage milestones since the end of 2016

we see pipelines in the UK that could exceed that and it's just a question of the economics and the process."

With this many units expected to be in place over such a short timescale, poor practices could grow as more disreputable members of the industry seek to take advantage of 'Solar 2.0' in much the same way some did during the golden age of feed-in tariffs.

Throughout 2016 the Renewable Energy Consumer Code (RECC), a consumer protection scheme for domestic renewables, received at least one complaint a week related to battery storage, half of which concerned mis-selling practices.

However, this could be set to change with the publication of the Code of Practice for Electrical Energy Storage Systems by The Institution of Engineering and Technology (IET). Formulated alongside the UK's rapidly evolving distribution network operators (DNOs) and others, the guidance on "safe, effective and competent application of electrical energy storage systems" provides "a timely shot in the arm" for the country's storage market according to Sonnen's UK director, Martin Allman.

"There's a real lack of guidance for installers to follow – and which consumers could use as well. The IET guide is going to be really important to fill that vacuum, to give some clear advice to installers about how they can go about installing and selling these systems, and making sure things are done in the right way," he says. "It's just part of a maturing market that these standards can come along and play an important role."

Another sign of growing maturity for UK storage is regulatory progress, and recent advances for home storage are typified by the government's decision to extend a tax break enjoyed by solar to energy storage.

In August the UK's Solar Trade Association announced it had secured a 5% VAT rate for battery storage instead of the standard 20% previously applied. With the stipulation that this would only be allowed if the battery unit is sold and installed with solar panels, the decision will no doubt further boost the attractiveness of a solar-plus-storage package, which could become the leading choice for homeowners, while discussions to extend this to retrofit storage continue.

With this initial decision as well as rapidly developing business models from major players in the market bent on making a success out of UK residential storage, Allman points out: "There is an exciting momentum to the UK battery storage market with various pieces of the jigsaw coming together over the last few months."

The C&I opportunity

Meanwhile commercial and industrial applications of energy storage are proving tricky for existing suppliers – surprising considering the ability of storage to reduce what are in the UK considerable electricity costs for businesses.

These systems can help large energy users avoid the peak times used to calculate a premium levied on electricity use by drawing down from the grid at cheaper periods to use later, without interrupting normal operations. For the thousands of commercial properties equipped with solar arrays, storage can help to further increase self-consumption and lower reliance on the grid while reducing exposure to unscheduled interruptions to business activity.

Despite these benefits, cost remains the presiding factor for any business when considering investment, and while batteries can cost a quarter of what they did six years ago, many are waiting for this price curve to continue downward.

A range of businesses models have therefore emerged to tempt early movement into the storage world. Much in the way that power purchase agreements emerged to overcome a similar issue in solar, businesses are now being offered free energy storage in the UK.

Omnio, set up under solar developer British Solar Renewables, has set out to address the "overlooked" market for small, distributed energy users. The company's engineering team work with host businesses to install batteries free of charge at proposed sites. These will then provide a peak shifting service and charge when energy prices are low before discharging when they are at their peak to generate savings across the business. Omnio uses the installs and an aggregator to provide ancillary services to the grid, prioritising the partner businesses' needs but creating revenue to fund the fleet of 50kW energy storage devices.

"Omnio is looking to help distributed energy users, companies who probably use just as much energy as those large companies but distributed over 50-100 sites. Large retail, hotels, restaurants, those sorts of things, who have a shorter site tenure of something like five to 10 years," founder and managing director Chris Curry explains.

In a similar vein, Siemens Financial Services has launched no-money-down options for the first time in the UK. The 'outcome-based' finance model is available to electricity users with on-site electricity demand profiles between 1MW and 100MW and allows customers to pay for Siestorage systems based on battery output

Head of sales in energy finance for Siemens Financial Services, Ian Tyrer, says that customers would be paying for "what the technology delivers rather than the technology itself". In the case of Siestorage, this again allows C&I electricity users to arbitrage their power purchases and defer them to non-peak periods, saving on bills and grid network costs.

For businesses, arbitrage is rapidly becoming the key draw of storage and, according to Scott McGregor, chief executive of flow machine company redT, could soon become the main economic case with which storage can be pitched.

"I've been very vocal up until now about how energy storage doesn't make economic sense in the UK. However we've spent months tentatively modelling how to get the revenues laid up for storage, grid services and solar and some arbitrage and we're getting an eight to 10-year payback now in the UK, which is pretty good for an infrastructure project. We believe it is now commercial in the UK, we've got the right price for the system so it's economic," he says.

The right direction of travel

Despite these advances in both residential and C&I, it is the recent activity and progress in grid-scale storage that is making the UK such an exciting market for the technology. As Lauren Cook, analyst with *PV Tech Power*'s publisher Solar Media's in-house research team, explains in the box to the right, the pipeline for utility electricity storage projects is growing and has now reaching over 3.5GW.

This pipeline and all the additions that are certain to join it have been waiting for a combination of factors to kick into gear, and these have finally emerged in the UK: government backing, regulatory change and a planned revolution of the power system.

Storage-friendly reforms in the UK

Removal of 'double charging': Owners of storage assets will no longer have to pay charges associated with the RO, CfDs, FiTs and Capacity Market auctions when charged electricity is dispatched. Electricity used to charge storage assets may also be exempt from Climate Change Levy costs under certain conditions.

Demand residual charged: Ofgem is considering removing these transmission and distribution charges as part of its Targeted Charging Review.

Definition of storage: The Electricity Act 1989 will be amended to include an explicit definition of electricity storage, specifically as a generation subset to allow Ofgem to consult on a modified generation licence intended for next summer.

Easier connections: Network operators will be expected to improve the connections process for storage, specifically the clarity and transparency regarding where to connect and better queue management.

Energy storage has been chosen as a key industry for the future of the UK, both in and out of the EU, and with that in mind the UK government launched a call for evidence alongside regulator Ofgem seeking views on what was needed to get this industry going.

Eight months after its launch, having been delayed by the UK's snap general election in May, the outcome set out 29 actions in response to a whole range of issues in need to tackling if storage is to take off (see box above for examples).

While these actions may not materialise until 2019 in some cases, the measures were widely welcomed by industry as a sign that the government was finally making progress on behalf of storage. Cyrille Brisson, European vice president at Eaton, says: "The proposed steps should help remove barriers to market and allow for a more flexible and responsive energy system.

"The direction of travel is therefore the right one from a regulatory perspective and has the potential to put the UK in a strong position as a global leader in the development of battery storage technology.

Greg Clark, the UK's business, energy and industrial strategy (BEIS) secretary, also announced that £246 million would be spent on the Faraday Challenge, designed to boost research and development and position the UK at the forefront of energy storage, predominantly for electric vehicles.

This will see the creation of a virtual 'Battery Institute' to address the key industrial challenges in developing battery storage technology in the UK. Its most promising work will be moved on to further development for commercial applications while a competition is already underway to find the best proposition for a new National Battery Manufacturing Development facility.

In isolation this looks good, however storage companies will need to be careful of plans released by BEIS to alter the derating factor of batteries competing in the capacity market. The changes, which could see the majority of storage assets lose their current 96% derating status, stem from the fact that most storage facilities normally deliver power for around 30 minutes to an hour. Traditional fossil fuel plants, on the other hand, run for longer periods to offer greater security of supply during an extended stress period.

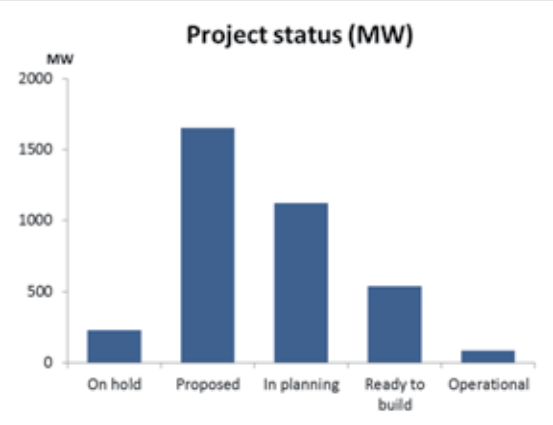
While capacity market payments often make up only a small proportion of the revenue for a storage project, they do offer a long-term income as part of a revenue stack often made up of shorter-term contracts. With upcoming changes to embedded benefits and National Grid's planned reforms to its products, it's unclear what revenues will look like for large-scale storage when the dust settles.

However, it is also likely to see rapid deployment alongside renewables as the UK moves into a post-subsidy phase of development. According to Solar Media's head of market research Finlay Colville, more than a quarter of the solar farms currently sitting in the UK's pipeline without subsidy are being planned to include energy storage units.

All of this across residential, commercial and utility-scale applications means the UK is more than meeting the hype around the developing market. Either through the sheer consistency of new additions to the market, new and innovative business models, or the regulatory progress and hunger for large-scale storage developments, it is sure to be a diverse and highly active sector for years to come.

The status of the UK utility storage pipeline

By Lauren Cook, analyst for Solar Media market research

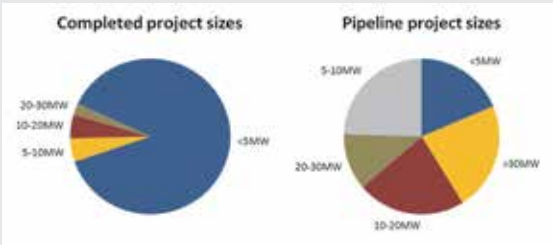


The UK's utility storage pipeline*

Operational projects have increased to over 80MW made up of around 40 projects. The average project size has been small to date – most under 1MW – with the four largest projects accounting for around 50MW.

The average project size looks set to increase with several 50MW projects in the ready-to-build category, where planning has been consented plus another indication of progress has been made, such as confirmed financing or a components supply contract. The average size of projects at this stage is 20MW, reflecting trends globally as grid-scale batteries become more widespread, and there are over 500MW of projects in this category that could be built over the next 12 months.

The proposed and in-planning categories show what is coming through the system next, with projects at the planning stage likely to be eyeing up the next capacity market auction and keeping a close watch on National Grid's decisions on how it will procure future frequency services.



The size of completed and pipeline utility storage projects in the UK*

The majority of completed projects are small, made up of demo and research projects between companies and DNOs, for example, or those co-located with renewables like solar farms. But with both 15 and 20MW battery storage systems built already this year we can see the shift towards larger projects is underway.

Going forward there is a lot more diversity in the pipeline, with projects typically anywhere in size up to 50MW. Stand-alone projects are typically larger and we can see a variety of project sizes in this group and even in individual developer's pipelines.

**Storage output has been measured in megawatts as this unit is more commonly used at the earlier stages of development, especially for planning purposes.*