

## Trial Review

# Reserve from storage in the BM

10<sup>th</sup> February 2021

### Executive Summary

This document outlines the operational experience, findings, and opportunities, following the final phase of flexibility trials with Battery Asset technology in the Balancing Mechanism, in September 2020.

A range of operational and market conditions, albeit not fully exhaustive, were experienced over the 3-week period presenting potential savings of £0.7m for consumers, when compared to alternative actions in the Balancing Mechanism. Recognising the potential value that has shown from the trial, it is important to consider the next steps in realising these savings for the end consumer on an enduring basis. In determining the next steps, we want to fully engage with the industry to co-create the next steps. This consultation will be in the remainder of 2020/21 and further updates to the planned timescales will be provided at our weekly transparency forum.

It has been further highlighted that live trials can test value proposition for consumers, prior to mobilising and informing future code development and change. They also provide the opportunity to test and refine the requirements and processes for ESO and Market Participants systems development and to inform future trials.

We welcome feedback on the trial, this document and the potential next steps.

Next steps:

- Consult with industry, to co-create fully the next steps and future product design.
- Future Product design to be cognisant of the contents of this document
- The findings are included within future Reserve Reform.

### Background

On 30<sup>th</sup> April 2020 we published a letter to industry market participants to engage in a temporary service Optional Downward Flexibility Management (ODFM) to help the Electricity National Control Centre (ENCC) manage the unprecedented levels of low demand that we were experiencing during the Covid-19 pandemic<sup>1</sup>. We also asked whether there was any additional flexibility that was available.

This was part of a set of activities which were taken which included successful implementation of more SuperSEL arrangements, a single bilateral contract with EDF and the implementation of ODFM agreed with over 4GW of distributed energy providers, many of whom had no previous direct market access.

In response, Arenko proposed a battery storage solution, and a trial was undertaken to determine whether NGENSO could access additional flexibility from storage providers, looking to access both upward and downward energy reserve.

Upward and Downward reserve from conventional plant can be procured ahead of time with BM start up instructions for allow a BMU to be ready and available to provide reserve; bid/offer instructions to BMUs already operating to position them so reserve can be delivered, or the enactment of a SuperSEL contract to position a BMU to enable more reserve. These actions occur ahead of time, in anticipation of a future need. These actions enable the control room to issue utilisation instructions in real time at marginal additional cost having already paid to secure the reserve.

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<sup>1</sup> <https://data.nationalgrideso.com/plans-reports-analysis/covid-19-preparedness-materials>

The trials have investigated whether the ENCC can effectively request the availability of sustained upward and downward reserve from batteries, using existing operational arrangements to achieve the same effect - enable the ENCC to position the asset and access reserve at marginal pricing in a similar way as existing operational methods.

The following activities have been completed:

- First phase of trial on 22<sup>nd</sup> May 2020
- Review of first phase of trial, published on 6<sup>th</sup> July 2020<sup>2</sup>.
- Design of a second trial over a longer period to allow the full testing of the proposal
- Second phase of trial between 22<sup>nd</sup> July 2020 and 28<sup>th</sup> July 2020
- Review of second phase, published on 14<sup>th</sup> August 2020
- Third phase of trial between 4<sup>th</sup> September 2020 and 24<sup>th</sup> September 2020 with four participants
- Review third phase of the trial.

Phase 3 trial aims were:

- To understand the sustainability of existing arrangements to allow access to the flexibility that storage assets can provide
- Facilitate more market participants efficiently and effectively
- To explore how the ENCC can robustly plan, commit and utilise providers taking account of the interactions across the accessible various elements of flexibility e.g. sustained reserve versus frequency control
- To consider what an enduring solution may look like
- To operate over a variety of market and operational conditions and to adjust processes accordingly
- To maximise the experience gained from the trial.

This document provides a review of the third phase of the trial and discusses the findings from the extended trial run in September with an extended number of providers.

## Key Questions

As part of this review we have assessed the potential value under the market conditions experienced for the trial duration. We also discuss issues raised with the existing frameworks to operate storage assets differently and consider the delivery of potential solutions to build on the experience which has been gained.

*What lessons did you learn through the third phase of the trial?*

Through the three weeks there were a wide range of operational and market conditions experienced. Our assessment shows that there was potential benefit to the end consumer. This exercise does not make any assessment with respect to the commercial behaviours, such as pricing strategies of market participants which may be different in any enduring arrangement.

The assets which participated in the trial are shown in Table 1:

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<sup>2</sup> [https://data.nationalgrideso.com/plans-reports-analysis/covid-19-preparedness-materials/r/trial\\_review\\_-\\_reserve\\_from\\_storage\\_in\\_the\\_bm](https://data.nationalgrideso.com/plans-reports-analysis/covid-19-preparedness-materials/r/trial_review_-_reserve_from_storage_in_the_bm)

Table 1: BM Participants in Trial

BMU	Operator	Trial Start Date	Trial End Date	Capacity	Approximate Storage Capability
<b>ARNKB-1</b>	Arenko	04/09/2020	24/09/2020	41MW Export 41MW Import	60 Minutes
<b>AG-HEL00G</b>	Habitat	04/09/2020	24/09/2020	49MW Export 49MW Import	90 Minutes
<b>AG-HEL01H</b>	Habitat	04/09/2020	24/09/2020	20MW Export 16MW Import	60 Minutes
<b>AG-MFLX02</b>	Flexitricity	21/09/2020	24/09/2020	49MW Export 49MW Import	90 Minutes

An assessment of potential value for the end consumer, under the market and operational conditions of the trial was c. **£0.7million** (see appendix for the valuation methodology used).

We have determined this potential value assuming robust capability was in place to assess, nominate and instruct the trial market participants. During trial conditions, our experience has shown that prior to full implementation of enduring solutions there is additional capability required within the ENCC, in our procurement process, and in market development activities.

Our assessment of potential value considered the use of the service for:

- Value allocated to upward reserve, where it is not utilised but ready to respond if required
- Balancing energy to resolve upward energy imbalance (offers) when demand is greater than generation, and when there is a need to address low frequency
- Value allocated to downward reserve, where it is not utilised but ready to respond if required
- Balancing Energy to resolve downward energy imbalance (bids) when generation is greater than demand and when there is a need to address high frequency

The breakdown of potential value is shown in Table 2.

Table 2: Weekly breakdown of Potential Trial Value

<b>Week</b>	<b>Potential Value</b>
<b>04<sup>th</sup> September - 10<sup>th</sup> September</b>	£0.20 million
<b>11<sup>th</sup> September - 17<sup>th</sup> September</b>	£0.25 million
<b>18<sup>th</sup> September - 24<sup>th</sup> September</b>	£0.23 million
<b>Total</b>	£0.68 million

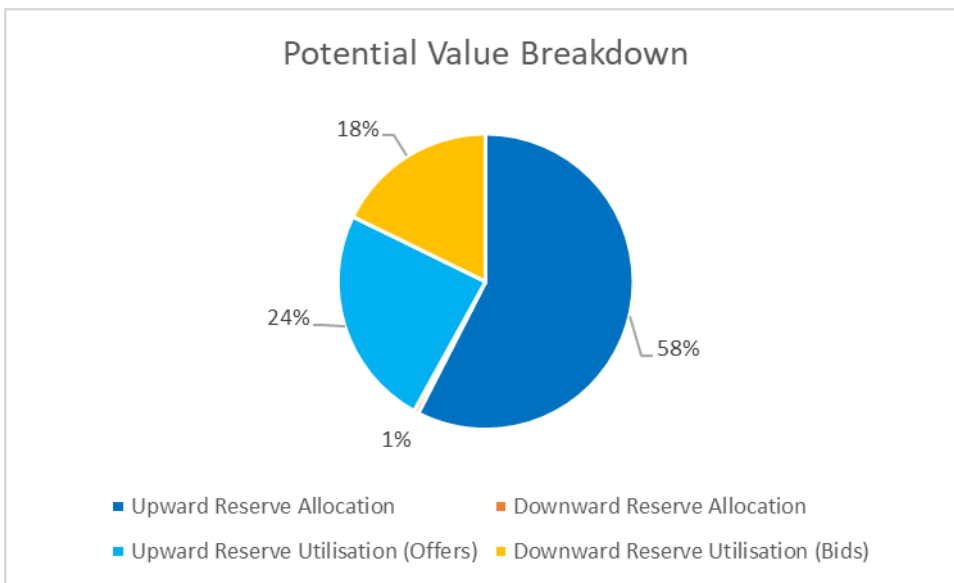
Throughout the period there were 796 out of 992 (80%) settlement periods of potential value.

Potential value has been calculated by looking at the alternative actions taken in the Balancing Mechanism and assuming that the ENCC has well developed, fit for purpose processes and systems in place to be able to achieve this potential value consistently for all assets including storage.

It should be noted that the potential value is based on the assessment methodology and the appendix contains a high-level summary. A mechanism for assessing the true cost of any future service would need to be developed as part of any enduring solution.

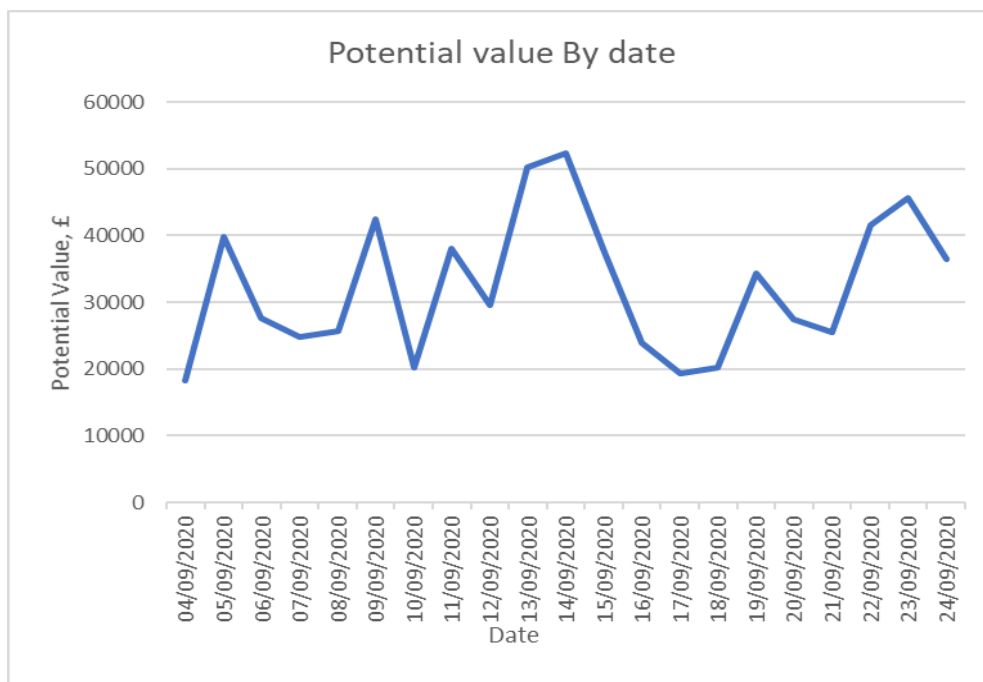
The potential value by category is shown in Figure 1:

Figure 1: Potential Value Breakdown



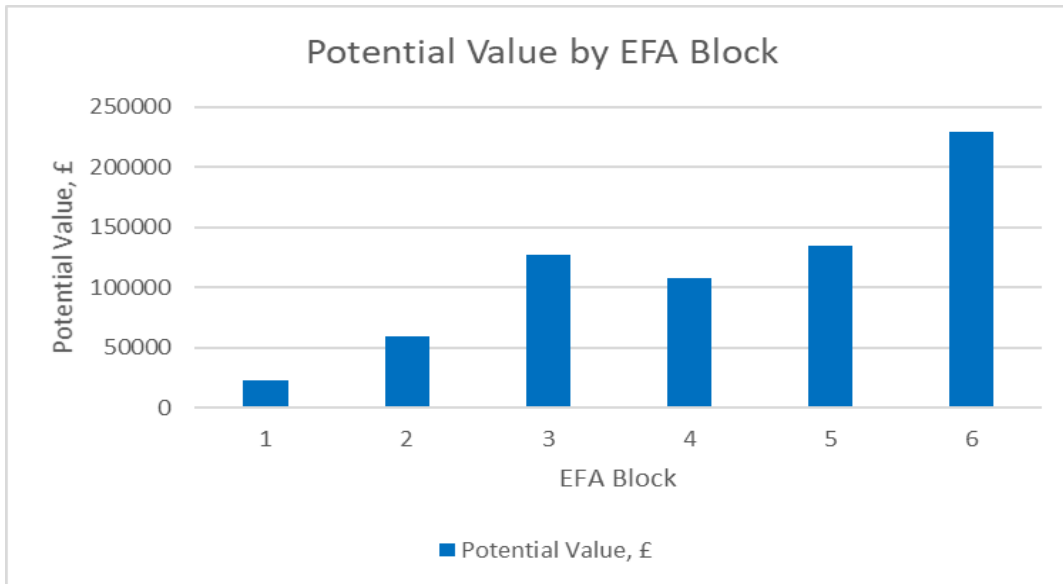
We have provided a breakdown of the potential value aggregated by settlement day and by EFA period across the trial window. These breakdowns are shown in Figure 2 and Figure 3.

Figure 2: Potential Value by Date



The daily potential value shows greater savings in days where there was reserve scarcity, driven by a variety of operational and system reasons

Figure 3: Potential Value by Electricity Forward Agreement (EFA) Block



*Commentary on existing frameworks*

The current Balancing Mechanism framework allows for a submission of one set of parameters for technical and commercial data. However, a question raised by the trial is whether Balancing Mechanism frameworks should evolve to better reflect the diverse set of emergent technologies and energy resources, such as storage. The different operating capabilities of emergent technologies has resulted in the need to think innovatively, such as this storage trial to fully realise value to the end consumer

Historical utilisation of storage assets has shown the predominant use is to address frequency control and this in turn has resulted in the energy volumes which can be achieved by these assets, being limited. Therefore, the prices which were submitted by these providers was reflective of the way in which these assets were used.

Our assessment of the trial has shown that these assets can be allocated to be to provide reserve availability, which has value to system operation. This potentially allows better planning across all assets for the provision of reserve and this in turn can promote competition across all market participants for the provision of reserve and from utilisation to meet energy imbalance,

Operating these assets in a different way, has the potential to increase the level of utilisation which provides a natural incentive for these assets to compete with other assets who provide reserve, potentially resulting in cost efficiencies for the end consumer. The future impact is a greater pool of flexibility in the BM which will deliver increased operational resilience and support the wider ambitions of operating carbon free by 2025.

*What could an enduring solution look like?*

The reserve from BM storage trial was set-up to expedite learning and therefore carried out using the existing BM frameworks. This resulted in bids and offers being required ahead of these assets being allocated to reserve and additional bids and offers required to meet energy imbalance. This arrangement was complex to assess and instruct. The transparency of the actions can be improved for market participants.

The enduring solution should have the following features:

- Be accessible to all technically capable assets

- Work within or alongside existing market frameworks, e.g. stackable
- Be fully compliant with Clean Energy Package
- Be easy to understand and transparent
- Appropriate inclusion in cashout price calculation
- Deliver robust capability and auditable processes

## Reserve Reform

It is important that we consider the learning from the trial in the design stages of reserve reform and any implementation of enduring solutions are consistent with reserve reform proposals.

## Robust Capability & Process

In adopting the learning by doing approach by the running the trials, a great amount of experience was gained. To facilitate the trial additional processes were temporally introduced in the ENCC, and although manageable with four participants, it has been highlighted that additional capability would be necessary to facilitate industry wide participation.

It is important to ensure that enduring solutions have robust capability in place for the end to end process. This is from the submission of data into the ENCC, ensure consistent decision making across all assets in scheduling and despatch timescales, through to settlement. The trial demonstrated there were some areas where this would need to be considered.

## Next Steps

Recognising the potential value that has been demonstrated from the trial, it is important to consider the next steps in realising these savings for the end consumer on an enduring basis. In determining the next steps, we want to fully engage with the industry to co-create the next steps. This consultation will be in the remainder of 2020/21 and further updates to the planned timescales will be provided at our weekly transparency forum.

We have now concluded our trials, and the next steps are:

- Consult with industry, to co-create fully the next steps and future product design.
- Future Product design to be cognisant of the contents of this document
- The outputs are included within future Reserve Reform activities.

## Conclusions

A range of operational and market conditions, albeit not fully exhaustive, were experienced over the 3-week period presenting potential savings of £0.7m, when compared to alternative actions in the Balancing Mechanism. Linear scaling of the savings would not be truly representative for a full period to represent the true consumer value and this would require detailed modelling as potentially part of the next steps and future Product Design.

We have found that running such a trial is a great way to test the value proposition for consumers prior to mobilising and informing future code developments and provides the opportunity to learn by doing to inform future systems developments and inform future trials.

We now welcome the opportunity to build on the trail, via consulting more broadly with Industry, to enable the co-creation of the next steps and future product design.

It is important the experience and findings from this trial, and subsequent Industry feedback, informs the future reserve reforms.

National Grid ESO want to thank Arenko, Habitat and Flexitricity for and working with us on the trials, along with all other parties who worked with us to access additional flexibility at pace this summer. If other providers have any ideas for future trials to access additional flexibility, then National Grid ESO look forward to receiving these and discussing further.

We welcome feedback from the industry and this can be sent to [box.BalancingProgramme@nationalgrideso.com](mailto:box.BalancingProgramme@nationalgrideso.com).

## Appendix: High Level Description of Assessment Methodology

1. Determine costs and volumes of spinning assets for allocation of upward reserve. We have not included offers taken for allocation of upward reserve for assets in the Balancing Mechanism
2. Determine costs and volumes of spinning assets for allocation of downward reserve. We have not included bids taken of downward reserve for asserts in the Balancing Mechanism
3. Effective prices of trial providers calculated for balancing energy. This included the up-front commitment cost and the utilisation cost.
4. Bids and Offers energy imbalance stacks were created of the actions taken in the Balancing Mechanism. This removed:
  - a. System Actions
  - b. Actions taken for the creation of reserve
  - c. Bids whose prices were more attractive than the effective prices of trial providers. e.g. bid price was greater than the effective price of the trial providers
  - d. Offers whose prices were more attractive than the effective price of trial providers e.g. Offer prices was less than the effective price of the trial providers
5. Average price of energy imbalance bid stacks was calculated
6. Average price of energy imbalance offer stacks was calculated

For each half hour this provides the effective volumes, price and cost of the trial provider and the alternatives for each of the four value areas. This was used to create the potentials savings from each half hour for the four value areas.

Using expertise from the ENCC personnel, with knowledge of the market and operational conditions and the impact this would have on decision making each half hour one was assigned to one of the four areas of value. This was determined based on:

- (a) Optimising the value across the three-week period
- (b) Ensuring technical compliance with the state of the energy of the trial participants