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Balancing Reserve

Pricing Proposal

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Context

This pricing proposal is submitted under the methodology approved by the Authority on 20th May 2022[1]. It references argument and analysis submitted to the Authority by the ESO in December 2019 to seek a derogation from the requirements under Article 6(4) for Balancing Mechanism activations for the purposes of energy balancing.

This is particularly relevant for the Balancing Reserve service as dispatch of contracted service providers will be undertaken through Bid Offer Acceptances (BOAs) through the Balancing Mechanism (BM). Prior to the introduction of day ahead procurement of Balancing Reserve, reserve holding for balancing purposes and activation of held reserves has been achieved solely through the BOAs in real time.

Therefore, it is recommended to read the arguments put forward in the Appendix to the December 2019 Art 6(4) derogation request[2] (henceforth referred to as the "Dec 2019 request") alongside this pricing proposal pro forma. The Dec 2019 request assessed BM actions against the following criteria: homogeneity, competition and perfect/full information as well as providing useful supporting evidence on implementation costs and ESO strategy.

All evidence and assumptions used for the analysis in the Dec 2019 request have been considered and where there is reason to believe that they may no longer be valid this has been noted and addressed.

[1] 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)

[2] https://www.nationalgrideso.com/document/188141/download

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Pricing Proposal – Balancing Reserve

Criteria	Assessment
Homogeneity	*Balancing Reserve utilisation is not homogeneous.* Control room engineers will consider the following factors *alongside* submitted utilisation prices when dispatching units to deliver balancing reserve: • **Speed of delivery** Faster ramping units may be more effective at solving real time energy imbalances than slow ramping units. • **Location** Units will not be dispatched if doing so would exacerbate an existing network constraint. • **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). It is also possible that Balancing Reserve contracted providers could be dispatched for system reasons rather than for energy balancing. The overall dispatch decisions will deliver the most economic and efficient outcomes with the information available to control room engineers during real time operation. This finding supports a Pay-As-Bid utilisation price. **Interaction with the conclusions of the Dec 2019 request** The Dec 2019 request cited that "*the BM provides energy for both constraint/system management and for energy balancing purposes drawn from one merit order".* This will remain true following the introduction of day ahead procurement of Balancing Reserve as contracted BR providers could be dispatched for energy reasons or to support constraints with actions flagged appropriately. It is unlikely that contracted BR providers would be sent a BOA for voltage or inertia reasons as contracted BR providers will likely already be generating to be able to meet the dispatch flexibility requirements of the BR service and therefore can provide voltage and inertia support with no additional energy instructions. Other contracted BR providers may be able to provide voltage support via injection or absorption of reactive power from 0MW. The value of a combined merit order is that it delivers more options to the control room and therefore allows for lower total costs than a world where contracted BR providers were held purely for energy balancing and couldn't be used to meet other needs. In practice, during periods of low demand, or during periods of high network congestion there may not be sufficient flexibility available on the system to facilitate the full sterilisation of Balancing Reserve for energy only actions. The Dec 2019 request states "*Forcing the ESO to take unique actions for system operator actions and energy balancing is neither efficient nor practical in operational terms.*" This statement remains true once BR has been introduced. Deriving a utilisation clearing price in real time that only applied for Balancing Reserve dispatch whilst retaining a combined merit order would either sterilise contracted BR provider capabilities, leaving the Control Room unable to use them to support other system needs or the BR utilisation clearing price would be polluted by actions taken for non-BR reasons. Adopting a Pay-As-Clear utilisation price for BR whilst the BM remains a combined merit order stack would mean consumers lose out on lower cost solutions and end up paying more.
Full Information	*Full information is not available to support dispatch pricing decisions in real time.* ESO's daily reserve holding requirements (in MW) 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. However, 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

Criteria	Assessment
	anticipated disturbance). Control room engineers continuously assess the changes in unit output needed and instruct the service manually for immediate delivery (which means no clear utilisation requirements for BR can be defined and shared beforehand). This makes Pay-As-Clear utilisation pricing difficult to manage for market participants. Dispatch data will, however, be available through the usual Elexon channels post event. **Interaction with the conclusions of the Dec 2019 request** The Dec 2019 request included a view on data relating to BM bids and offers and concluded that whilst data was fully available, the timing of data availability proves a problem in supporting real time Pay-As-Clear price discovery. The introduction of Balancing Reserve will provide no new data flows that can solve this problem and therefore this conclusion is still valid. *"… there is significant data available to the market post-event – including the bid and offers provided, the bids and offers accepted, technical characteristics, and the price and volume paid. However, due to the real-time nature of the activities of the ESO, whilst these guide market parties in general trends, the specifics in a given settlement period cannot be fully known until real-time, in a timescale in which market parties cannot effectively respond."*

Competition

The DA Balancing Reserve market is expected to be competitive. All BM participating units are able to enter the market and compete to win Balancing Reserve contracts. Contracted units will have an incentive to gain additional revenue from being utilised in real time therefore it is expected that they would compete with each other to be utilised. However, if the entire DA volume is won by units from one company the level of competition for utilisation could be lower. To mitigate this all non-contracted BMUs can also be considered to solve the energy imbalance, if correctly positioned, which places a further competitive pressure on those contracted to submit reasonable utilisation prices.

We expect the introduction of a firm method of procurement for regulating reserve, the 'Balancing Reserve' service to increase competition for utilisation from the status quo position of securing regulating reserve through the BM.

To assess the level of competition to be expected in the daily Balancing Reserve market we considered a winter base case of participating volumes, see Appendix for more details. Maximum headroom values (with compliance with the time to full delivery parameter) have been used to avoid the impact of 0 days in the average value for the month.

Data on BMU ownerships has been drawn from ESO's internal records (the National Grid Economic Datawarehouse, NED). This data has then been compared with internally held data from the ESO's Single Markets Platform of BMUs which attempted to register for BR v1 in January-March 2023. This had resulted in a manual overriding of the VPI units which are listed as separate legal entities in NED but as part of the same company in SMP data.

1. **HHI & Market Concentration**

The Herfindahl Hirschman Index (HHI) of market concentration was calculated.

Winter Base Case
941

The HHI was below 1500. This indicates a competitive marketplace.
A breakdown of the top 10 companies by expected market share is contained in the table.

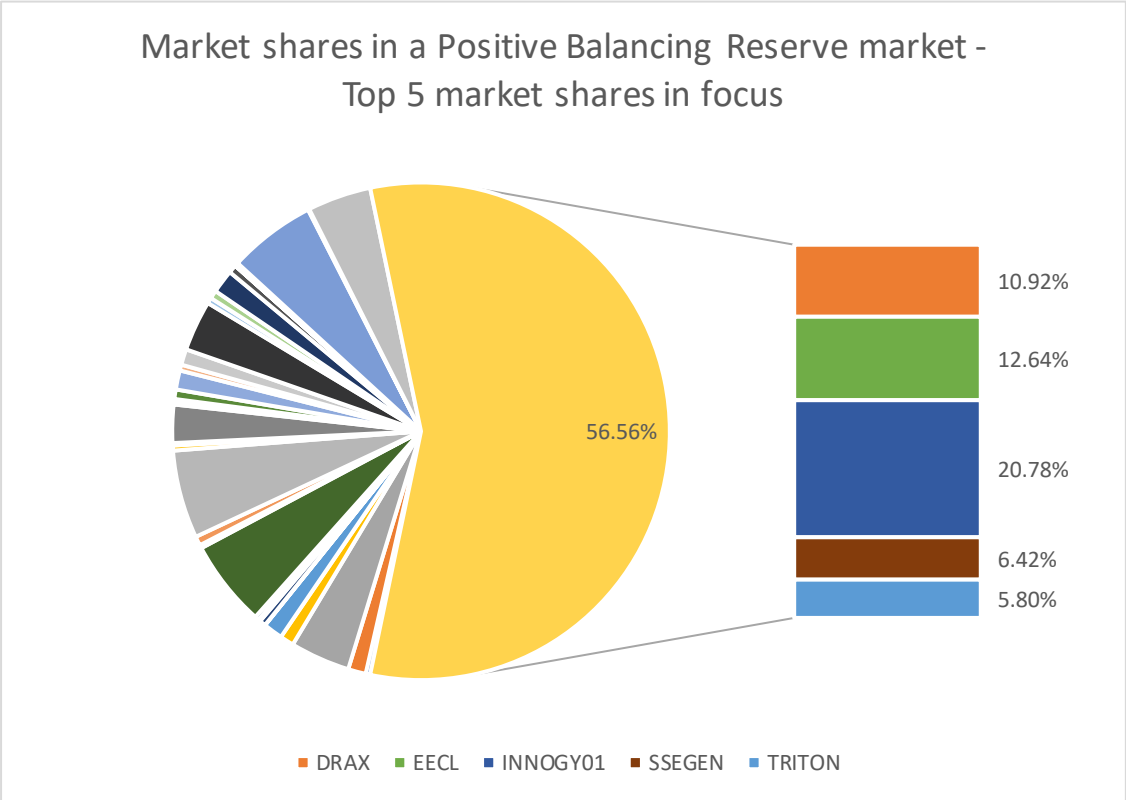
Rank	Company	Market Share %
1	Innogy	20.78
2	Uniper	12.64
3	Drax*	10.92
4	SSE Gen	6.42
5	Triton Power	5.80
6	First Hydro	5.73
7	VPI	5.68
8	EPUKI	5.62
9	WestBurton B	4.14
10	Carrington	3.89

*Note: DRAXX-5 and DRAXX-6 are not included in the dataset as they are expected to close before the Balancing Reserve market is launched.

The top ranked company has a possible 20.78% of the market share for the Positive Balancing Reserve market. This is unlikely to be a problem on days when the market is potentially oversupplied (for example on days where ESO requirement is in the lower part of the expected range) but could cause an issue on some tighter days.

As this finding relates to the pricing proposal this could be a benefit of adopting a Pay-as-Bid approach to utilisation payments in this market.

Changes that have been made to the Balancing Reserve service to reduce the minimum bid size and to separate procurement of reserve for response from the proposed service are expected to improve the level of competition and reduce barriers to entry into the market.

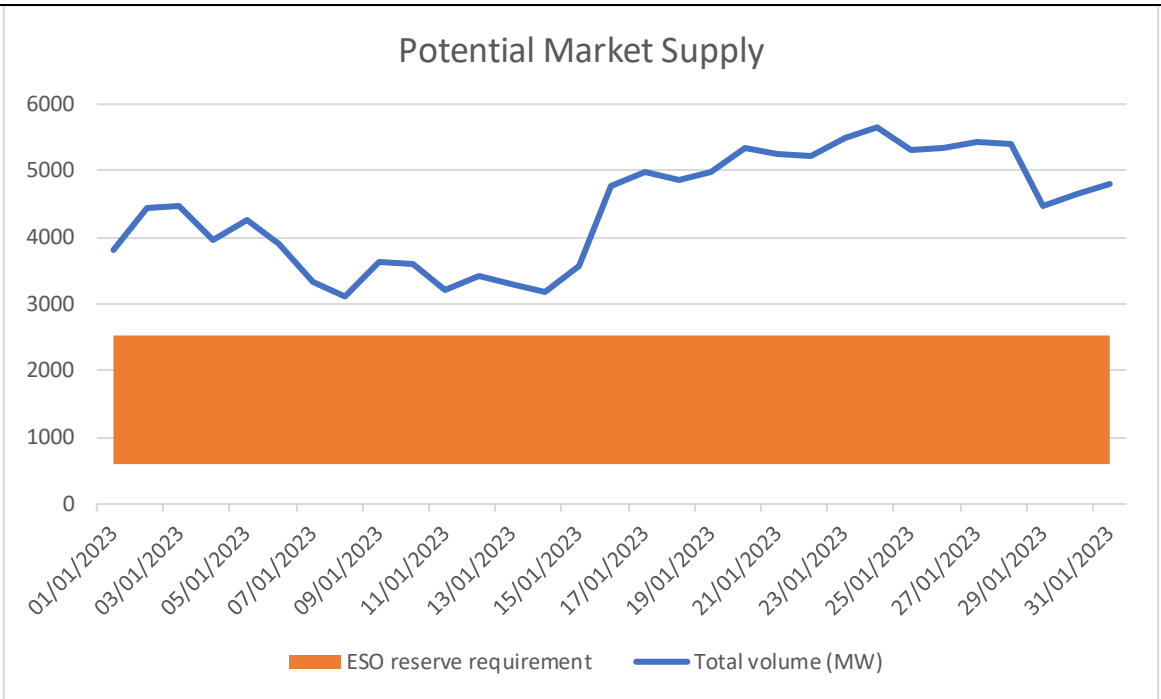


There are 39 different companies in this study, but the five largest companies control over 50% of the volume that could be offered into the market.

The ESO in partnership with the regulator will monitor the market for any signs of anti-competitive behaviour as the market comes into effect.

2. Level of market supply

This chart shows that for the January example used, the headroom/footroom available from the eligible cohort does vary depending on weather conditions and plant availability. However, it is always above our maximum possible requirement. See Appendix for explanation of our reserve requirement.



Interaction with the conclusions of the Dec 2019 request

The Dec 2019 request calculated HHI using data from the 2018 calendar year. The above charts used a snapshot of data from January 2023. No additional units have been added to reflect units on outage, participation from non-conventional providers (such as wind for positive BR) or any units due to commission in 2023 (e.g., KEAD-2).

It is likely that in the intervening time some company ownership has changed which can have a significant impact on the resulting HHI number.

The Dec 2019 request reported a range of HHI values with a mean value of 2680. The methodology used in the analysis would be affected by plant outages in individual periods rather than taking a longer month view like this pricing proposal does.

This is likely to produce more uncompetitive periods and is based on accepted volumes rather than the volumes that were available which is not necessarily representative of the true size of the marketplace.

In conclusion, the differences in the HHI are due to differences in the methodology used and for the purposes of Balancing Reserve we expect robust competition between providers for availability contracts and depending on geographical constraints on the network when it comes to utilisation in real time.

Implementation	*To enable implementation, we need to be able to use a Pay-as-Bid payment mechanism for utilisation payments. We are able to implement Pay-as-Clear for availability payments through our new assessment tool development as this element of the service does not affect BM systems and data flows.* To fully benefit from the cost savings identified through procurement of Balancing Reserve in a firm capacity the market must be launched as soon as possible. This requires working with many of the existing systems and processes that we already have in place. This constraint has influenced our design in several areas and also applies to the decision about the payment mechanism.

	To be able to manually dispatch Balancing Reserve we need to use the existing BM Bid Offer Acceptance system which is Pay-as-Bid. It is not possible to change this system or to implement an alternative dispatching system in the time allowed. The cost of implementing such a change to the BM or developing an alternative system and portal to facilitate the development of real time clearing prices would be significant. A comprehensive impact assessment of the costs and implications of moving BM energy dispatch to a Pay-As-Clear payment mechanism was produced by the ESO in May 2021. The purpose of the document was to describe and cost the impacts to the existing ESO balancing systems of implementing Article 6(4) of the CEP. The document analysed a set up very similar to the one that would be created by moving Balancing Reserve utilisation to Pay-As-Clear: a marginal price calculated for energy flagged actions with system flagged actions remaining Pay-As-Bid. **The total implementation cost identified by this impact assessment was ~£60m (in 2021 prices).** It would not be possible to optimise dispatch across pay-as-bid and pay-as-clear market structures and so this would also prevent economic and efficient dispatch. **Interaction with the conclusions of the Dec 2019 request** The Dec 2019 request touched on the implementation costs associated with introducing a Pay-As-Clear methodology providing a number of different categories where moving BM bid and offer payments to Pay-As-Clear would introduce additional cost and complexity. These categories included: code modifications, impacts to imbalance pricing and impact of BM parties to update their pricing strategies. There is no new information to suggest that these points are no longer relevant.

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

Overall Assessment	Pay-as-bid
Description of measure proposed to minimise the use of the Specific product subject to economic efficiency	The ESO does not have access to standard products at this time. This means that we are unable to use standard products to meet the need which the Balancing Reserve product fulfils. The recast Electricity Regulation states that the ESO may only use specific FCR products in an economically efficient manner, in line with our license obligations to manage the system safely and effectively. Our requirement setting and buy order methodology will minimise the use of this specific product and ensure that procurement is economic and efficient.
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 Balancing 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 Balancing Mechanism. Moving BR procurement to day ahead of delivery will not introduce any new inefficiencies or distortions within the scheduling area. To utilise this Balancing Reserve service to full effect there is a need to align seamlessly with existing BM mechanics including dispatch mechanism. This means that BM bids and offers are the most appropriate mechanisms to dispatch and pay for Balancing Reserve in line with the existing routes to access Balancing Reserve in the BM. This provides certainty in revenue expectations for contracted BR providers that they can recover their marginal cost of utilisation and removes the risk of BR market participants baking their utilisation expectations into their availability submissions and distorting the pay-as-clear availability price signalling. Analysis commissioned from external consultants LCP forecast a net consumer benefit of over £600m across the next four years from using the Balancing Reserve service to secure the entire positive reserve requirement. This figure could be increased by accurately forecasting periods where procuring Balancing Reserve at DA would have an outsize impact on the wholesale market price. A key finding from the LCP work was that the value of expected BM revenue factored into wholesale market pricing strategies is likely to be lower as market expectations will adapt to fewer BM actions. This is due to market knowledge that ESO has secured a given volume of Balancing Reserve before the wholesale market runs. This could improve wholesale market operation as industry could plan better for their opportunity cost of not holding capacity for BM participation in real time and reduce distortions within the scheduling area.
A demonstration that the Specific balancing product do not create significant inefficiencies and distortions in the balancing market outside the scheduling area	ESO requirement and market results will be published so no inefficiencies and distortions in the balancing market outside the scheduling area are expected to be created by the introduction of this BR service.
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 Balancing Reserve service as there are no standard products currently in operation in GB.

Date of scheduled review (Insert date 2 years from Go-Live date, to be followed by periodic review every 3 years)	Review date: 01 March 2026

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Appendix: Defining the data set for competition analysis

Defining cases

Winter Base Case – this case is used to explore a typical day in winter when the Balancing Reserve market is expected to offer cost savings compared to procurement of regulating reserve solely in the BM.

- Data for BMUs from January 2023 was selected as representative of GMT landscape.
- Nuclear, demand and interconnector BMUs are removed from the dataset.
- Any records with no real time MEL or SEL and no run up rate for first elbow have been removed from the dataset.
- Headroom is calculated as Min ([MEL-SEL],[Run up Rate 1*8]) this allows the time to full delivery parameter to be captured – where Run up Rate 1 is not considered to be the most accurate ramp rate to use then Run up Rate 2 is used instead.
- Where data errors set headroom to a negative number this is floored at 0 (sometimes SEL is higher than MEL where the unit hasn't resubmitted SEL but resubmitted MEL to 0). This has the effect of lowering average pairs.
- Pumped Hydro is assumed not to be able to flow through 0
- Batteries are assumed to offer headroom from 0 and not through 0 for simplicity. The volume available to the BR market may be higher than modelled.
- 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. This has been manually overwritten for VPI and Triton Power.

ESO Balancing Reserve requirement

Using a winter reserve setting for GMT22/23 (excluding special days) the highest regulating reserve requirement was for the 2F late ramp on a Monday at 1550MW and the highest possible wind reserve requirement is for a forecasted wind generation of between 12-14GW at 980MW.

Therefore, the maximum volume expected to be required from the Balancing Reserve market in a single settlement period is 1550 + 980 = 2530MW.

On the low side the lowest regulating reserve requirement was for 400MW and is usually for overnight periods. The lowest wind reserve requirement is 200MW when very low wind output of 0-0.5GW is forecast.

Therefore, the minimum volume expected to be required from the Balancing Reserve market in a single settlement period is 400 + 200 = 600MW.

Case overview

Winter Base Case

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

Assumption	Points
Volume from participating units	• **168 unique units / 28.75MW** average unit size (all units including those with 0 headroom) • **148 unique units / 32.64MW** average unit size (remove units with 0 headroom) • Total of averages (e.g. average day) **4.83GW**
Unavailable units	• DINO1 and DINO4 were on long term outage in January 2023 and do not appear in the dataset. • Wind BMUs, nuclear BMUs are assumed not to participate in the market.

Battery Units, corrections and revisions – November 2023

This pricing proposal from August 2023 used data from January 2023 and to reduce the size of the dataset selected based on BMU fuel type.

Lots of BM participating batteries are listed in the BM Units table in NED as Fuel Type = [null] or as Dummy BMUs which means that they have been missed from the assumed BMUs that would participate in Positive BR.

Cross checking with the dynamic response service participating units has produced some additional units that need to be included in the analysis.

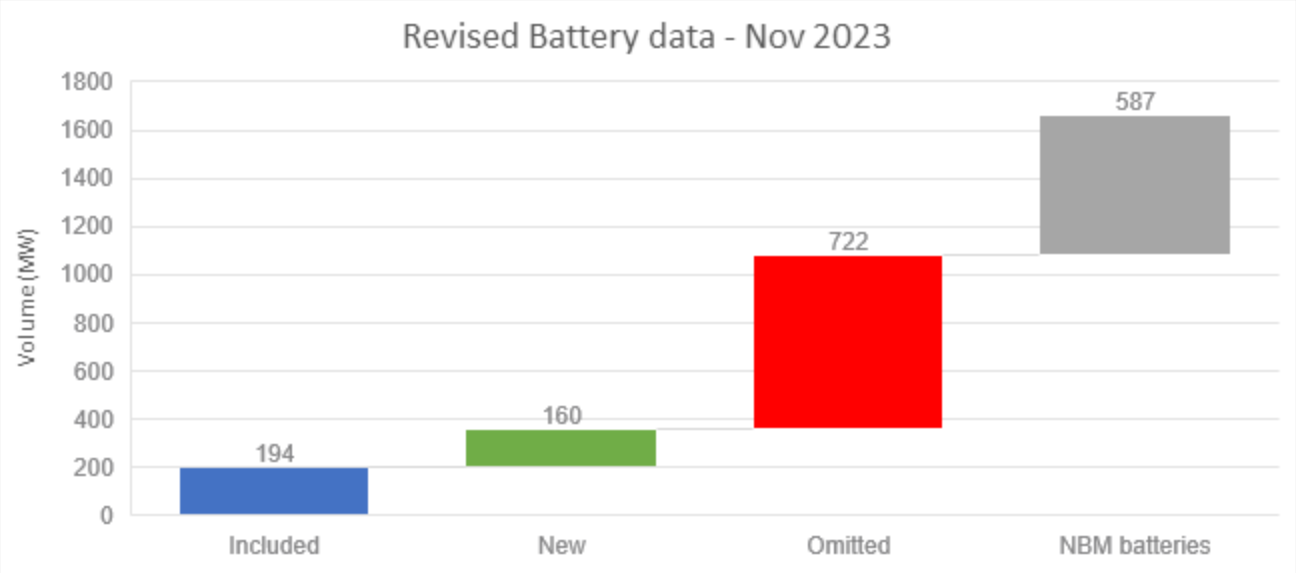
The conclusions from the pricing proposal are not affected but the chart of supplied volume shifts slightly with the additional volume.

Update on the volume assumed to participate from Battery BMUs

Data from November 2023 has been used for the most up to date view on BM battery capacity. This means that 160MW from 8 BMUs has been included as they joined the BM between January 2023 and November 2023.

The true capacity of the units may be being masked by resubmissions of MEL to manage response contracts and therefore there may be more capacity than is listed on a given BMU. For this reason, the prequalified volume of response has been used as a proxy for headroom.

As per the August 2023 iteration all batteries are assumed to offer headroom from 0MW. BMUs are not allowed to split their headroom to participate in an LF response service at the same time as Positive Balancing Reserve so if participating in BR from 0MW the unit should have full headroom available.



Assumption	Points
Volume from participating battery units	• **115 unique units / 14MW** average unit size • **59 units are BM participating** / total volume 1076MW • **56 units are NBM** / total volume 587MW NBM units are not eligible to participate in BR
Unavailable units	• 1 unit always submits MEL = SEL and therefore is assumed not to have headroom, this may be an error on the part of the battery provider in its dynamic data submissions.

Update to the Potential Market Supply chart

The blue line which shows total volume that could participate has been updated with a flat 1076MW capability from Battery BMUs. In reality it is difficult to know how batteries will participate in order to maximise their revenues from other markets and manage their state of energy.

The maximum possible reserve level has also been updated with new GMT 2023/24 levels which for a Monday morning pick up have increased compared to last year's requirement. This change is driven by changes in the rolling 3-year dataset we use to set reserve levels.