The webinar will start shortly
Please make sure your microphone is muted and your camera is turned off
Speakers

- Joanne Greenan
- Steve Dugmore
- Yingyi Wang
- Ewa Krzywkowska
- Francisco Sanchez
- Sam Stokes
- Mili Gupta
- Gabriel Diaz
## Quick Reserve & Slow Reserve

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
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<tr>
<td>Welcome and Housekeeping</td>
<td>Mili Gupta</td>
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<tr>
<td>Delivery Plan</td>
<td>Jo Greenan</td>
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<tr>
<td>Service Design</td>
<td>Ewa Krzywkowska Francisco Sanchez Yingyi Wang</td>
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<td>Question and Answers</td>
<td>Coordinated by Jo Greenan</td>
</tr>
<tr>
<td>Next Steps and Close</td>
<td>Mili Gupta</td>
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Delivery Plan

Jo Greenan
Reserve Reform timeline

- **December 2020**: Co-creating workshop 1
- **October 2020**: Project initiation
- **March 2021**: Co-creating workshop 2
- **April 2022**: Indicative Service Design for Slow Reserve
- **May 2021**: Show & Listen Event 1
- **May 2022**: Show & Listen Event 2
- **March 2021**: Indicative Service Design for Quick Reserve
- **June 2022**: Show & Listen Event 3
- **July 2022**: Show & Listen Event 4
- **May 2022**: Updates to Slow Reserve Service Design
- **June 2022**: Updates to Quick Reserve Service Design

Additional activities:
- **November 2020**: Industry engagements & feedback sessions
- **Discussion on Recovery Periods, Minimum Activation Periods, Performance Monitoring & Energy Requirements**
- **Discussion on Minimum and Maximum Ramp Rates, Performance Service Windows and Baselines**

Outputs:
- Reserve Reform Initial Design Consultation
- Reserve Product Reform Co-creation workshop 9th December 2020
- Reserve Product Reform Co-creation workshop 2 May 2021

*ESO*
### Delivery Plan

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<td>EBR Consultation</td>
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**Key messages:**

- Service go-live is towards the end of 2023
  - The main dependency on our timeline is the required IT changes to be carried out by ESO's Balancing Programme.
  - Delivery is also dependent on the launch of Enduring Auction Capability (EAC)
- EBR Consultation Launch will be launched towards the end of April
- Onboarding will be via Single Markets Platform (SMP)
Service Design Re-cap

Yingyi Wang
Ewa Krzywkowska
Francisco Sanchez
### Key Design Elements

#### Technical Design

<table>
<thead>
<tr>
<th>Provider’s Eligibility</th>
<th>• The unit being able to meet specific technical requirements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery Specifications</td>
<td>• Including Time to Full Delivery, Minimum and Maximum Activation, Recovery Periods and Ramping Envelope.</td>
</tr>
<tr>
<td>Dispatch Mechanism</td>
<td>• Platform to send and receive instructions.</td>
</tr>
<tr>
<td>Baselining &amp; Energy Requirements</td>
<td>• A forward view of the asset’s output which aids system planning and for Reserve, allows ESO to monitor the performance of service delivery</td>
</tr>
<tr>
<td>Aggregation &amp; Metering</td>
<td>• Rules around aggregation of units and frequency of metering data points for operational and purposes.</td>
</tr>
<tr>
<td>Performance Monitoring</td>
<td>• Acceptable dispatch envelope including ramping up and ramping down acceptable envelopes, and penalties for poor performance.</td>
</tr>
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</table>

#### Procurement Design

<table>
<thead>
<tr>
<th>Service Windows</th>
<th>• Period of time that providers must have their energy available to deliver the Reserve service.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auction Timings</td>
<td>• The time at which ESO will procure the Reserve services at designed auction platform.</td>
</tr>
<tr>
<td>Assessment Principles</td>
<td>• Rules how the auction would be cleared and how the units will be awarded the contract.</td>
</tr>
<tr>
<td>Payment Mechanism</td>
<td>• Methodology to pay providers for availability and/or utilisation.</td>
</tr>
<tr>
<td>Revenue Stacking</td>
<td>• Rules around procuring other services in the same service window from the same unit.</td>
</tr>
<tr>
<td>Locationality</td>
<td>• Principles behind locational assessment and how the location of the units would be included in the auction clearing assessment.</td>
</tr>
</tbody>
</table>
Time to full delivery

**Slow Reserve: Up to 15 minutes**
- This is driven by the System Operator Guidelines (SOGL) requirement to restore frequency to within ±0.2 Hz deviation following a contingency.
- Parameter in line with maximum delivery duration of Dynamic Containment (15 minutes).

**Quick Reserve: Up to 1 minute**
- This parameter is driven by analysis on historic frequency data which shows that a time to full delivery of 1 min or less would:
  - Reduce exposure to deviations of ±0.1 Hz from around 8% of the time to around 3.3% of the time.
  - In absolute terms, this means frequency could be outside ±0.1 Hz for around 290 hours per year instead of around 700 hours per year.

Note: Not to scale.

Around 65% of the total time outside ±0.1 Hz is due to events lasting 60 s or more.
Minimum Activation Period

Slow Reserve: Up to 30 mins

• A maximum of 30 minutes gives flexibility to ENCC whilst considering industry feedback.
  1. Optimise asset health for certain technology types, such as reciprocating engines, DSR, CCGTs and biomass, who we expect to make up a large proportion of the market.
  2. Availability and utilisation pricing should be more reflective of a unit’s marginal running costs where a Minimum Activation Time could be specified
  3. We foresee Slow Reserve units being dispatched incrementally in sequence by ENCC depending on the changing system conditions in real-time.

Quick Reserve: Up to 5 mins

• This will facilitate enough flexibility in dispatching and ceasing units to respond to the operability challenges while giving providers certainty about the minimum time that they can be dispatched.
• Based on analysis of historic frequency data, Minimum Activation Period up to 5 minutes has the potential to shorten the duration of 80% of ±0.1 Hz swings. Only around 20% of ±0.1 Hz swings (~330 per year) are less than 5 minutes.
Maximum Activation Period

Definition: the maximum duration for which an instruction can be issued, as specified by providers

Slow Reserve: Not less than 120 mins

- The working position is of a maximum activation period not less than 120 minutes.
- Activation for a maximum of (at least) 120 minutes provides ENCC with firm Slow Reserve capacity to return and stabilise system frequency within operational limits. Most frequency deviations and energy imbalances are resolved within this timeframe so a longer timeframe should not be mandated.
- Participating assets will be able to specify a Maximum Activation Time, greater than 120 minutes, where delivery of Slow Reserve beyond the Maximum Activation Time is feasible.

Quick Reserve: Not less than 15 mins

- This will allow sufficient time for ENCC to dispatch Slow Reserve if the additional reserve is needed and provides a direct transition between Quick and Slow Products.
- Participating assets will be able to specify a Maximum Activation Time, greater than 15 minutes, where delivery of Quick Reserve beyond the Maximum Activation Time is feasible.
Maximum Recovery Periods

Definition: the maximum time for which a unit is allowed to recover and return to availability following an instruction, as specified by providers.

Slow Reserve: Maximum of 30 mins

It was identified during co-creation workshops that there were at least two distinct technology types which had different views on recovery periods:

1) A first category included reciprocating engines, pumped hydro, DSR and gas turbines. These service providers stressed the importance of defined recovery periods to dedicate time for assets to return to availability and thereby facilitate multiple dispatches per day.

2) Conversely, storage providers stated that recovery periods were less important if state of energy could be managed effectively. Some storage providers even advised they were able to offer additional reserve availability during recovery using operational baselines.

For day-ahead STOR assets, ~80% have recovery times less than or equal to 30 minutes. Therefore, we believe that setting the Maximum Recovery Time at 30 minutes is sensible to capture most of these assets.

This supports our key objectives of facilitating competition everywhere, improving market liquidity and reducing cost to the ESO and the end consumer.

Quick Reserve: Maximum of 3 mins

ESO’s original position was for 1 minute.

However, based on industry feedback this parameter was updated to 3 minutes to represent a good compromise between unit’s ability to deliver and historic system needs.

For historic system needs, we looked at the interval between frequency events of different magnitudes, e.g. ±0.1 Hz, ±0.15 Hz (see figure below).

![Histogram showing frequency event intervals](image)
We require baselines for both operational and performance purposes. They provide visibility to our control room of expected asset output and help create a datum against which to monitor performance.

- 60-minute nomination baselines will be expected from both BM and non-BM participants for both Positive and Negative Slow and Positive and Negative Quick Reserve products.
- The service design proposal is that a unit can have also non-zero baseline (dependent on IT platform development).

**Quick & Slow Reserve: 60-minutes nomination baseline**
Performance & Operational Metering

Quick & Slow Reserve: 1 Hz (once per second)

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

- **Operational metering** frequency would 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 under deliveries for monitoring purposes.
Ramp Rates

Slow Reserve: between 60s – 15 minutes

**Maximum ramp rate:**
- For all ramping, the unit must not deliver at a rate greater than 100% of contracted capacity per minute (maximum ramp rates).
- For instantaneous ramping, the unit must not deliver more than 50% of contracted capacity in any 30 seconds period of ramping.

**Minimum ramp rate:**
- The unit may not deliver at a rate less than 6.67% of contracted capacity per minute or the unit must deliver 100% of contracted capacity in 15 minutes or less (minimum ramp rate for ramp to and from instruction).

The minimum and maximum ramp rates will apply for ramping to and from the instructions.

Quick Reserve: at least 60 seconds

**Maximum ramp rate:**
- 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.

**Minimum ramp rate:**
- 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.

The minimum and maximum ramp rates will apply for ramping to and from the instructions.
ESO will conduct regular performance monitoring of service availability and delivery.

**Availability:**
- The unit should be able to provide 100% of contracted headroom or footroom and failure to deliver the contracted availability will trigger an Event of Default (EOD). When a reserve unit triggers an EOD, it will forfeit Availability Payment for all the relevant Committed Windows.

**Utilisation:**
- The unit must be within acceptable ramping envelope when ramping to and from the instructions.
- Under-delivery below 95% contracted capacity will mean availability payments for the relevant service window will be withheld. Utilisation payments will be made for all energy delivered.
- Over-delivery will be permitted up to 20% in addition to contracted capacity, however utilisation and availability payments will be capped at 100% of contracted capacity.
ESO will conduct regular performance monitoring of service availability and delivery.

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Energy Requirements

Quick Reserve: At least 1 activation at 100% of contracted capacity

• For energy-limited assets, we propose a requirement for at least 1 activation at full contracted output per Settlement Period.

• As with other Response Services, it falls on providers to work out appropriate energy management strategies to avoid being penalised.

Ramp rates rules for baseline for energy limited providers:

• May not submit a baseline with a ramp rate greater than 5% of the contracted capacity. I.e., a 100MW Quick Reserve asset could change its baseline by maximum of 5MW/min.

• This ramp rate restriction will apply to the entire service window period plus the preceding and following settlement period.
• Results from GB DA Energy Market Auction and IC trading will impact the scheduled units and consequently, the system inertia level and largest loss we need to secure. Requirements closer to actual system needs, reducing overholding.

• Quick Reserve is mainly for pre-fault so IC positions have less relevance, but closer to real-time procurement will facilitate participants who cannot forecast their availability over long time horizons (mainly DERs), thus widening market access.

• Leaves enough time buffer for NGESO to activate its Business Contingency Plan (BCP) if auction process fails.

• Having a single co-optimised strategy for reserve and response would maximise their shared benefits while considering their dependencies.
Service Windows

Length of Service window refers to the period of time that providers must have their energy available to deliver the service(s).

8-hour block to simplify management of the service and guarantee system security during low demand period

Slow

- SW1
- SW2
- SW3
- SW4
- SW5
- SW6
- SW7
- SW8
- SW9

Quick

- SW1
- SW2
- SW3
- SW4
- SW5
- SW6
- SW7
- SW8
- SW9
- SW10
- SW11
- SW12
Problem to be solved

Need to prevent losing Reserve capacity across the boundary to avoid putting our system security under risks.
Revenue stacking/splitting

For the same service window, one unit is allowed to split its positive and negative capacity to provide different direction products of the same service. Same MW cannot be sold twice

<table>
<thead>
<tr>
<th>Splitting possibilities</th>
<th>Dynamic Containment</th>
<th>Dynamic Moderation</th>
<th>Dynamic Regulation</th>
<th>Slow Reserve</th>
<th>Quick Reserve</th>
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<td>Dynamic Containment</td>
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<td>Dynamic Moderation</td>
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<td>Slow Reserve</td>
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### Payment Mechanism

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<th>Criteria</th>
<th>Availability</th>
<th>Utilisation</th>
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<td>Homogeneity</td>
<td>✔️</td>
<td>✗</td>
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<tr>
<td>Full Information</td>
<td>✔️</td>
<td>✗</td>
</tr>
<tr>
<td>Competition</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Proposed Payment Mechanism</td>
<td>Pay-as-clear</td>
<td>Pay-as-bid</td>
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Pay-as-clear is not recommended to settle energy for new Reserve services because:
- Technical characteristics (e.g. location) important for ESO despatch and constraint management
- Demand curve is unknown
Thus, the “Homogeneity” and “full information” criteria haven’t been met
## Technical Design Overview

<table>
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<tr>
<th>Product Criteria</th>
<th>Slow Reserve</th>
<th>Quick Reserve</th>
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<tr>
<td><strong>Direction</strong></td>
<td>Low (Positive Reserve) &amp; High (Negative Reserve)</td>
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<tr>
<td><strong>Minimum Capacity</strong></td>
<td>1 MW</td>
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<td><strong>Time to full output</strong></td>
<td>Maximum of 15 minutes of instruction</td>
<td>Maximum of 1 minute from instruction</td>
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<tr>
<td><strong>Maximum Activation Period</strong></td>
<td>A minimum of 120 minutes</td>
<td>A minimum of 15 minutes</td>
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<td><strong>Minimum Activation Period</strong></td>
<td>A maximum of 30 minutes</td>
<td>A maximum of 5 minutes</td>
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<tr>
<td><strong>Maximum Recovery Period</strong></td>
<td>A maximum of 30 minutes</td>
<td>A maximum of 3 minutes</td>
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<tr>
<td><strong>Aggregation rules</strong></td>
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<td>Providers can aggregate units within a GSP Group</td>
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<td><strong>Dispatch Solution</strong></td>
<td>BM – BOAs / Non-BM - ASDP</td>
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<td><strong>Operational &amp; Performance</strong></td>
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<td><strong>Metering</strong></td>
<td>1Hz</td>
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<tr>
<td><strong>Ramp rates</strong></td>
<td>Maximum ramp rates - not greater than 100% of contracted capacity per minute.</td>
<td>No maximum ramp rate limits.</td>
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<td>Maximum instantaneous ramp rates – unit cannot deliver more than 50% of contracted capacity in any 30 seconds period of ramping.</td>
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<td><strong>Performance Monitoring</strong></td>
<td>Availability and Utilisation - Penalties for over (&gt;120%) and under (95%) deliveries</td>
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<tr>
<td><strong>Baselining</strong></td>
<td>60-minute nomination baseline</td>
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<tr>
<td><strong>Energy Requirements</strong></td>
<td>Able to maintain delivery at 100% of contracted capacity for duration of the service windows.</td>
<td>At least 1 activation at 100% of contracted capacity per Settlement Period</td>
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## Procurement Design

<table>
<thead>
<tr>
<th>Product Criteria</th>
<th>Slow Reserve</th>
<th>Quick Reserve</th>
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</thead>
<tbody>
<tr>
<td><strong>Unit Cap/ Bidding Volume Cap</strong></td>
<td>N/A</td>
<td>300 MW</td>
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<tr>
<td><strong>Contract Type</strong></td>
<td>Firm + Optional (procured via BM and non-BM/ASDP platform)</td>
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<tr>
<td><strong>Frequency of Procurement</strong></td>
<td>Daily</td>
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<tr>
<td><strong>Auction Timing</strong></td>
<td>D-1 14:00</td>
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<tr>
<td><strong>Service Window</strong></td>
<td>1* 8 hour overnight block (23:00-07:00) + 8 * 2 hour blocks</td>
<td>Interim: 2h Window Enduring: Settlement Period</td>
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<tr>
<td><strong>Auction Platform (for Firm Requirement)</strong></td>
<td>Enduring Auction Platform</td>
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<tr>
<td><strong>Revenue stacking/splitting</strong></td>
<td>Same MW cannot be sold twice</td>
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</tr>
<tr>
<td><strong>Payment Structure</strong></td>
<td><strong>Firm service:</strong> Availability+ Utilisation</td>
<td><strong>Optional service:</strong> Utilisation</td>
</tr>
<tr>
<td><strong>Payment Mechanism</strong></td>
<td>Availability: Pay-as-clear Utilisation: Pay-as-bid</td>
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Next Steps

Mili Gupta
Next Steps

• Webinar slides and Q&A will be published on the ESO webpage: Quick & Slow
• EBR Article 18 Consultation - Plan to launch w/c 24th April
• If you have any questions, contact us: box.futureofbalancingservices@nationalgrideso.com
• Industry follow-up webinar on Thursday 30th March to cover the following areas:
  • Crossovers
  • Onboarding
  • Q&A

Sign up to 30th March Webinar here>>>>>

Webinar Sign up