Reserve Reform
Show & Listen #3
23 June 2022
Agenda

I. Review of Show & Listen 2
II. Quick Reserve – Project timeline
III. Quick Reserve – System need
IV. Quick Reserve – Design parameters
   1. Time to full delivery
   2. Recovery period
   3. Dispatch mechanism
   4. Product duration
   5. Ramping envelope
   6. Performance & operational metering
V. Quick Reserve – Procurement service design
VI. Looking ahead to our next Show & Listen event
How to engage

• We will be using Mural to gather detailed feedback.

• If you have a clarification, question or discussion point, please use the “raise your hand” function in MS Teams and wait to be called.

• We will be recording the session in order to make sure we capture all feedback, this will not be published or shared.
Recap of Show & Listen 2
Recap of Show & Listen 2

- We shared an overview of two new Slow Reserve products – Positive Slow Reserve and Negative Slow Reserve.
- Key discussion points included our proposals for service windows, auction timings, metering and baselining. We addressed your feedback points on the Q&A document, which can be located using the link below.

Slides

Q&A document
Quick Reserve – Timeline
Proposed Project Timeline

- Using an Agile approach we can introduce services and functionality in sequential releases.
- However, there are a number of dependencies for the different releases:

<table>
<thead>
<tr>
<th>Dependency</th>
<th>Launch stage</th>
<th>Required for</th>
<th>Estimated timescales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ofgem approval</td>
<td></td>
<td>All services</td>
<td>4 months</td>
</tr>
<tr>
<td>ASDP release</td>
<td>Stage 1</td>
<td>NBM providers</td>
<td>6 months</td>
</tr>
<tr>
<td></td>
<td>Optional NBM + BM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enduring Auction Capability project</td>
<td>Stage 2</td>
<td>Firm market</td>
<td>12 months</td>
</tr>
<tr>
<td></td>
<td>Firm NBM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balancing Transformation release</td>
<td>Stage 3</td>
<td>BM providers</td>
<td>24 months</td>
</tr>
<tr>
<td></td>
<td>Firm BM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Launching a Firm NBM market ahead of a Firm BM market is estimated to deliver potential consumer value of £1-2M per month.

• Note that STOR day ahead will continue until the full NBM and BM Firm Positive Slow Reserve service is available.
Overview of system need
**Dynamic Containment**

- **Recovery Time:** 1 second to full delivery
- **Frequency Range:** 49.5 Hz to 49.8 Hz
- **的功效:** Prevent frequency deviations outside -0.8Hz / +0.5Hz following large losses

**Dynamic Regulation**

- **Recovery Time:** 10 seconds to full delivery
- **Frequency Range:** 49.8 Hz to 50.2 Hz
- **功效:** Assist in keeping frequency near to 50Hz during normal conditions

**Dynamic Moderation**

- **Recovery Time:** 1 second to full delivery
- **Frequency Range:** 49.8 Hz to 50.1 Hz
- **功效:** Assist in keeping frequency within 0.2Hz, especially during more volatile conditions

**Static Recovery**

- **Recovery Time:** 30 seconds to full delivery
- **Frequency Range:** TBC to 50.2 Hz
- **功效:** Recover frequency to 0.5Hz within 60 seconds following large losses

**Slow Reserve**

- **Recovery Time:** 15 minutes
- **Frequency Range:** 49.5 Hz to 50.5 Hz
- **功效:** Recover frequency from 0.2Hz within 15 minutes

**Quick Reserve**

- **Recovery Time:** 1 minute
- **Frequency Range:** 49.5 Hz to 50.5 Hz
- **功效:** Recovery frequency back towards 50Hz, mainly during normal conditions
Dynamic moderation assists with keeping frequency within 0.2Hz, especially during more volatile conditions.

Quick reserve used to recover frequency back towards 50Hz.

Dynamic regulation assists with keeping frequency near to 50Hz during normal conditions.

Dynamic Containment prevents frequency deviations outside -0.8Hz / +0.5Hz following large losses.

Static Recovery recover frequency to 0.5Hz within 60 seconds following large losses.

BOAs, other reserve recover frequency to 50Hz.

Slow Reserve recover frequency to 0.2Hz within 15 minutes.

Dynamic regulation assists with keeping frequency near to 50Hz during normal conditions.
Dynamic regulation assists with keeping frequency near to 50Hz during normal conditions.

Dynamic Containment prevents frequency deviations outside -0.8Hz / +0.5Hz following large losses.

Dynamic moderation assists with keeping frequency within 0.2Hz, especially during more volatile conditions.

Quick reserve used to recover frequency back towards 50Hz.

BOAs, other reserve recover frequency to 50Hz.

Slow Reserve recover frequency to 0.2Hz within 15 minutes.

Dynamic regulation assists with keeping frequency near to 50Hz during normal conditions.
Anticipated service transition

We are not proposing closing any services at this stage.
Quick Reserve
How to use Mural for live feedback in this event?
Time to full delivery

- Frequency behaviour

- Typical frequency trace. Moving closely around 50.0 Hz.
  - Random fluctuations
  - Disturbances

- Frequency response is procured assuming a pre-fault frequency different from 50 Hz.

- How is the frequency distributed over the year?
  - Around 90% of the time.
  - Around 10% of the time. ~ 832 hours per year.

- How are these ~ 832 hours per year distributed, based on the duration of the events?
Time to full delivery

- How are the total number of hours per year dependent on the duration of the events?

![Graph showing frequency deviation and duration](image)

- Around 65% of the total time outside ±0.1 Hz is due to events lasting 60 s or more.
- Only around 15% of the total time outside ±0.1 Hz is due to events lasting 5 minutes or more.
Time to full delivery

- Cumulative yearly exposure (%)

<table>
<thead>
<tr>
<th>Event duration (s)</th>
<th>0.05 Hz</th>
<th>0.1 Hz</th>
<th>0.15 Hz</th>
<th>0.2 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UF</td>
<td>OF</td>
<td>UF</td>
<td>OF</td>
</tr>
<tr>
<td>30</td>
<td>2.81</td>
<td>2.78</td>
<td>1.03</td>
<td>1.02</td>
</tr>
<tr>
<td>60</td>
<td>4.58</td>
<td>4.59</td>
<td>1.68</td>
<td>1.63</td>
</tr>
<tr>
<td>90</td>
<td>5.89</td>
<td>5.77</td>
<td>2.22</td>
<td>2.05</td>
</tr>
<tr>
<td>120</td>
<td>7.00</td>
<td>6.81</td>
<td>2.70</td>
<td>2.43</td>
</tr>
<tr>
<td>180</td>
<td>8.77</td>
<td>8.37</td>
<td>3.39</td>
<td>2.99</td>
</tr>
<tr>
<td>240</td>
<td>10.41</td>
<td>9.77</td>
<td>3.86</td>
<td>3.50</td>
</tr>
<tr>
<td>300</td>
<td>12.01</td>
<td>11.09</td>
<td>4.13</td>
<td>3.86</td>
</tr>
<tr>
<td>&gt; 300</td>
<td>23.3</td>
<td>22.5</td>
<td>4.7</td>
<td>4.8</td>
</tr>
</tbody>
</table>

- ~290 hours per year
- ~700 hours per year

- A time to full delivery of 60 s or less would assist in reducing the exposure to deviations of ±0.1 Hz from around 8% of the time to around 3.3% of the time (a reduction of 4.7%).

- This implies a drop from 700 to 290 hours per year (net reduction of around 410 hours).
Future perspective

- Looking at the past as indication of the future:
  - In 2014 frequency was inside the ±0.1 Hz range for 94% of the time (~534 hours outside).
    Compared with 90% in 2021 (~832 hours outside).
  - We are anticipating this exposure to increase in the future as the system is getting more volatile (more renewable connected, low inertia, large uncertainty).
  - Strengthens the need for faster response and reserve products.
Recovery Period

- This refers to the time interval in which a unit is allowed to recover and return to availability following an instruction.

- For Quick Reserve, a recovery period of 1 minute or less is proposed.
Please head to the Reserve Show & Listen Mural board to provide feedback on our proposals.
Dispatch mechanism

- Dispatch instructions to BM providers will be by way of Bid-Offer Acceptances via EDT/EDL.

- A Non-BM provider will be dispatched via the Ancillary Services Dispatch Platform (ASDP) system.

- Both Quick Reserve (Positive & Negative) services will be dispatched and ceased manually by ENCC.

- In the future, we are proposing to add optional (additional) dispatch mechanism for frequency relay for automatic dispatch following frequency deviation.
Product duration

- **Minimum Activation Period** is the minimum duration for which an instruction can be issued, as specified by providers. For Quick Reserve, we proposed Minimum Activation Period to be **up to 5 minutes**.

- **Maximum Activation Period** is the maximum duration for which an instruction can be issued, as specified by providers. For Quick Reserve, we proposed Minimum Activation Period to be **at least 15 minutes**.

- Minimum and Maximum Activation Periods are inclusive of ramp to instruction, time at full delivery and ramp from instruction.

- All instructions can be extended in intervals of one minute from the Minimum Activation Period up to the Maximum Activation Period.

<table>
<thead>
<tr>
<th>Power</th>
<th>Time to full delivery</th>
<th>Time at full delivery</th>
<th>Recovery Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Output</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Diagram showing the relationship between time, power, and capacity.
Ramping envelope

Proposal:

- No maximum ramp rates limit when ramping up or to instruction or ramping down and from instruction. The unit can ramp to and from instruction freely (continuously or instantaneously) with any ramp rates.
- The unit may not deliver at a rate less than 100% of contracted capacity per minute (minimum ramp rate for ramp to and from instruction).
- The unit may start delivery immediately after accepting a dispatch instruction.
Delivery Examples

- Ramp-up: 0.5 min
- Time at full delivery: 14.5 min
- Ramp-down: 1 min
- Activation period: 15.75 min

- Ramp-up: 1 min
- Time at full delivery: 9 min
- Ramp-down: 0.75 min
- Activation period: 10.25 min
Performance & Operational Metering

- We are proposing that Quick Reserve has 1Hz (once per second) read frequency for both operational and performance metering for all participating units.

- **Operational metering** frequency to align with the Balancing Mechanism. It is needed to aid control room visibility of units when dispatched and ramping. We are also developing new systems which will enhance forecasting capability, also improved by more granular metering data.

- For **performance metering**, it is important to be able to check compliant ramping within the envelope, over and deliveries for monitoring purposes.

- These metering requirements are consistent with Slow Reserve metering requirements for standardisation purposes.
Quick Reserve: Indicative Product Technical Design

<table>
<thead>
<tr>
<th>Product Criteria</th>
<th>Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Capacity</td>
<td>1.0MW</td>
</tr>
<tr>
<td>Time to Full Delivery</td>
<td>Providers must reach full activation within 1 minute from instruction</td>
</tr>
<tr>
<td>Maximum Activation Period</td>
<td>A minimum of 15 minutes</td>
</tr>
<tr>
<td>Minimum Activation Period</td>
<td>A maximum of 5 minutes</td>
</tr>
<tr>
<td>Maximum Recovery Period</td>
<td>A maximum of 1 minutes</td>
</tr>
<tr>
<td>Aggregation rules</td>
<td>Providers can aggregate units within a GSP Group</td>
</tr>
<tr>
<td>Dispatch Mechanism</td>
<td>BM – BOAs / Non-BM - ASDP</td>
</tr>
<tr>
<td>Operational Metering</td>
<td>1Hz</td>
</tr>
<tr>
<td>Performance Metering</td>
<td>1Hz</td>
</tr>
<tr>
<td>Ramp rates</td>
<td>As per envelope restrictions</td>
</tr>
<tr>
<td>Baselining</td>
<td>60-minute nomination baseline</td>
</tr>
</tbody>
</table>

Where possible we kept the Quick Reserve technical design proposal as close to the Slow Reserve technical design for standardisation across products in Reserve Reform.
Please head to the Reserve Show & Listen Mural board to provide feedback on our proposals.
<table>
<thead>
<tr>
<th></th>
<th>Launch Stage 1 Optional (BM &amp; Non-Bm)</th>
<th>Launch Stage 2 + Firm Non-BM</th>
<th>Launch Stage 3 + Firm BM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit Cap</strong></td>
<td>500 MW</td>
<td>500 MW</td>
<td>500 MW</td>
</tr>
<tr>
<td><strong>Frequency of Procurement</strong></td>
<td>Ad-hoc</td>
<td>Daily</td>
<td>Daily</td>
</tr>
<tr>
<td><strong>Auction Timing</strong></td>
<td>N/A</td>
<td>D-1 14:30</td>
<td>D-1 14:30</td>
</tr>
<tr>
<td><strong>Service Window</strong></td>
<td>2h Window</td>
<td>2h Window</td>
<td>Settlement Period</td>
</tr>
<tr>
<td><strong>Auction Platform</strong></td>
<td>N/A</td>
<td>Enduring Auction Platform</td>
<td>Enduring Auction Platform</td>
</tr>
<tr>
<td><strong>Stacking</strong></td>
<td>Same MW cannot be sold twice</td>
<td>Same MW cannot be sold twice</td>
<td>Same MW cannot be sold twice</td>
</tr>
<tr>
<td><strong>Linking of Bids</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Payment Structure</strong></td>
<td>Utilisation only</td>
<td>Firm service: Availability+ Utilisation Optional service: Utilisation</td>
<td>Firm service: Availability+ Utilisation Optional service: Utilisation</td>
</tr>
</tbody>
</table>
Please head to the Reserve Show & Listen Mural board to provide feedback on our proposals.
Next steps
Quick Reserve – Next Steps

• Feedback from today’s session – does this style and structure work for you?
  Box.futureofbalancingservices@nationalgrideso.com

• We would like to propose another session in July where we hope to share more information and Q&A session around Quick Reserve product.

• Further written feedback would be appreciated on Quick Reserve design elements via email (Box.futureofbalancingservices@nationalgrideso.com)

• Mural board will be open for 1 week to provide a space to give us a feedback
Appendices
Meet The Team

Adam Sims
Reserve Reform Product Manager

Steve Dugmore
Reserve Reform Market Services Lead

Mike Coldwell
Market Requirements Future Design Manager

Francisco Sanchez Gorostiza
Reserve Reform Product Design

Rob Westmancoat
Reserve Reform Product Design

Ewa Krzywkowska
Reserve Reform Product Design

Yingyi Wang
Reserve Reform Procurement Design