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Towards the storage decade

Building permanent capacity to maximise renewables

Renewable resources are all around us and are the cheapest form of electricity. But we currently waste enough clean energy to power 1.2m homes every year.[1]

To decarbonise our power system, this needs to change. If the 2010s were the story of wind – especially offshore wind – the 2020s needs to be the story of how we integrate and capture wind for when it does not blow.

To achieve this, we need energy storage. We need to be able to store electricity to cover windless and sunless periods. Large scale battery storage can provide a permanent solution to integrate intermittent renewable energy into the grid.

Britain is already deploying batteries at scale – and at speed. By the end of 2023, 3GW of batteries will be connected to our grid. And this is only the start. 61GW of battery projects are in the pipeline, with multiple projects winning contracts at the last Capacity Market auction – the Government's tool for ensuring we have enough power plants to keep our system secure.[2] Building all of these projects would substantially enhance the UK's energy security, reducing our exposure to volatile international gas markets and allowing us to rely on British renewables.

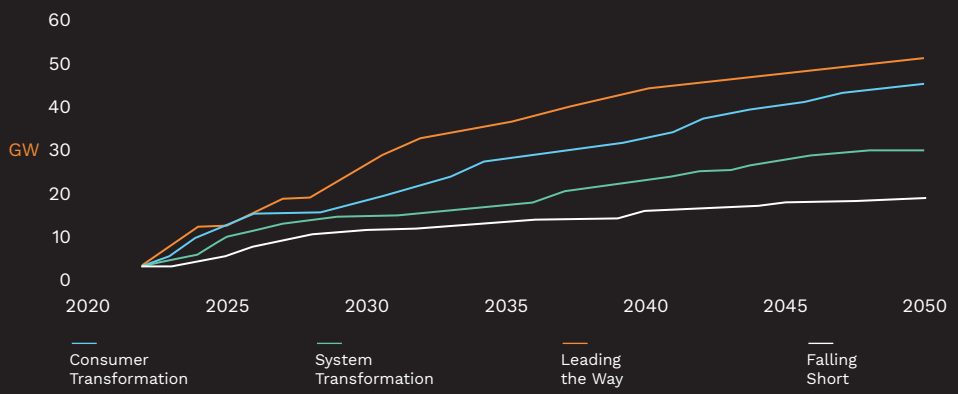
But without targeted policy for the storage sector, many storage projects will not be realised. Batteries do not need Government subsidies or radical market reform, as existing market structures can provide enough revenues for operators to develop projects. However, operators are facing other obstacles that put their ambitions at risk. Achieving the full potential of the British energy storage sector means fine-tuning our power markets and bringing outdated regulation up to speed.

This manifesto sets out 5 steps that Government, Ofgem and the System Operator must take to ensure this happens:

01.	Unblock grid connections	Remove unviable 'zombie' projects from the grid connection queue, allowing projects with capital, planning and contracts to move ahead.
02.	Modernise system balancing	End the de facto exclusion of storage from balancing markets by modernising System Operator tools and prioritising low carbon options.
03.	Ensuring security	Update regulations to reward plants in line with their genuine ability to provide power at speed in case of emergency.
04.	Getting power to where it is needed	Find new ways for storage to prevent our network wasting renewable energy by charging when there is not enough grid capacity to get power out of an area, and discharging when there is.
05.	Ensuring investor confidence	Make the UK an attractive place to invest in energy storage by addressing uncertainties about future energy market arrangements.

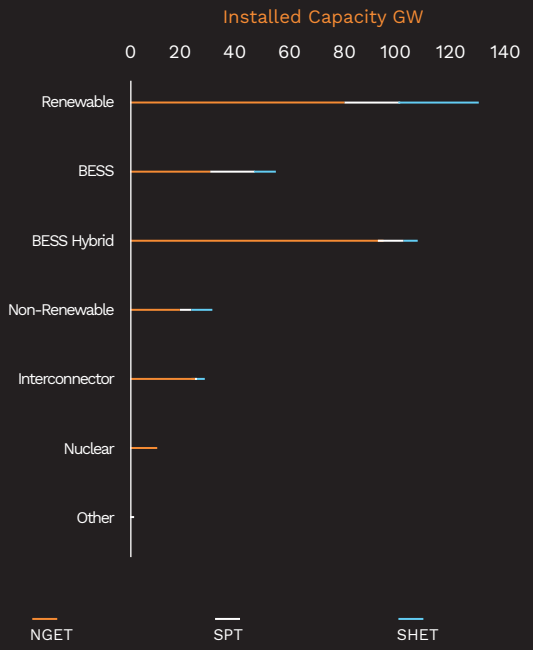
Adopting these 5 measures will accelerate the deployment of storage without the need for any new Government subsidies or radical changes to energy markets. Both Ember Consulting and National Grid ESO estimate that, in the best-case scenario for achieving our 2035 net zero electricity targets, we will need at least 20 GW of storage by 2030. Only through these measures can storage help deliver our power decarbonisation ambitions.

Figure 1
Electricity Storage Installed Capacity. Source: National Grid ESO Future Energy Scenarios Report, 2023.



Many storage operators are facing significant barriers resulting from grid connection delays. These delays hold back projects that would reduce public costs and drive down carbon emissions.

Figure 2
Transmission System Capacity Queue (excludes connected), Transmission Charging Methodologies Forum and CUSC Issues Steering Group, National Grid ESO, October 2023



These delays exist for two reasons. First, because the current application process works on a first-come, first-served basis, which means developers – and opportunistic investors – can bank grid connections even if they lack planning, capital and contracts. These 'zombie' projects clog up the grid connection queue. And second, because network companies often fail to deliver new grid connection infrastructure on time.

While we welcome recent moves from the System Operator to accelerate grid connections, we believe there is a considerable way to go.[3] As Figure 2 shows, the amount of projects in the queue far exceeds even the most optimistic of the System Operator's forecasts, with over 395GW of generation currently seeking to connect. With the system operator finding that 70% of these projects are unlikely to get built, there is a need for a better process to manage grid connection applications.

The right next step is to develop a process that removes zombie projects from the queue. This should involve introducing a cost or liability for 'squatting' on substation bays, limiting the number of future connections by entity, and introducing deadlines by which stalled projects are terminated. Delivering these changes would rapidly speed up the delivery of new projects. The Government must also ensure that network companies face proportionate financial penalties if they fail to deliver grid connections on time. By incentivising timely delivery of new grid connections, this would accelerate the energy transition and protect the public from high bills.

02. Modernise system balancing

To keep the lights on, Britain's System Operator must balance power flows in real time – an increasingly challenging task as more intermittent renewables connect to the system.

Batteries are excellent options for responding to urgent system needs: they can respond to operational signals and provide power within 100 milliseconds. They also offer cheaper electricity than more established technologies used to balance the system, such as fossil gas power stations. However, outdated markets and tools are preventing energy storage operators from delivering faster, cheaper, and cleaner balancing services.

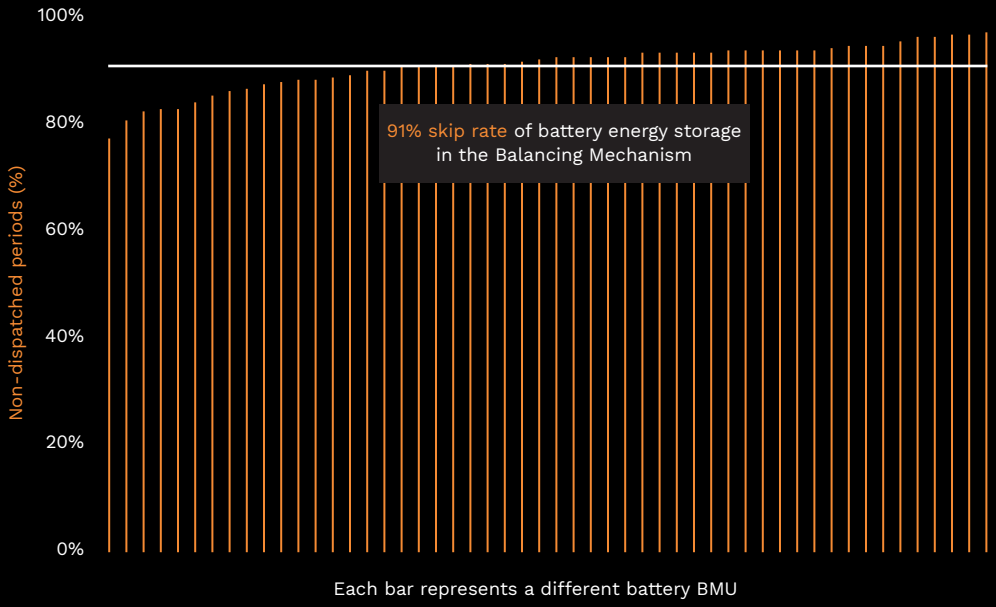
In theory, batteries can act in the Balancing Mechanism – the corrective market that the System Operator runs to procure balancing services. But in practice, the System Operator often skips over batteries

and uses more expensive fossil fuel plant. Indeed, Modo Energy have shown that this has occurred 91% of the time in 2023 alone.

This is because the System Operator's current, highly manual IT systems do not allow engineers to use batteries as easily as gas plant. This means existing balancing processes delay decarbonisation and push up power prices. To make our energy system cheaper, cleaner and more secure, we must therefore modernise system balancing.

The System Operator has committed to upgrade its IT tools – but its new platform will not be ready until 2027. The first step to cheaper system balancing must be for the System Operator to accelerate the delivery of this new IT platform, ensuring batteries are a major participant in the balancing market in 2023.

We are also calling for the System Operator to commit to providing detailed data and explanations for each 'skip' event. This should be accompanied by a new, transparent process for valuing low-carbon balancing services. Alongside this, the System Operator must set a target for carbon-free balancing services by 2035, with interim targets in 2025 and 2030. Finally, Ofgem should make efficient dispatch of batteries a performance indicator for the System Operator.



The events of the last two years have shown that the Capacity Market – Great Britain's mechanism for ensuring that we have enough power generation on the system to meet peak demand – is not ensuring genuine security of supply for our power system.

Figure 3
'Balancing Mechanism: How Much Are Batteries Actually Getting Skipped?', Shaniya Holness-McKenzie, Modo Energy 2023.

This is due to exposure to increasingly insecure international fossil gas markets, and a lack of ambition in accommodating new low-carbon technologies. The Capacity Market must be reformed to harness reliable, fast-acting, low-carbon plant. Electricity storage ensures excess, low-carbon, domestic sources of electricity (offshore wind, solar, etc.) are available at times of peak demand, thereby boosting system security.

Power plants with Capacity Market contracts are currently paid based on availability. Even though Britain's power supply has become increasingly intermittent, flexibility – the ability to balance fluctuating power flows in real time – is not valued. Battery storage is an extremely flexible asset, capable of responding quickly to export power. This speed of response is recognised by National Grid ESO, who increasingly rely on batteries to provide new dynamic services to operate the system in real time. Given its critical role in system security, we believe the Capacity Market should reward providers in line with their genuine ability to provide power at speed in case of emergency. This means rewarding a provider's contribution to supply margins and additional flexibility.

Furthermore, the Capacity Market mandates outdated performance testing rules that do not account for recent technological advances. These tests were designed in 2017 when batteries could only export for a maximum of 30 minutes – while current assets can export for 2-4 hours. Consequently, battery storage operators are prevented from contributing fully to system security.

Already, much of the power we produce is generated far from centres of demand. We generate most of our wind in Scotland and out at sea, while demand for electricity is concentrated in the South East.

Our power system was never designed around this shift. As we build more wind, it will only become more challenging to bring large volumes of renewable power south on wires designed for a much smaller load. While we build new grid infrastructure to reflect this new reality, we need to ensure that the wind power we produce is not wasted.

This means developing new markets to support the new engineering solutions that storage offers, including using storage as a 'transfer booster' to increase flows of renewable power across bottlenecks in the transmission system. It means finding new ways to incentivise storage operators to integrate renewables into the power system, charging when there is not enough grid capacity to get power out of an area, and discharging when there is. This would maximise the use of renewables in the UK and ensure more consumers can benefit from cheap, clean power. And it means ensuring that wind power captured by a battery and retransmitted counts as green for the purposes of assuring customers that they're buying genuinely green power.

05. Ensuring investor confidence

Energy storage investors have expressed unease about proposed changes to Great Britain's power markets under the Review of Electricity Market Arrangements (REMA).

In particular, they are wary of a proposed shift to 'nodal pricing' - a reform that would fragment the national energy market into multiple local markets, each with distinct and unpredictable pricing dynamics. Investors require the stability and clarity provided by accurate revenue forecasts. A shift to nodal pricing would make such forecasts all but impossible, adversely affecting investment cases. In turn, this would slow growth in the renewable energy sector and damage efforts to improve national energy security.

Assuring long-term investment in energy storage, as well as other forms of renewable energy, means sending a clear message ruling out a shift to nodal pricing.

Similarly, the Government are considering proposals to introduce a cap and floor mechanism for energy storage. This mechanism is intended to reduce investment risks for long-duration storage projects such as pumped hydro, which have very high rates of capital expenditure. A cap and floor mechanism may be required to build new long-duration energy storage assets – but short and medium duration storage technologies, which have lower rates of capital expenditure, do not need a cap and floor. A cap and floor for these technologies would remove the need for operators to compete to deliver essential system services, resulting in a glut of new storage projects with minimal value to the energy system and the public. We are therefore calling for a clear declaration that a cap and floor will not apply to short and medium duration storage.

Building a new industry

The measures set out above will support revenue for this new sector, but to ensure that the UK can maximise the benefit of driving storage forward we need to carefully consider how and where we can capture key parts of the value chain.

This means incentivising the purchase of components from the UK where we have a strong track record of delivery. We need to make it as simple as possible to achieve planning consent for storage and other low carbon projects, and start to identify the skills needed to develop the 61GW of projects in the pipeline. Without a fully joined up plan, we risk, once again, much of the investment needed for the decade of storage going overseas.

References

1 Stonehaven Wasted Wind Analysis for Highview Power, February 2023

2 UK Battery Storage Project Database, Solar Media 2023

3 UK Battery Storage Project Database, Solar Media 2023

4 ESO Connections Reform Consultation, 2023

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