ESO

Quick Reserve

Pricing Proposal

Summary

This proposal compares the service design for Quick Reserve against the criteria established in the GB Pricing Proposal v1.1 for Specific Balancing Products. It concludes that the availability portion of the service meets the requirements of homogeneity, full information and competition which would indicate the use of Marginal Pricing, but that the utilisation portion does not meet the required levels of homogeneity or competition and hence should not use Marginal Pricing.

Context

This pricing proposal is submitted under v1.1 of the GB Pricing Proposal (PP)[1], as approved by the Authority on 20th May 2022[2]. It has assessed the following high-level options for the availability and utilisation portions of Quick Reserve procurement:

Availability

Option	Notes
Pay-as-clear auction	This option is aligned with the intent of Article 6(4) of Regulation (EU) 2019/943 (the Clean Energy Package, or CEP) and allows us to leverage the existing business processes and IT infrastructure created for procurement of the new response services (DM, DR and DC).
Zonal pay-as-clear auction	This option is also aligned with the CEP. It would require the development of new business processes and IT systems, adding an estimated two years to the service start date.
Pay-as-bid tenders	This is the legacy procurement option used for STOR and Fast Reserve. It is not aligned with CEP and would retain or reintroduce several manually-intensive business processes.

[1] GB Pricing Proposal v1.1

[2] Ofgem Decision Letter, (May 2022), Decision to approve proposal from the Electricity System Operator for an alternative pricing methodology for settlement of balancing energy for specific balancing products (nationalgrideso.com)

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Utilisation

Option	Notes
Pay-as-clear dispatch	This option is aligned with the CEP. It would require the development of a new balancing market independent of the BM, an effort which was assessed in 2021 by the ESO as costing £~60 million and taking 3-5 years.
Pay-as-bid dispatch	This option is not aligned with the CEP, but can be considered as per the GB Pricing Proposal v1.1. For this first phase, it would utilise the existing BM market and systems and thus would have minimal impact; in order to introduce NBM providers, some development of IT systems will be required, currently estimated to take 9-12 months.

Pricing Proposal – Quick Reserve

Criteria	Assessment
Homogeneity	*Quick Reserve availability is mostly homogeneous.* Quick Reserve procurement seeks to create reserve capacity. The only factor which could lead to discrimination between providers is location, for example if a network constraint were so congested that reserve behind it were fully sterilised. Some potential Quick Reserve capacity (740 MW, or 14% of the currently eligible market) is behind the B6 boundary, which was congested 30-40% of the time in FY2023-24. This provides a strong argument for the development of a zonal pay-as-clear auction (ESO has already started work on a methodology for this, although it will take some time to develop). Given the timescales on the development of a zonal pay-as-clear auction, it is recommended to proceed with implementation of a national pay-as-clear auction in the interim, since this has minimal impact on ESO's existing systems and processes and will still result in a net benefit. *Quick Reserve utilisation is not homogeneous.* Optimal dispatch would consider the following factors *alongside* submitted utilisation prices when dispatching units to deliver Quick Reserve: • **Location** Units will not be dispatched if doing so would exacerbate an existing network constraint. As per the comments above, even if some units were procured behind an active constraint boundary, they could not then be dispatched (regardless of price) as this would render the power system insecure. • **Systems and tools available** In periods when there are IT system outages, dispatch decisions might need to be taken to accommodate an increased requirement for manual dispatch (e.g., telephone BOAs). • **Recovery time** By "recovery time" we mean the time which must elapse between the end of one instruction and the start of the next one. In periods of volatility (e.g., gusting wind), units with longer recovery times will be held in reserve and units with shorter recovery times will be used more frequently. These factors combined mean that the service will often have low levels of homogeneity in dispatch, and thus pay-as-bid dispatch is clearly indicated.
Full Information	*Full information is available to support availability pricing decisions* ESO's daily reserve holding requirements (in MW, per service window) will be published ahead of the auction. The full auction results, which includes both accepted and rejected bids together with their volume and price, will be shared on the ESO Data Portal after assessment is completed.

<table>
<tr><td></td><td>Full information is not available to support dispatch pricing decisions in real time.

During real-time operation, utilisation pricing decisions cannot be informed by full information when a system disturbance happens (or actions are taken preventatively to manage an anticipated disturbance). Control room engineers continuously assess changes in unit output needed and instruct the service manually for immediate delivery (which means no clear utilisation requirements for QR can be defined and shared beforehand).

The lack of clear volume signal means that providers cannot make meaningful decisions about whether to offer their energy in the balancing market as well as in the Quick Reserve market. This means that any implementation which requires providers of QR to exit the BM to provide QR will cause large distortions in the BM. This provides a strong indicator for using the existing (pay-as-bid) BM dispatch mechanism for dispatch of Quick Reserve, thus avoiding that distortion</td></tr>
<tr><td>Competition</td><td>The market for Quick Reserve availability will be moderately competitive.

An assessment of the Herfindahl Hirschman Index (HHI) for the Quick Reserve availability market was carried out for a standard winter day (see Appendix for full details), which yielded an HHI of 2,003. A breakdown of the top 10 companies by expected market share is contained in the table below.

<table>
<tr><th>Rank</th><th>Company</th><th>Market Share %</th></tr>
<tr><td>1</td><td>First Hydro</td><td>41.23%</td></tr>
<tr><td>2</td><td>SPGEN01</td><td>8.40%</td></tr>
<tr><td>3</td><td>Statkraft Markets GMBH</td><td>7.63%</td></tr>
<tr><td>4</td><td>EDF Energy</td><td>6.89%</td></tr>
<tr><td>5</td><td>SSEGEN</td><td>5.73%</td></tr>
<tr><td>6</td><td>Tesla</td><td>5.50%</td></tr>
<tr><td>7</td><td>Limejump Energy</td><td>4.18%</td></tr>
<tr><td>8</td><td>Arenko Cleantech</td><td>3.76%</td></tr>
<tr><td>9</td><td>Flexitricity</td><td>3.40%</td></tr>
<tr><td>10</td><td>SMS Energy Services</td><td>2.58%</td></tr>
</table>

At first glance, the market is at risk of distortion by First Hydro, as reflected in the HHI. However, the Quick Reserve requirement, set by ESO, will not exceed 500 MW for the foreseeable future – this effectively caps the influence any one provider has on availability pricing, as only their cheapest 500 MW’s will ever influence the clearing price. Recalculating HHI with this cap in place reduces it to 881, indicating a highly competitive market and a good candidate for pay-as-clear.

The market for Quick Reserve utilisation will be highly variable but may not be competitive.

The market for Quick Reserve dispatch is dependent on the outcome of the availability auction. On days when the auction is won by a wide variety of smaller providers, we would anticipate a good level of competition, but it is very possible that on some days, 100% of the availability would be won by a single provider, which risks removing all competition from the utilisation market.

Mitigating this temporary monopoly requires that the units compete directly with others. In practice, the BM is well positioned to be a natural competitor for Quick Reserve utilisation, provided the firm Quick Reserve units are dispatched from within the BM, or some comparable pay-as-bid dispatch mechanism.</td></tr>
</table>

Conclusion	Quick reserve availability can be procured as a homogeneous product, with full market transparency and robust competition. It is recommended to procure it via a daily pay-as-clear auction, with some consideration given to a future move to a zonal auction. Quick reserve utilisation cannot be procured on a homogeneous basis, full transparency cannot be provided to the market ahead of time, and it cannot be made competitive if it is procured in isolation. It is therefore recommended to procure it via pay-as-bid dispatch.

If Pay-as-Clear is not the outcome, further detail is required.

Overall Assessment	Pay-as-bid (for utilisation only)
Description of measure proposed to minimise the use of the Specific product subject to economic efficiency	The ESO does not currently have access to standard products, so the implementation of the service will only interchange the use of one Specific product with another. To ensure Quick Reserve is dispatched in an economic manner, it will be dispatched in accordance with the Balancing Principles Statement[3], the agreed GB guidance for economic dispatch of a pay-as-bid Specific product, as updated from time to time in line with consultation and feedback from the Authority and other interested stakeholders.
A demonstration that the Specific balancing product does not create significant inefficiencies and distortions in the balancing market inside the scheduling area	The introduction of Quick Reserve procurement at day ahead of delivery will meet a need for access to flexibility that the ESO has previously met through instructions in the optional NBM Fast Reserve market. Securing QR procurement at day-ahead of delivery will introduce competition into utilisation pricing and thus remove existing distortions. The measures taken to ensure competition, as explained above, will prevent the evolution of any market distortion as a result of the new service.
A demonstration that the Specific balancing product does not create significant inefficiencies and distortions in the balancing market outside the scheduling area	There is no balancing product traded between the GB scheduling area and other scheduling areas which matches the timescales of Quick Reserve, so it is not possible for the Quick Reserve product to impact on other scheduling areas.
Where applicable, the rules and information for the process for converting the balancing energy bids from Specific balancing product into balancing energy bids from standard balancing products. EU Regulation 2019/943	Not applicable to this Quick Reserve service as there are no standard products currently in operation in GB.

Appendix: Defining the dataset for competition analysis

Defining cases

Winter Base Case – this case is used to explore a typical day in winter when the Quick Reserve market is expected to offer cost savings compared to procurement of optional NBM Fast Reserve solely through the current optional within day market.

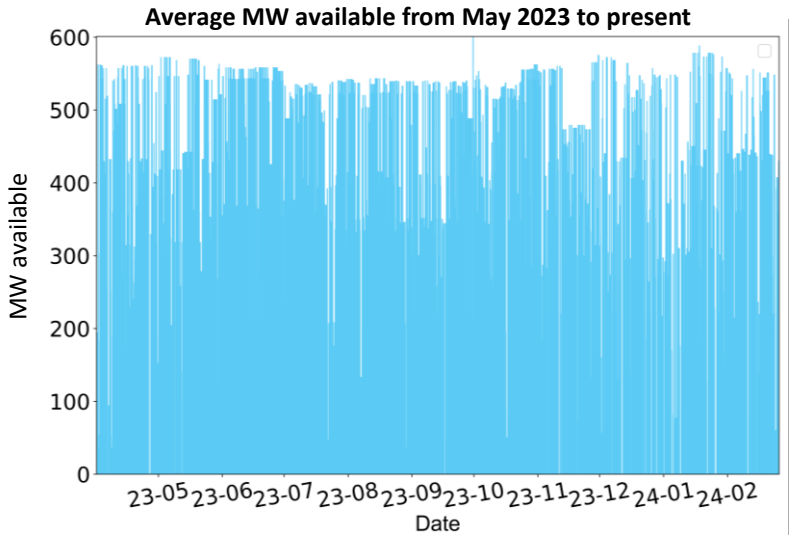
- Data for BMUs from January 2024 were selected as representative of GMT landscape.
- Nuclear, demand, Coal, Oil and interconnector BMUs are removed from the dataset.
- Any records with no real time MEL and no run up rate information have been removed from the dataset.
- Available volume is calculated as Min ([Maximum run-up rate], [MEL]). This allows for the maximum available volume within a minute (the Quick Reserve ramp rate requirement) to be calculated.
- Pumped Hydro is assumed to be in a state of readiness and therefore able to reach full output in 1 minute.
- Batteries are assumed to offer headroom from 0 and not through 0 for simplicity. The volume available to the QR market is likely to be higher than modelled.

[3] The Balancing Principles Statement is published in accordance with Standard Condition C16 of National Grid Electricity System Operator Transmission Licence

- BMU owners are as per ESO internal datasets as relating to the BSC party and might not capture the relationship between different subsidiaries, therefore level of competition might be oversold.

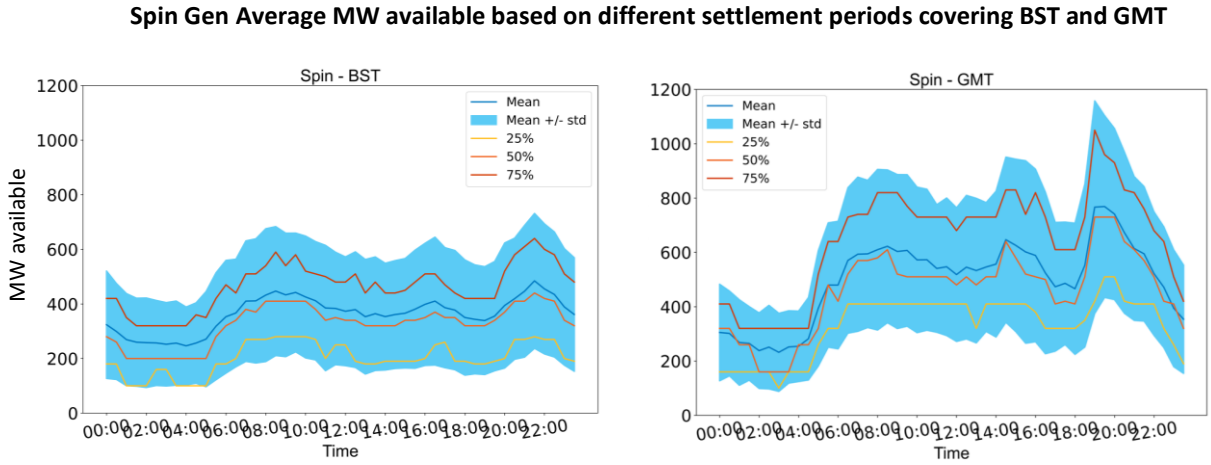
ESO Quick Reserve requirement

Through the historical Optional Fast Reserve requirement analysed, the average MW availability covering the period from May 2023 to present remains mostly consistent.



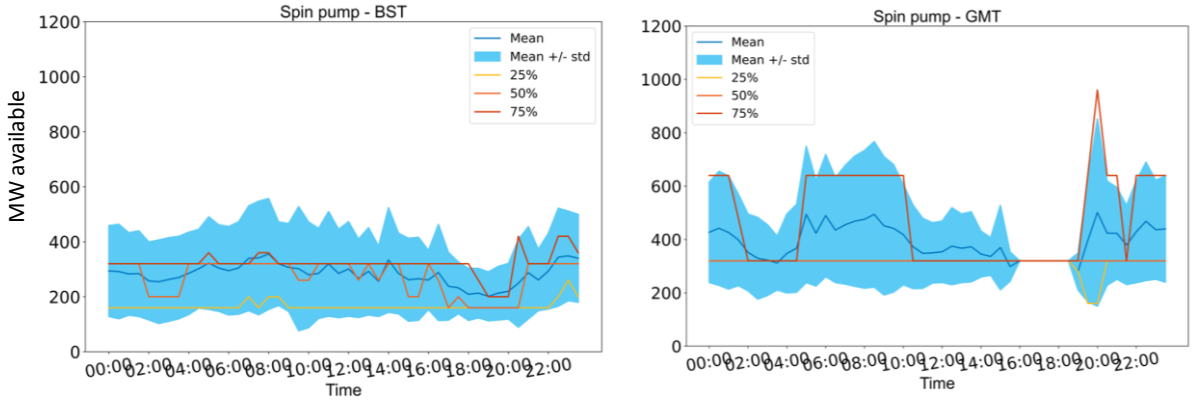
In addition, the average MW available BST and GMT for both Spin Gen and Spin Pump based on different settlement periods also exhibits consistent behaviour with average MW available higher during daytime and evening periods.

Based on the analysis, the minimum positive reserve volume expected to be required from the Quick Reserve market in a single settlement period is therefore 500MW.



In contrast, the minimum negative reserve volume expected to be required from the Quick Reserve market in a single settlement period is therefore 300MW.

Spin Pump Average MW available based on different settlement periods covering BST and GMT



Case overview

Winter Base Case

ESO Quick Reserve requirements are highest in the winter and expected cost savings are also likely to be highest in winter. So, it is important to understand possible levels of competition and market liquidity in this period.

Assumption	Points
Volume from participating units	• **63 unique battery units / 32.5MW** average unit size • **16 unique pump storage units / 181.3MW average unit size** • Maximum available volume is **4.95GW** (~2.0GW batteries, 2.9GW Pump storage)
Unavailable units	• Wind BMUs and other conventional gas/CCGT units are not considered in this analysis. However, the allowance of non-zero baselines does allow them to participate, with CCGT potentially being able to offer ~700MW and Wind several GWs of capacity (although, currently only negative Reserve).

Further information on asset participation for Potential Market Supply and Competition

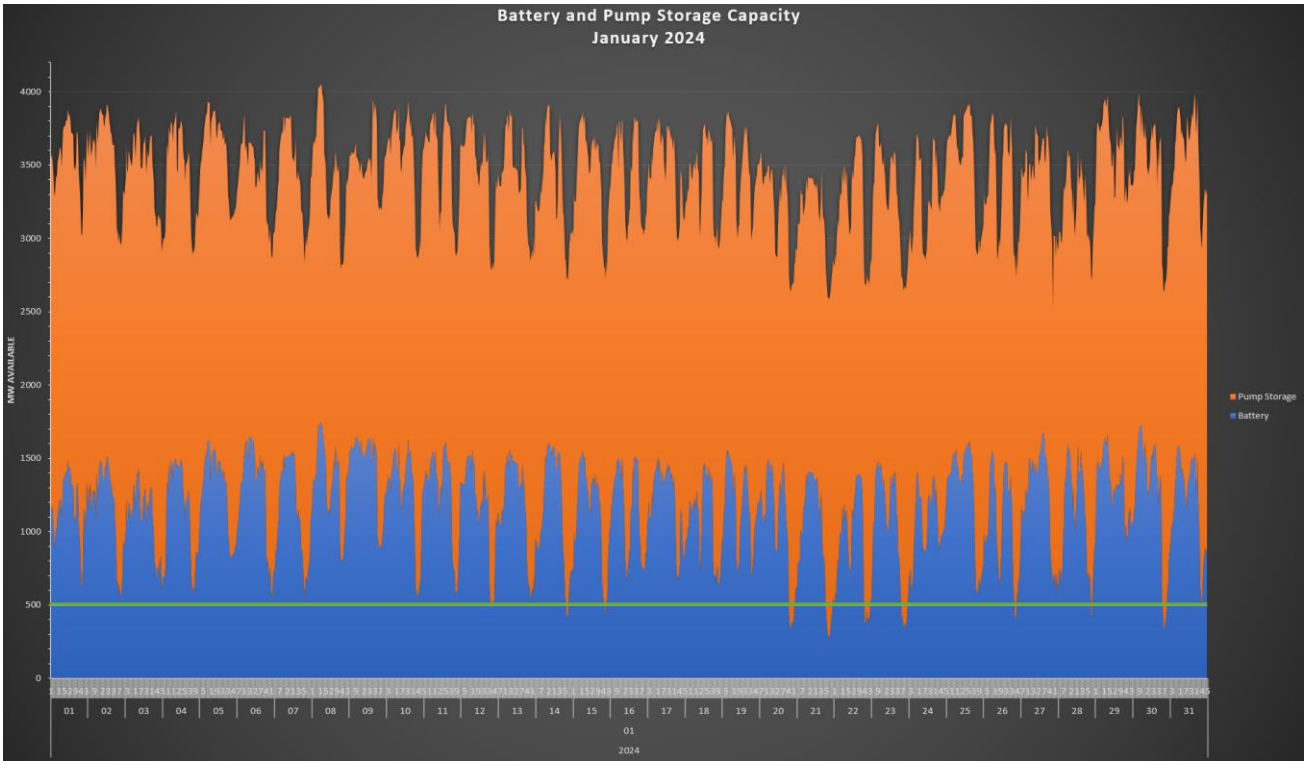
NED data from January 2024 has been used for a worst-case winter scenario, considering only storage assets (Pump Storage and Batteries).

The average availability of battery volume for each day is around 1GW. There is currently over 2.2GW of registered battery capacity in the BM alone, with a further 500MW+ NBM units which will later become available during Phase 2.

The average availability for Pump Storage units for each day is around ~2.2GW, with a total capacity in the market of 2.9GW.

Capacity taken from NED uses the maximum of either the MEL or MAX(runup rate). The true maximum capacity of battery units is therefore likely being masked by resubmissions of MELs (and also submission of poor data which has been omitted from the analysis) to manage and protect volume for response contracts. Therefore, there may be more capacity than is listed on any given battery BMU.

Although likely a low estimate, this analysis is still useful to use as a proxy for an average available volume per day. In most cases below, it can be seen that batteries alone meet at worst 60% and at best 350% of the typical daily requirement of 500MW (highlighted in green).


Battery and Pump Storage Capacity
January 2024
MW AVAILABLE
4000
3500
3000
2500
2000
1500
1000
500
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
01
2024
Pump Storage
Battery