# Evolution of the GB inertia market

27 May 2026

## From by-product to procured service

As Britain's power system decarbonises, it has lost thermal power stations that once underpinned the stability of the power grid.

Inertia is a physical characteristic of the grid that can prevent sudden changes in system frequency and is therefore essential for grid stability. Inertia behaves like the suspension system in a car, dampening the effect of sudden bumps in the road to keep the car stable.

Historically, inertia was an inherent by-product of large bits of thermal power plant machinery rotating in-sync with the electricity system. In case of a sudden change in system frequency, kinetic energy allowed these parts to carry on spinning, slowing down changes in frequency. This meant frequency could be more easily maintained at within required bounds (+/- 1% of 50Hz). Over the last decade these traditional assets have retired and have been replaced with non-synchronous wind and solar plant that have limited inherent inertial response. With increasing penetration of these variable/intermittent generation technologies, system frequency tends to fluctuate more significantly, and the Rate of Change of Frequency (RoCoF) increases, which can result in serious frequency stability issues and trigger emergency load shedding.

One such event, the so-called 9 August 2019 power outage which impacted over 1 million customers in Great Britain, helped emphasize the importance of monitoring and maintaining system stability requirements – primarily inertia but also short circuit level (SCL) - and put wind in the sails of the stability services procurement plans of National Grid Electricity System Operator (NESO).

Since 2019, first through three phases of Stability Pathfinders and subsequently through recently launched Stability Markets, NESO has procured over 47 gigavolt-ampere seconds (GVA.s) of inertia at a total cost of £2.3 billion.[1] This is equivalent to 39% of the current

[1] This total volume figure does not include volumes procured from awarded contracts which have since been cancelled. We assume a power factor of 1 when converting between megawatt-seconds and megavolt-ampere seconds. Costs are expressed in real 2024 terms. Reported costs are assumed to be in real terms in the price year in which they were awarded, before being rebased to 2024 prices. NESO. Scotland's wind success story bolstered by £323m stability investment. Available at: https://www.neso.energy/news/scotlands-wind-success-story-bolstered-ps323m-stability-investment; NESO. ESO announces new contracts to deliver over £14 billion in savings. Available at: https://www.neso.energy/news/eso-announces-new-contracts-deliver-over-ps14-billion-savings; NESO. Mid-term (Y-1) Stability Market results. Available at: https://www.neso.energy/industry-information/balancing-services/stability-market/mid-term-y-1-stability-market.

minimum inertia requirement of 120 GVA.s (reduced from 140 GVA.s in 2023), or 46% of the recently reduced threshold of 102 GVA.s presently awaiting Ofgem's approval.[2]

In this bulletin we explore the experience of stability services procurement in GB and comment on the outlook for the future.

## Towards market-based procurement

NESO's approach to ensuring minimum stability requirements has evolved from targeted interventions to structured market-based procurement.

### Table 1 Summary of GB stability service procurement to date

| | Pathfinder Phase 1 | Pathfinder Phase 2 | Pathfinder Phase 3 | Stability Market Y-1 Round 1 | Stability Market Y-1 Round 2 |
|---|---|---|---|---|---|
| **Requirement** | Inertia, voltage support and SCL | Inertia, SCL and dynamic voltage | Inertia and SCL | Inertia | Inertia |
| **Region(s)** | GB-wide | Scotland | England and Wales | GB-wide | GB-wide |
| **Contract start date** | 2021 | 2024 | 2025 | 2025 | 2026 |
| **Contract term** | Up to 6 years | Up to 10 years | Up to 10 years | 1 year | 1 year |
| **Procured volume** | 12.5 GVA.s inertia | 6.75 GVA.s inertia, 11.55 GVA SCL | 15.6 GVA.s inertia 7.5 GVA SCL | 5 GVA.s inertia | 7.3 GVA.s inertia |

*Source:* *National Grid Energy System Operator*

*Note:* *For Pathfinder Phase 3, the inertia volume shown excludes contracts that NESO announced had been mutually terminated in March 2025. The resulting figure reflects the remaining contracted inertia volume based on NESO's updated results. For Phase 3 procured volumes of SCL, we have used NESO's tender requirement of 7.5 GVA.*

The first step was the Stability Pathfinder programmes launched in 2019. These were targeted tenders designed to address shortfalls in inertia and SCL, and test procurement approaches

2 NESO. Frequency Risk and Control Report 2025, Supplementary Report. 2026. Available at: https://www.neso.energy/document/379676/download; NESO. Clean Power 2030, Annex 3. Available at: https://www.neso.energy/document/346801/download

for meeting long-term stability requirements. The Pathfinders secured stability services from different technologies under 6-10 year contracts.

Since 2023, NESO has moved towards Stability Markets, marking a shift from one-off tenders to an open and transparent, market-based approach to procure these services across several timescales:

- Long-Term (Y-4), providing a four-year delivery window;
- Mid-Term (Y-1) for delivery across a year; and
- Short-Term (D-1) for delivery on a rolling day-ahead basis.

The Y-4 contract structure ensures that NESO's requirements are communicated to industry ahead of time to incentivise new build assets, and the medium and short-term markets are intended to address changes in NESO's requirement closer to real-time and provide revenue certainty to stability providers. While the short-term (D-1) market is still under development, two Y-1 rounds have been held to date and a Y-4 tender for delivery in 2029 is underway.

This transition reflects a broader shift in strategy. As the power system transitions, NESO is aiming to:

- reduce reliance on short-term Balancing Mechanism actions alone;
- create a dedicated route to market for inertia services across different timescales; and
- support competition across different technologies.

The objective is simple: secure enough inertia, at the lowest cost, to keep the system stable.

## Who can provide inertia - and who does?

Different technologies can provide inertia, but they do not all do so in the same way.

Historically NESO has procured stability services from conventional generators (notably gas turbines in GB) through the Balancing Mechanism close to real-time, bundled with active power. Similar to conventional generators, synchronous condensers (also known as synchronous compensators)[3] can provide stability services (inertia, SCL and reactive power) using large rotating machinery mass; but, unlike conventional generators they cannot generate power. Finally, specially configured pumped hydro storage (PHS) plant can "spin in air" to allowing turbines to rotate at synchronous speed to generate inertia. NESO has historically contracted bilaterally with PHS plant for so-called spin-services whereby PHS units

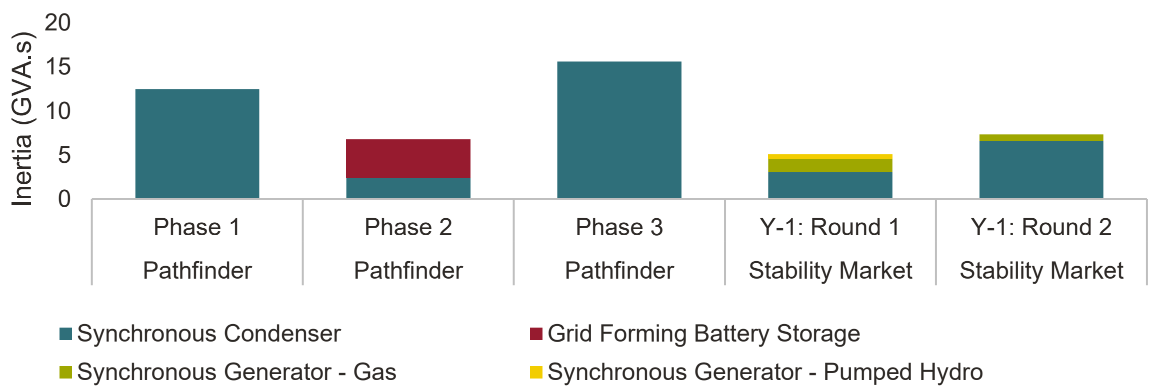
[3] NESO. Impact of Ofgem letter from the 20th October on Synchronous Condensers. 29 October 2021. Available at: https://www.neso.energy/news/impact-ofgem-letter-20th-october-synchronous-condensers

operating in spin mode can offer multiple ancillary services (including inertia, reserve and fast response) and switch to power generation/consumption mode within short notice.

Alongside these sources of *physical or synchronous* inertia, there are also sources of *virtual or synthetic* inertia that use *grid-forming (GFM)* technology to enable inverter-based resources (e.g. wind, batteries, solar photovoltaic systems and interconnectors) to mimic the behaviour of traditional synchronous machines.[4] Notable amongst these sources are grid-forming batteries that can provide virtual inertia (as well as reactive power and SCL) using fast-acting inverter controls. These have been used for many years in "islanded" grid systems (e.g., in the Caribbean nations, the ERCOT market in Texas, and South Australia).[5] NESO has recognised the need for GFM technology and grid forming capability has been incorporated in the GB Grid Code since early 2022.[6] In principle, this creates the conditions for a wide and diverse supply base to support greater competition in inertia provision.

As can be observed in Figure 1 below, awarded volumes have been dominated by synchronous condensers across both the three Pathfinder phases and two rounds of Y-1 Stability Markets held to date.

## Figure 1 Inertia procurement dominated by synchronous condensers




*Source: NESO stability procurement data; Frontier Economics analysis*

*Note: Procured inertia by technology (GVA.s). For comparison across procurement rounds, results are presented assuming a power factor of 1 when converting between MWs and MVA.s. Where unit type information was not available in NESO results data, asset types were identified based on a review of relevant press releases.*[7]

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4 NESO. How Grid Forming Technology is changing. 3 April 2024. Available at: https://www.neso.energy/news/how-grid-forming-technology-changing; NESO. Future of Interconnectors. 2023. Available at: https://www.neso.energy/document/354076/download

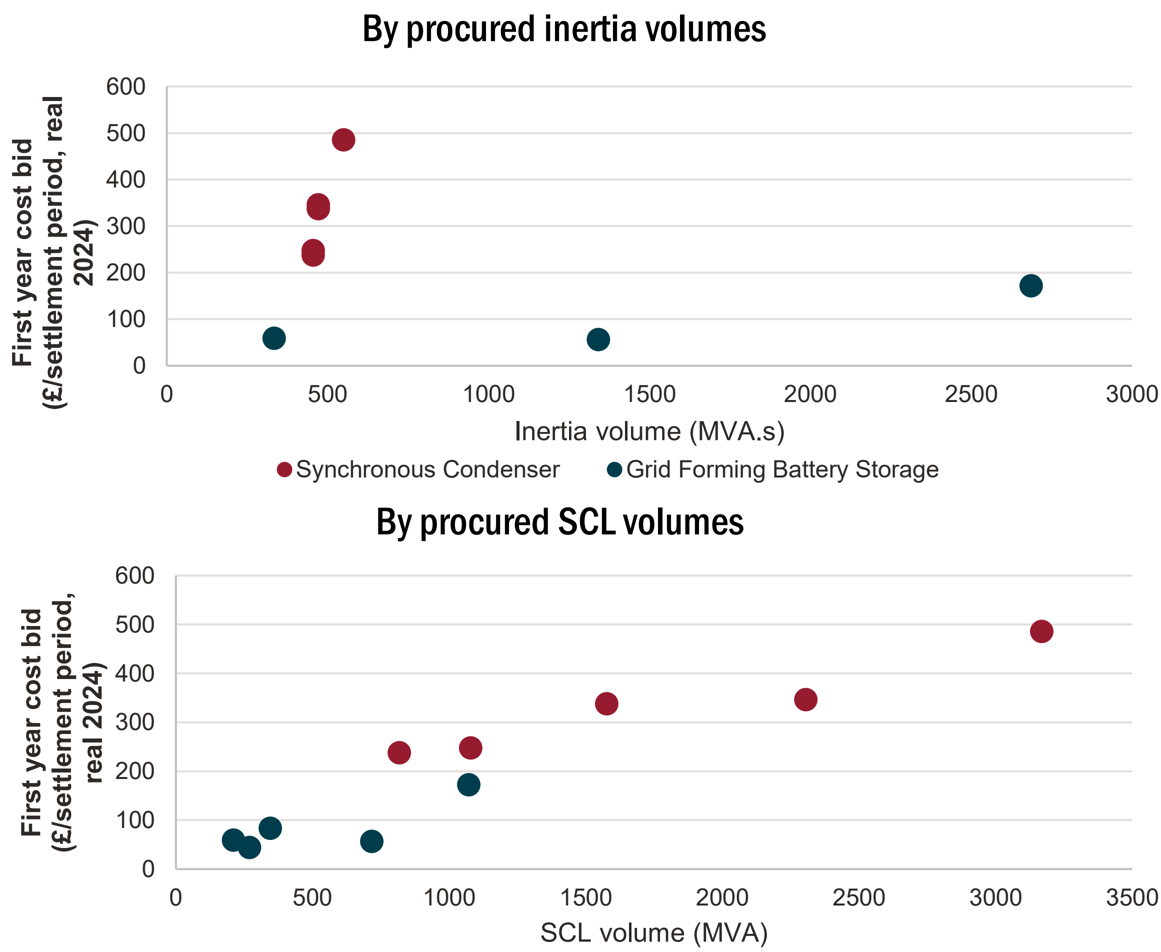
5 Suppliers of grid-forming batteries, Wartsila (200MW Zenobe's Blackhillock in Scotland) and Hitachi Energy (30MW BESS project in Darlymple, South Australia) interviewed by Energy Storage News in February 2026. See also: https://modoenergy.com/research/en/australia-nem-grid-forming-battery-energy-storage-explainer

6 Following Ofgem's approval of the Grid Code Modification GC0137. NESO. How grid forming technology is changing. 3 Apr 2024. Available at: https://www.neso.energy/news/how-grid-forming-technology-changing

7 https://www.neso.energy/news/first-phase-stability-pathfinders-delivered, https://www.solarpowerportal.co.uk/solar-projects/neso-awards-first-mid-term-stability-market-contracts, https://www.tritonpower.co.uk/deeside

While Pathfinders Phases 1 and 3 were limited to providers of physical inertia,[8] the technical requirements in Pathfinder Phase 2 were eased to expand the range of possible providers to include grid forming technologies.[9] Consequently, alongside synchronous condensers (2.2 GVA.s), five grid-forming batteries secured 4.4 GVA.s of inertia contracts over a 10-year period, demonstrating ability of inverter-based technologies to compete with traditional providers of physical inertia.

## Figure 2 Pathfinders Phase 2 – bids of clearing synchronous condensers and grid-forming batteries by inertia and SCL




*Source: National Grid ESO stability procurement data; Frontier Economics analysis*

*Note: Costs are shown as the first year cost per settlement period for successful units in Pathfinders Phase 2, expressed in real 2024 prices. Two additional grid-forming battery storage contracts cleared in the phase but had no associated inertia quantity, so they are not shown on the top chart. The sum of SCL volume is calculated as the sum of SCL assessed across all locations for each unit.*

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8 Modo. Stability Pathfinders: what they mean for battery energy storage. 26 Sep 2023. Available at: https://modoenergy.com/research/stability-pathfinders-inertia-short-circuit-level-battery-energy-storage

9 NESO. Stability Pathfinders Phase 2 FAQ. 4 Oct 2021. Available at: https://www.neso.energy/document/202791/download

As can be seen in Figure 2 above, all battery capacity in Phase 2 bid below the synchronous condensers which cleared in this phase. It is not possible to make a like-for-like comparison of bids because the contracts remunerate collectively for a location-specific service like SCL alongside inertia (which is procured on a national/regional basis). Nonetheless, these results suggest that grid-forming batteries can bid for stability services more competitively than synchronous technologies where they meet the relevant technical requirements.

One possible explanation for lower battery bid prices is that, unlike synchronous condensers which cannot generate energy and therefore need to recover most of their costs through provision of ancillary services like inertia, batteries can stack revenues across multiple markets. Notably, batteries undertake price arbitrage in the energy markets and can also participate in other balancing and ancillary services markets, the GB Capacity Market, and local flexibility markets run by GB Distribution Network Operators. This means that for batteries a contract for inertia presents a "top-up" to a diverse revenue stack helping recover their costs, allowing them to bid for the service more competitively.

Despite the success during Pathfinders Phase 2, grid-forming batteries have failed to secure contracts in the two Y-1 Stability Market rounds held to date, purportedly falling short at the technical assessment stage even where similar assets succeeded under Pathfinder contracts (Pathfinder contract holders are allowed to bid uncontracted capacity in Y-1 markets).[10] These outcomes also contrast with those observed in NESO's recent tender for voltage control services, where three of the four winning bidders were batteries (providing voltage control through a inverter-based mechanism) with NESO noting consumer savings of approximately £318 million.[11]

This may well be because for the Y-1 Stability Markets, NESO enhanced the technical specifications compared to previous procurements to procure firm and predictable inertia.[12] Notable are requirements around a fixed inertia contribution, often described as a fixed H constant, and a requirement to remain in grid-forming mode throughout the year.[13] Market commentary points to the fixed H requirement as a likely key driver that favours providers of physical inertia.[14] Stricter requirements may possibly be justified given historically observed drawbacks to virtual inertia provision (e.g. slower response; higher costs), although there is

10 NESO. Instructions to Tenderers. See p.20. Available at: https://www.neso.energy/document/355656/download

11 NESO. Voltage 2026 tenders awarded. 5 Dec 2024. Available at: https://www.neso.energy/news/voltage-2026-tenders-awarded

12 NESO. Mid-Term (Y-1) Stability Market - Round 2 Results FAQ. Available at: https://www.neso.energy/document/381816/download

13 The Y-1 Stability Market required a fixed inertia contribution from inverter-based technologies. See p.9 here: https://www.neso.energy/document/346996/download. Pathfinder 2 did not explicitly require a fixed inertia constant and year-round grid-forming requirements for batteries. Technical Specification https://www.neso.energy/document/185176/download; Final Assessment Methodology https://www.neso.energy/document/191686/download; and Compliance Guidance https://www.neso.energy/document/362521/download

14 Solar Power Portal. 2026. Available at: https://www.solarpowerportal.co.uk/battery-storage/neso-awards-no-contracts-to-battery-storage-in-stability-market-round-2

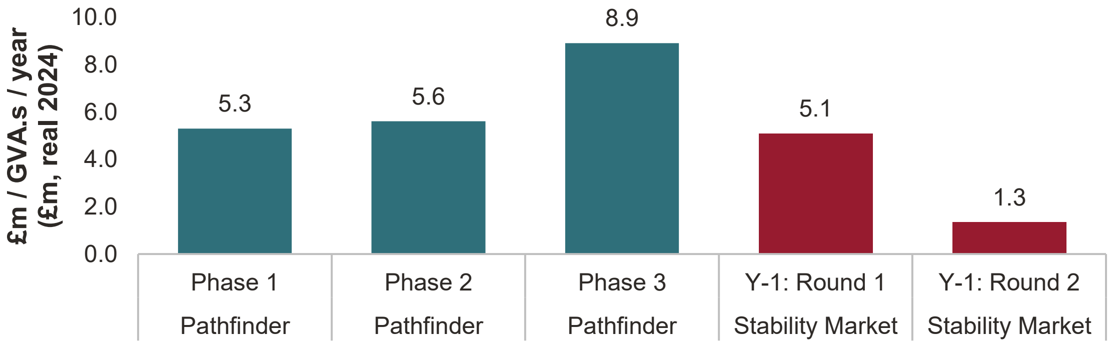
evidence that these have reduced over time alongside technological innovation and deployment trials.[15]

PHS plant have similarly had limited success to date. With the exception of the Drax Cruachan plant which was successful in the first round of Y-1, no other pumped hydro storage (PHS) unit has cleared in the stability procurement to date.[16] Other PHS plant, for example some units of Sloy, Dinorwig and Ffestiniog, participated in the Pathfinders but failed to clear given significantly higher bid prices. And aside from Cruachan, no other PHS plant appears to have bid in the Y-1 Stability Markets. This could be because some existing PHS plant are already under bilateral contracts with NESO for providing ancillary services.

## Observed costs are only part of the story

Procurement results provide a high-level view of the prices paid for stability services in GB summarized in Figure 3 below.

### Figure 3 The cost of stability – evidence from GB procurement




| **Region(s)** | GB-wide | Scotland | England and Wales | GB-wide | GB-wide |
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| **Contract term** | Up to 6 years | Up to 10 years | Up to 10 years | 1 year | 1 year |
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*Source: National Grid ESO stability procurement data; Frontier Economics analysis*

*Note: Average costs are calculated using total procurement costs and procured inertia volumes at the point of award. These are expressed in £m/GVA.s/year in real 2024 terms. Reported costs are assumed to be in real terms in the price year in which they were awarded, before being rebased to 2024 prices. Pathfinder phases refer to Stability Pathfinder procurements; Y-1 rounds refer to stability market auctions. For comparison across procurement rounds, results are presented assuming a power factor of 1 when converting between MWs and MVA.s. For Pathfinder Phase 3, this uses the original awarded contract package, before the later termination of some contracts.*

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15 Fikri Waskito et al. Review of Virtual Inertia Based on Synchronous Generator Characteristic Emulation in Renewable Energy-Dominated Power Systems. 1 December 2025. Available at: https://www.mdpi.com/2673-4826/6/4/69#B21-electricity-06-00069

16 NESO. Stability Network Services results. Available at: https://www.neso.energy/industry-information/balancing-services/network-services/stability-network-services; NESO. Mid-term (Y-1) Stability Market results. Available at: https://www.neso.energy/industry-information/balancing-services/stability-market/mid-term-y-1-stability-market

After rising to around £8.9m/GVA.s/year under the later Stability Pathfinder phases, more recent Y-1 Stability Market auctions have cost around £1.5m/GVA.s/year on average. Evidence from Ireland points to a similar order of magnitude. In Phase 1 of the Low Carbon Inertia Services tender for 6-year contracts (most comparable to Pathfinder Phase 1), the estimated average cost of inertia was around £4.5m/GVA.s/year.[17]

However, what this tells us about the future cost trajectory is not clear. These figures are not directly comparable for three main reasons.

First, costs reflect what is being procured. Some GB Pathfinder contracts procured inertia alongside SCL, whereas the Stability Market results relate only to inertia. This matters because unlike inertia which is procured on a nation-wide basis, SCL is procured on a "nodal" basis, and its value depends not only on the quantity provided, but also on where it is provided on the system. Furthermore, bidders choosing to bid for stability services appear to have been generally obligated to bid for both SCL and inertia and SCL- or inertia-only bids are not permitted.[18]

Second, contract duration differs materially. Pathfinder tenders with longer lead times (up to 4 years before delivery) and longer contract duration (6-10 year) contracts were designed to bring forward new assets. In contrast, medium-term (Y-1) Stability Markets have a shorter lead times and contract duration, allowing existing assets to compete. This matters because existing assets operate under very different economics. New assets need to recover investment costs, while existing assets may price against the cost of making existing capability available.

Third, the participating assets face different commercial realities. A new synchronous condenser may need to recover most of its costs through a stability contract. Other technologies such as grid-forming batteries and PHS that can earn revenues across multiple markets, are likely to treat stability provision as an incremental revenue stream. For these assets, bids may reflect the opportunity cost of providing inertia rather than the full cost of building and operating the asset.

The chart is therefore best read as illustration of how different procurement designs have produced different observed prices, rather than as evidence of a clear trend in the underlying cost of inertia.

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17 Frontier estimate based on the Ireland LCIS Phase 1 cap (€2.02/MVA.s per hour) and the SEM Committee's published statement that the total combined Ireland and Northern Ireland contract value was approximately 29.5% of the corresponding capped value, assuming six-year contracts and 100% availability. The estimate applies this combined contract value ratio to the Irish cap as an approximation. Cost is expressed in nominal terms using a 2025 EUR/GBP exchange rate of 0.86.

18 NESO. Instructions to Tenderers. See Section 14. Available at: https://www.neso.energy/document/357851/download

## How does the future look?

The experience to date suggests that the future outlook would depend most significantly on whether future procurement can broaden participation from technically capable providers. If this is possible, the cost of meeting stability requirements could decrease materially.

As of 2025 there were nearly 7GW of batteries operational in GB and projects in the pipeline suggests this would increase significantly by 2030. Experience from Pathfinder Phase 2 suggests that batteries have the potential to undercut traditional providers of physical inertia significantly. If technical requirements could evolve to accommodate batteries (as well as other grid forming technologies like interconnectors), today's prices may not represent the floor. It will be interesting to see how technical requirements are set for the upcoming Y-4 tender and whether continued preference for firm inertia provision will see synchronous condensers dominating again.

Greater participation from PHS units in the future could also help place downward pressure on inertia procurement costs. As new PHS plant come online supported by the Long Duration Electricity Storage scheme (seeking initially to secure between 2.7GW to 7.7GW of long duration storage by 2035 through Window 1[19]) and NESO progresses on their stated aim to move away from bilateral contracting towards market-based procurement of stability services, it is likely that future procurement rounds would see greater participation from PHS units.

The outstanding question is whether markets can unlock the full potential of technologies capable of providing inertia as the grid decarbonises.

19 Ofgem. Ofgem super-charging clean power storage for first time in 40 years. 8 April 2025. Available at: https://www.ofgem.gov.uk/press-release/ofgem-super-charging-clean-power-storage-first-time-40-years