



# ESO Reserve Reform

## Quick Reserve & Slow Reserve

9<sup>th</sup> March 2023

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

# Speakers



Joanne Greenan



Francisco Sanchez



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Sam Stokes



Yingyi Wang



Mili Gupta



Ewa Krzywkowska



Gabriel Diaz

# Quick Reserve & Slow Reserve

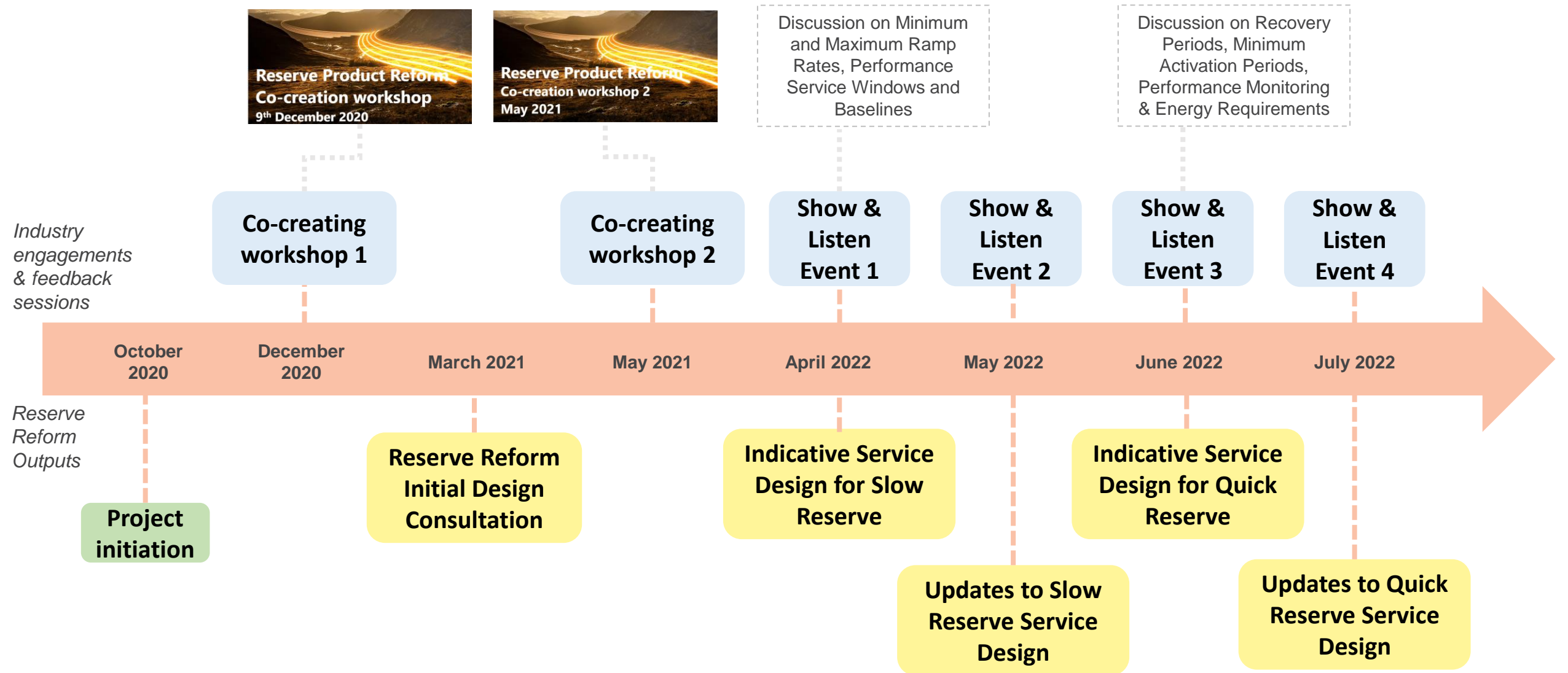
Topic	Presenter
Welcome and Housekeeping	Mili Gupta
Delivery Plan	Jo Greenan
Service Design	Ewa Krzywkowska Francisco Sanchez Yingyi Wang
Question and Answers	Coordinated by Jo Greenan
Next Steps and Close	Mili Gupta



# Delivery Plan

Jo Greenan

# Reserve Reform timeline



## Delivery Plan

			Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	2024 +
EBR Consultation						●	—————	●								
EAC Trials								●	—————	●						
Onboarding											●	—————	●			
Service Go-Live	Slow	Positive Negative											★			
	Quick	Positive Negative										★ ★	★ ★			

### 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

### Provider's Eligibility

- The unit being able to meet specific technical requirements.

### Delivery Specifications

- Including Time to Full Delivery, Minimum and Maximum Activation, Recovery Periods and Ramping Envelope.

### Dispatch Mechanism

- Platform to send and receive instructions.

### Baselining & Energy Requirements

- A forward view of the asset's output which aids system planning and for Reserve, allows ESO to monitor the performance of service delivery

### Aggregation & Metering

- Rules around aggregation of units and frequency of metering data points for operational and purposes.

### Performance Monitoring

- Acceptable dispatch envelope including ramping up and ramping down acceptable envelopes, and penalties for poor performance.

## Procurement Design

### Service Windows

- Period of time that providers must have their energy available to deliver the Reserve service.

### Auction Timings

- The time at which ESO will procure the Reserve services at designed auction platform.

### Assessment Principles

- Rules how the auction would be cleared and how the units will be awarded the contract.

### Payment Mechanism

- Methodology to pay providers for availability and/or utilisation.

### Revenue Stacking

- Rules around procuring other services in the same service window from the same unit.

### Locationality

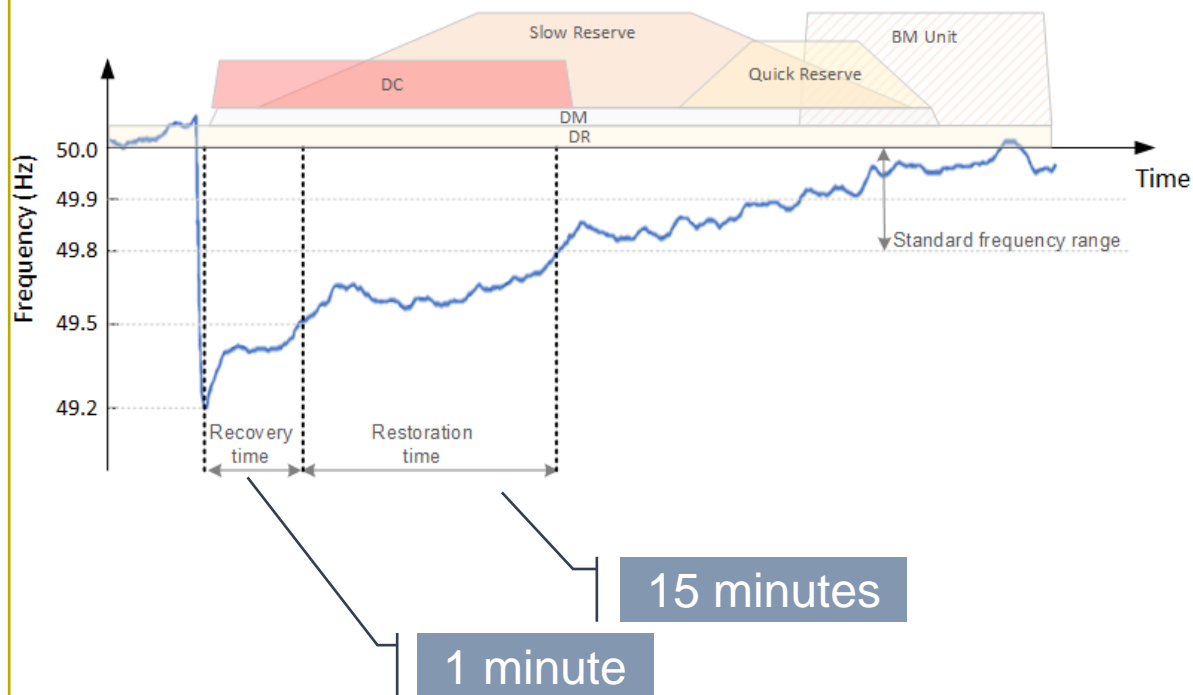
- Principles behind locational assessment and how the location of the units would be included in the auction clearing assessment.



# Time to full delivery

## Slow Reserve: Up to 15 minutes

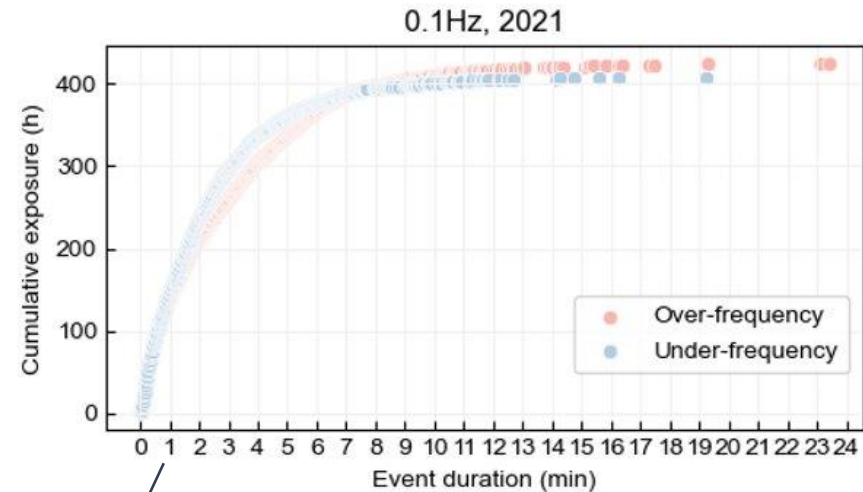
- This is driven by the System Operator Guidelines (SOGL) requirement to restore frequency to within  $\pm 0.2$  Hz deviation following a contingency.
- Parameter in line with maximum delivery duration of Dynamic Containment (15 minutes).



Note: Not to scale.

## 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  $\pm 0.1$  Hz from around 8% of the time to around 3.3% of the time.
  - In absolute terms, this means frequency could be outside  $\pm 0.1$  Hz for around 290 hours per year instead of around 700 hours per year.



Around 65% of the total time outside  $\pm 0.1$  Hz is due to events lasting 60 s or more.

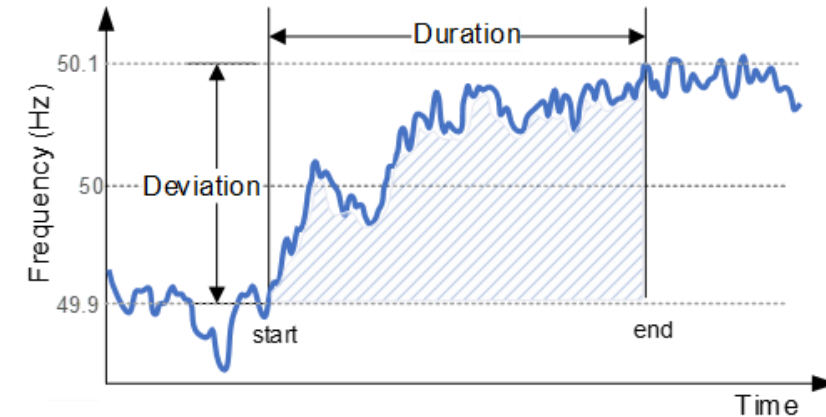
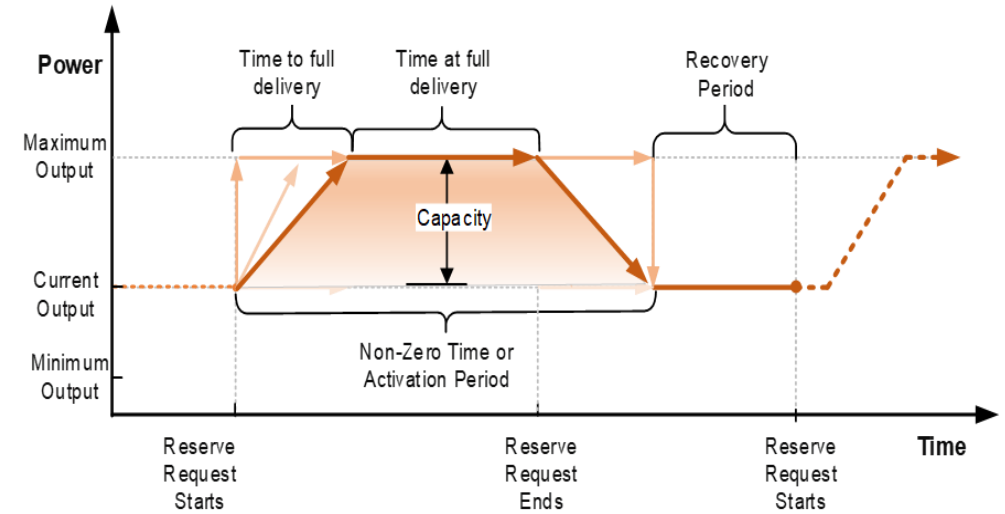
## Minimum Activation Period

### 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  $\pm 0.1$  Hz swings. Only around 20% of  $\pm 0.1$  Hz swings (~330 per year) are less than 5 minutes.



# Activation Periods

## Maximum Activation Period

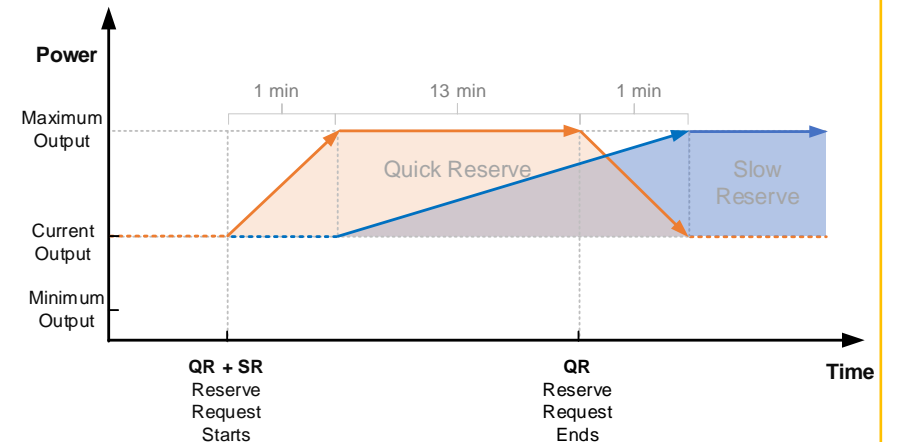
**Definition:** the maximum duration for which an instruction can be issued, as specified by providers

### 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.

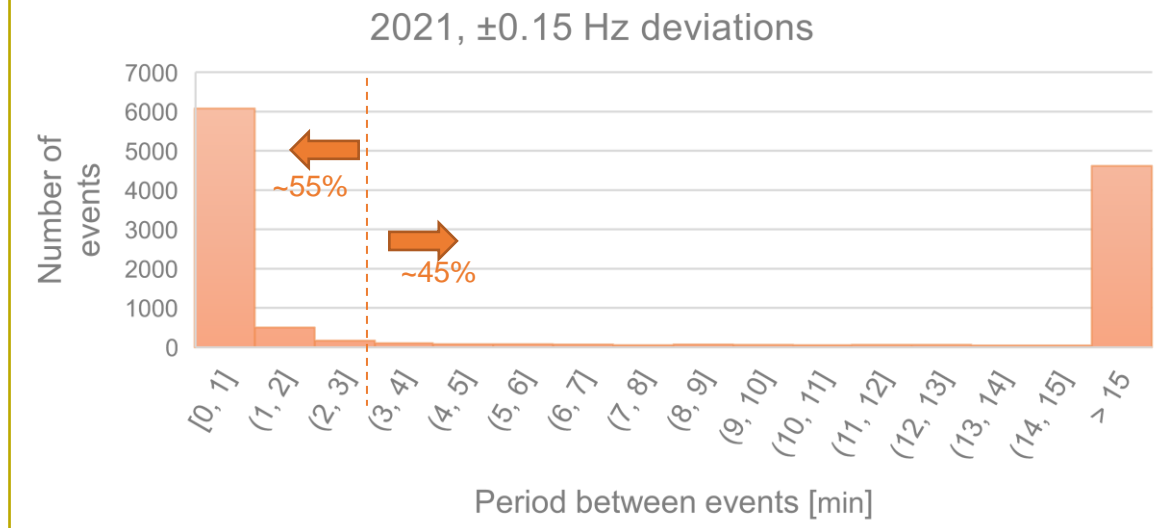
This supports our key objectives of facilitating competition everywhere, improving market liquidity and reducing cost to the ESO and the end consumer.

## 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.  $\pm 0.1$  Hz,  $\pm 0.15$  Hz (see figure below).

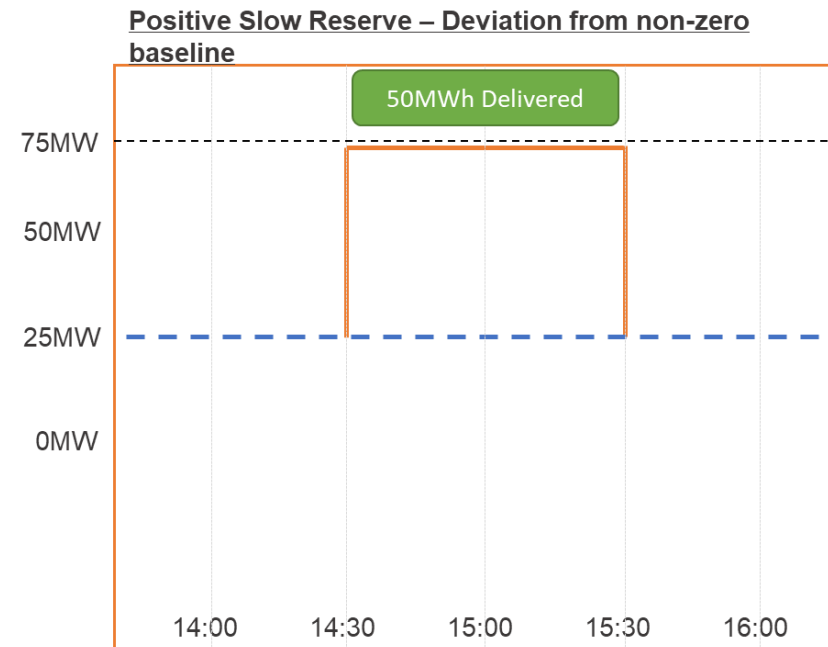
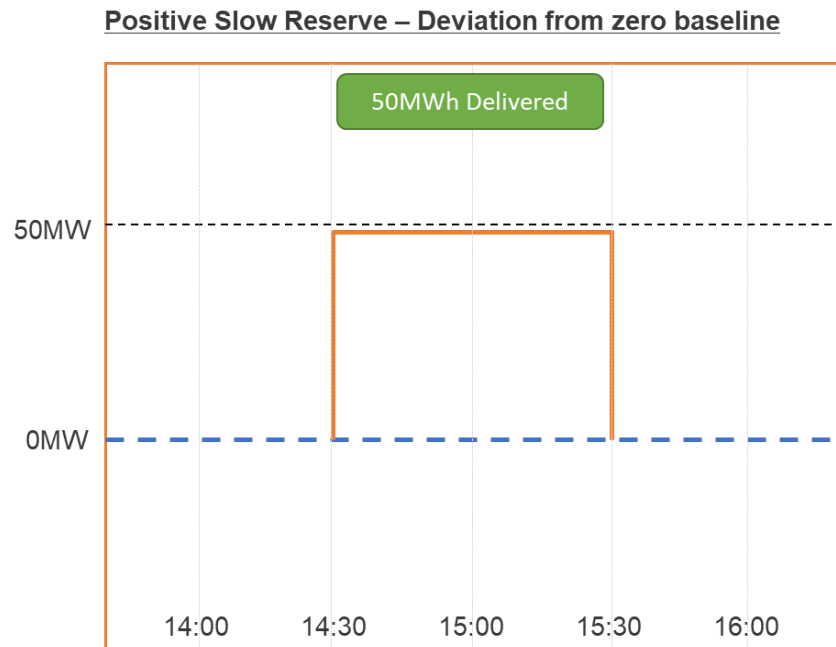


## Baselining

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.

### Quick & Slow Reserve: 60-minutes nomination baseline

- 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).



--- Reserve Baseline  
— Service Delivery

## Performance & Operational Metering

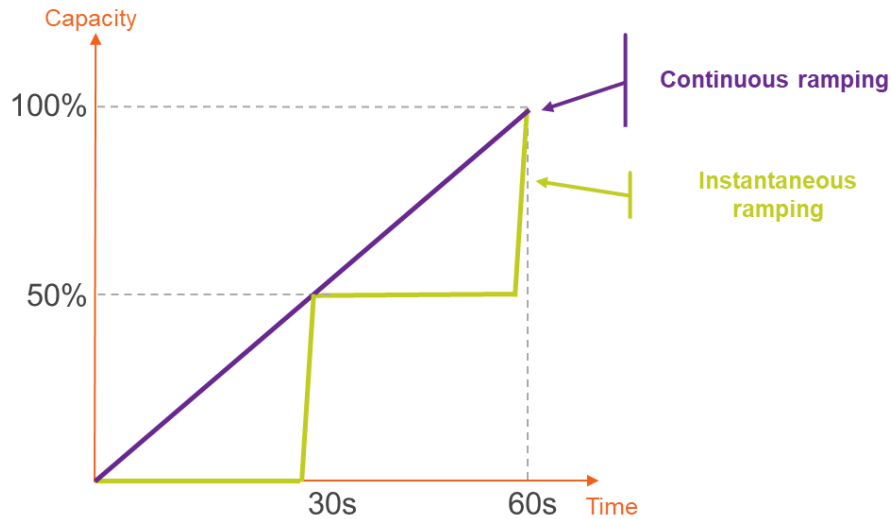
### Quick & Slow Reserve: 1 Hz (once per second)

**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 – 15minutes



### Maximum ramp rate:

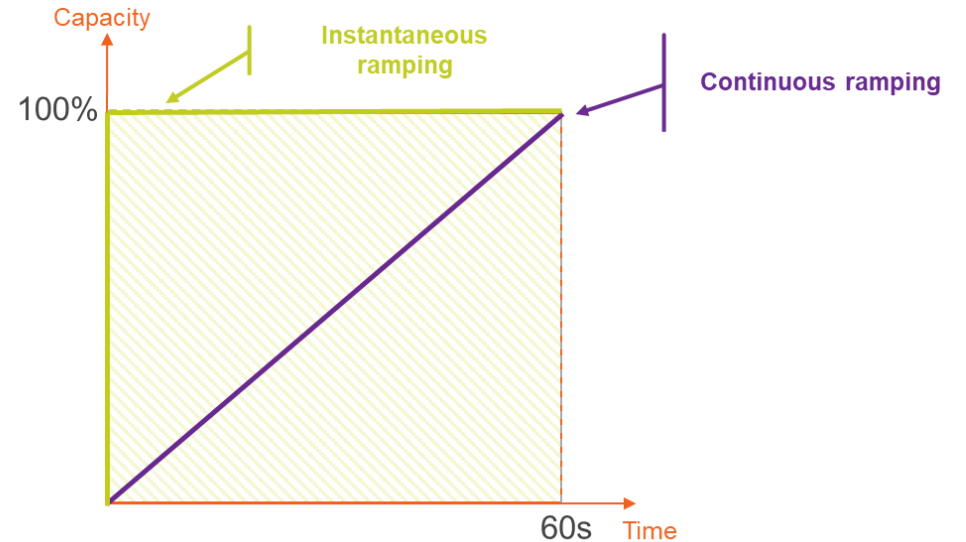
- For all ramping, the unit must not deliver at a rate greater than 100% of contracted capacity per minute (maximum ramp rates).
- For instantaneous ramping, the unit must not deliver more than 50% of contracted capacity in any 30 seconds period of ramping.

### 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:

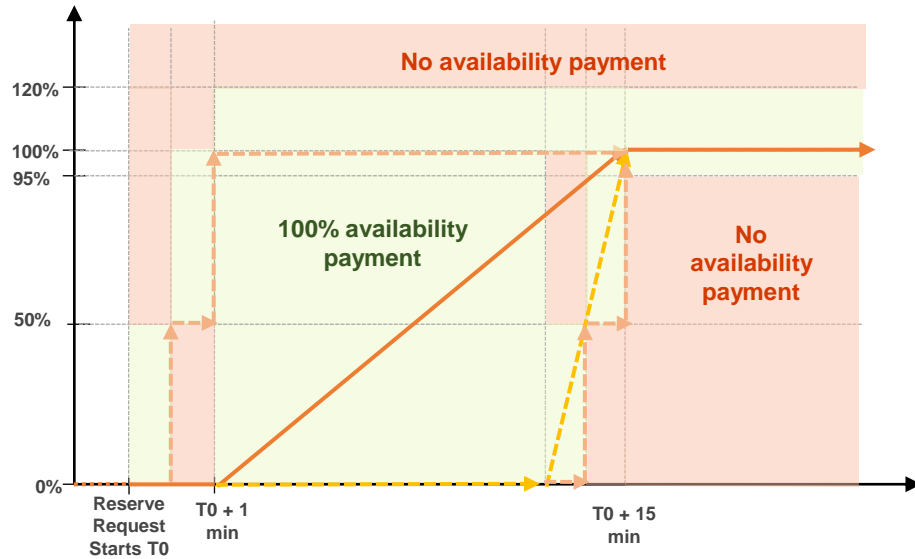
- The unit may not deliver at a rate less than 100% of contracted capacity per minute (minimum ramp rate for ramp to and from instruction).
- The unit may start delivery immediately after accepting a dispatch instruction.

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

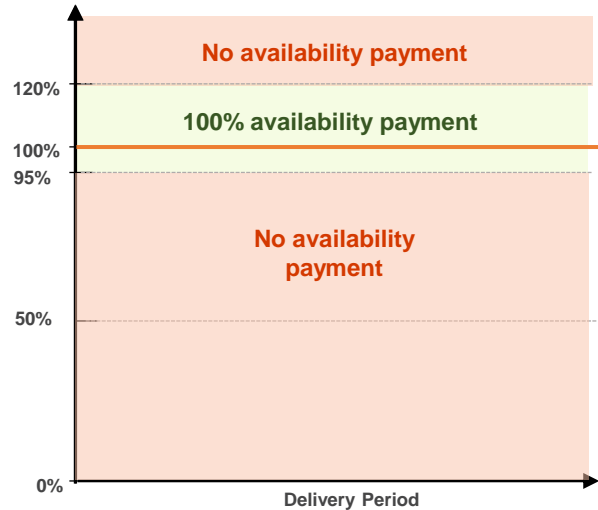


## Slow Reserve: Acceptable Delivery Envelope

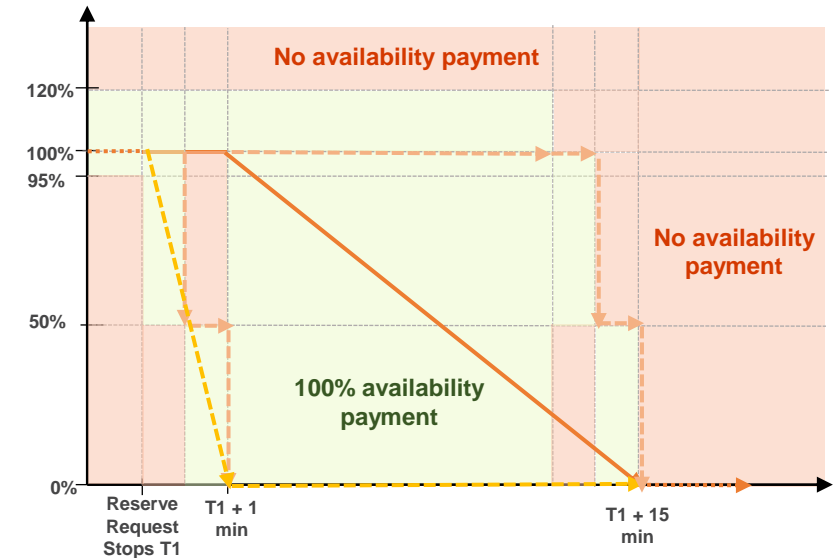
Ramping up period



Delivery



Ramping down period



**ESO will conduct regular performance monitoring of service availability and delivery.**

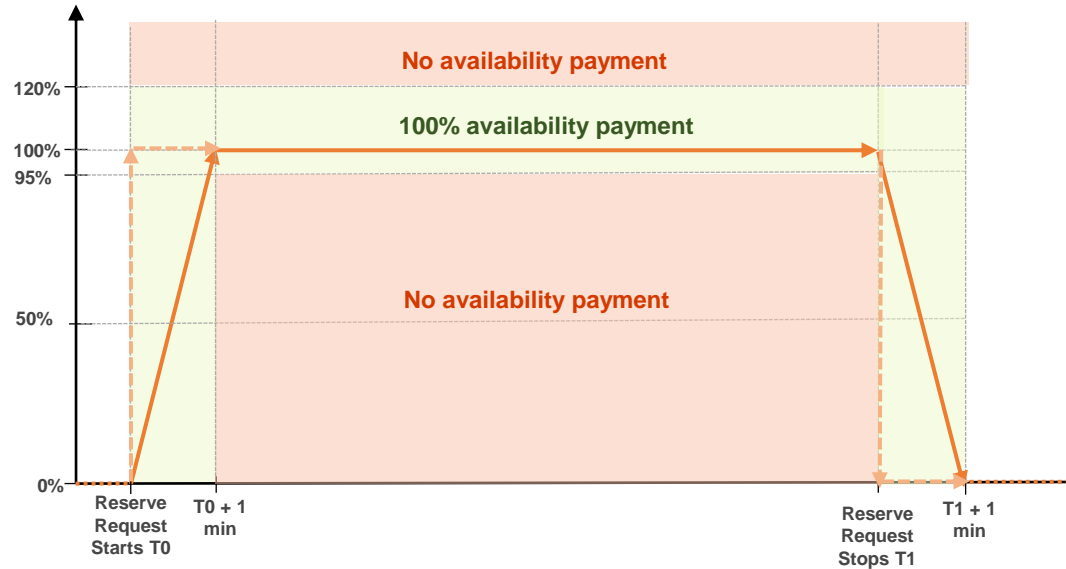
**Availability:**

- 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.

## Quick Reserve: Acceptable Delivery Envelope



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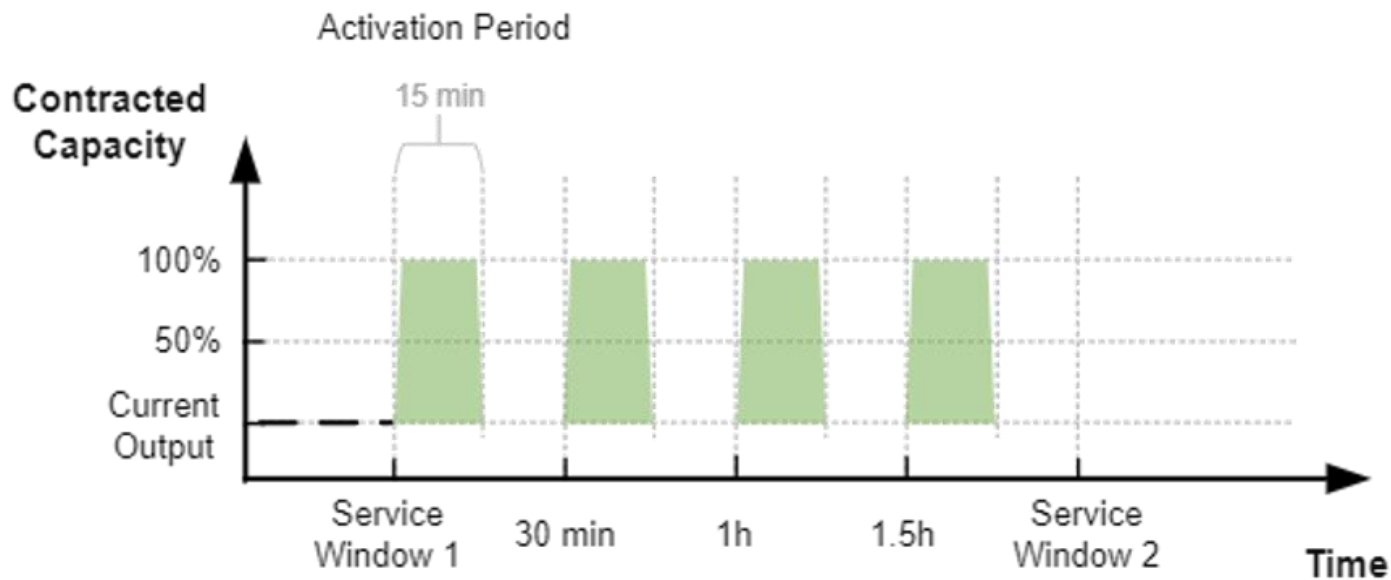
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- Over-delivery will be permitted up to 20% in addition to contracted capacity, however utilisation and availability payments will be capped at 100%.

## Energy Requirements

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

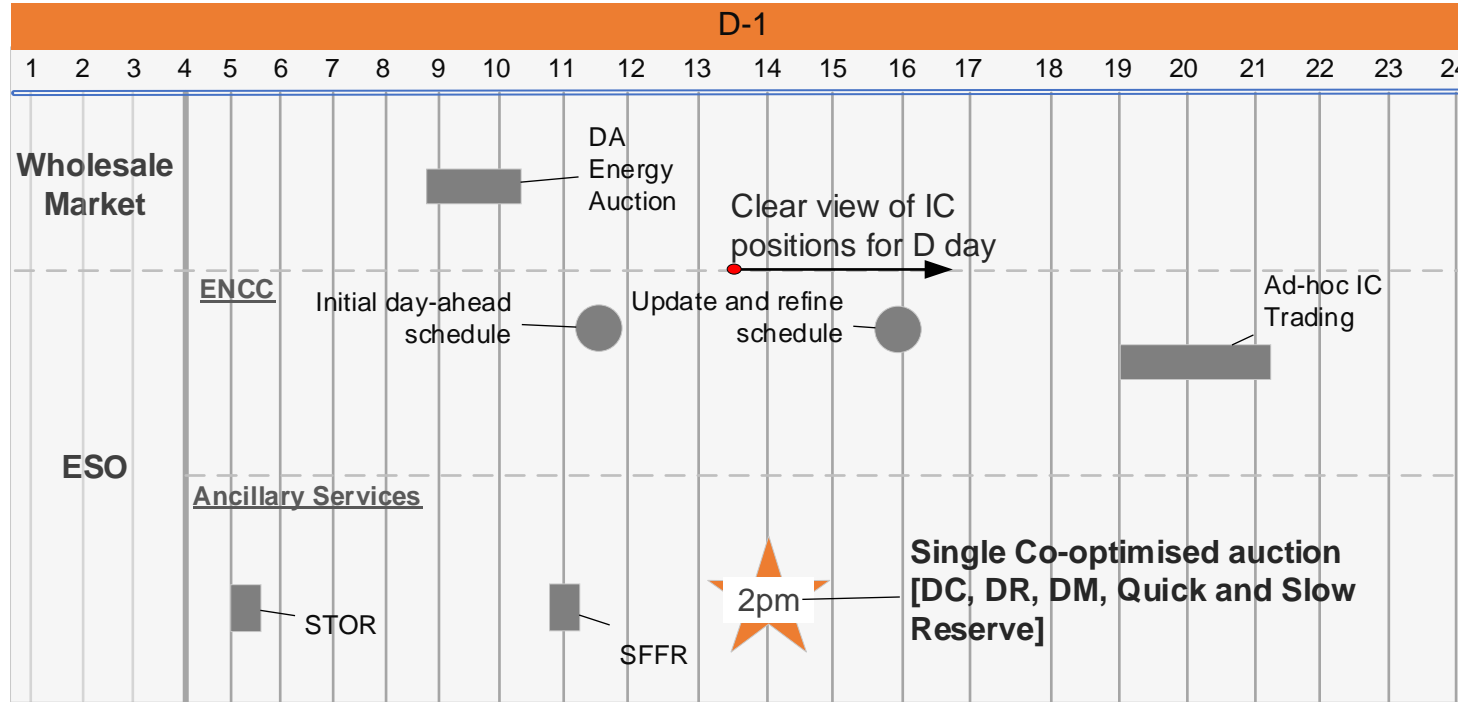
- For energy-limited assets, we propose a requirement for at least 1 activation at full contracted output per Settlement Period.
- As with other Response Services, it falls on providers to work out appropriate energy management strategies to avoid being penalised.



### 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.

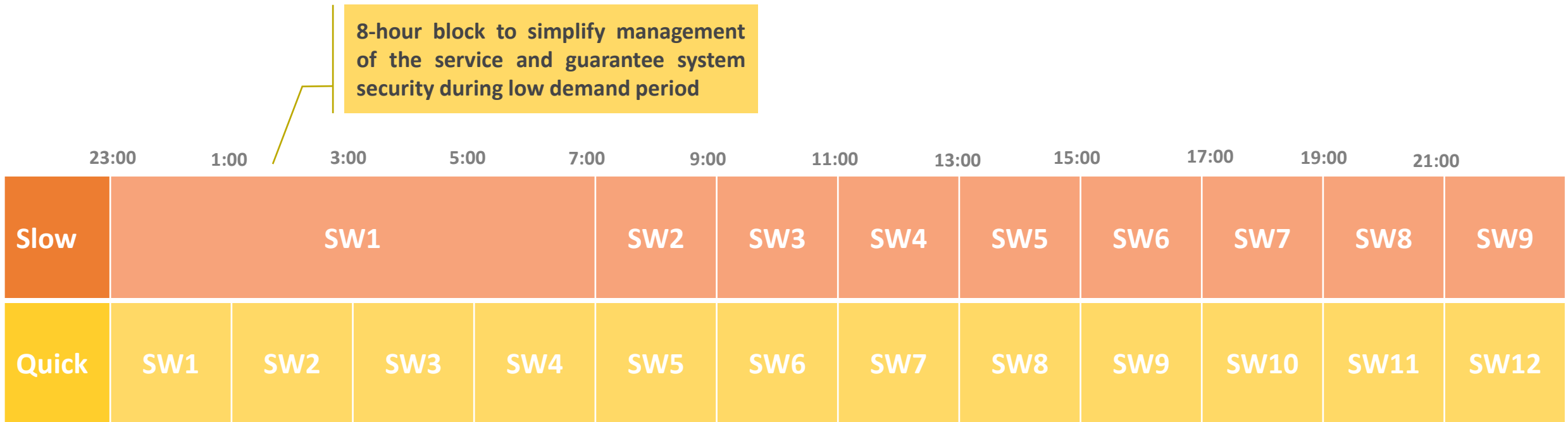
# Auction Timing



- 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 NGENSO 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.

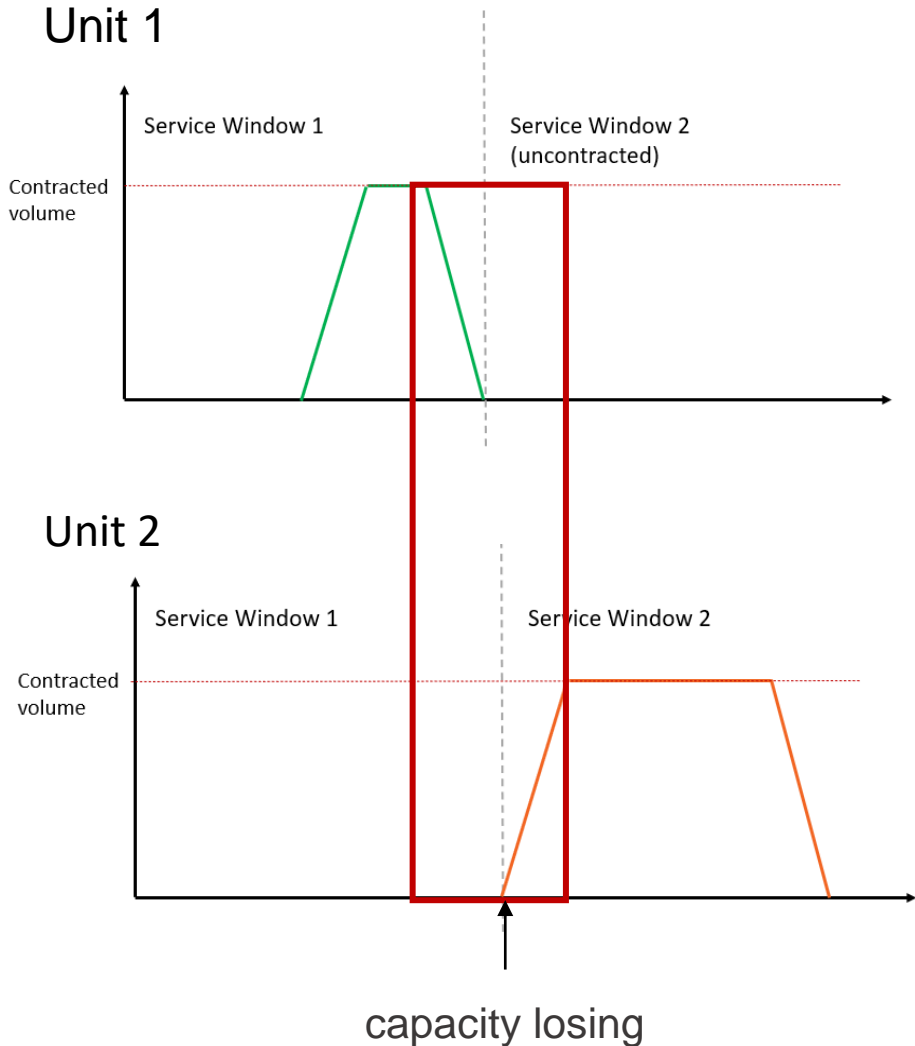
## Service Windows

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



# Crossover delivery

## Problem to be solved



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

## Revenue stacking/splitting

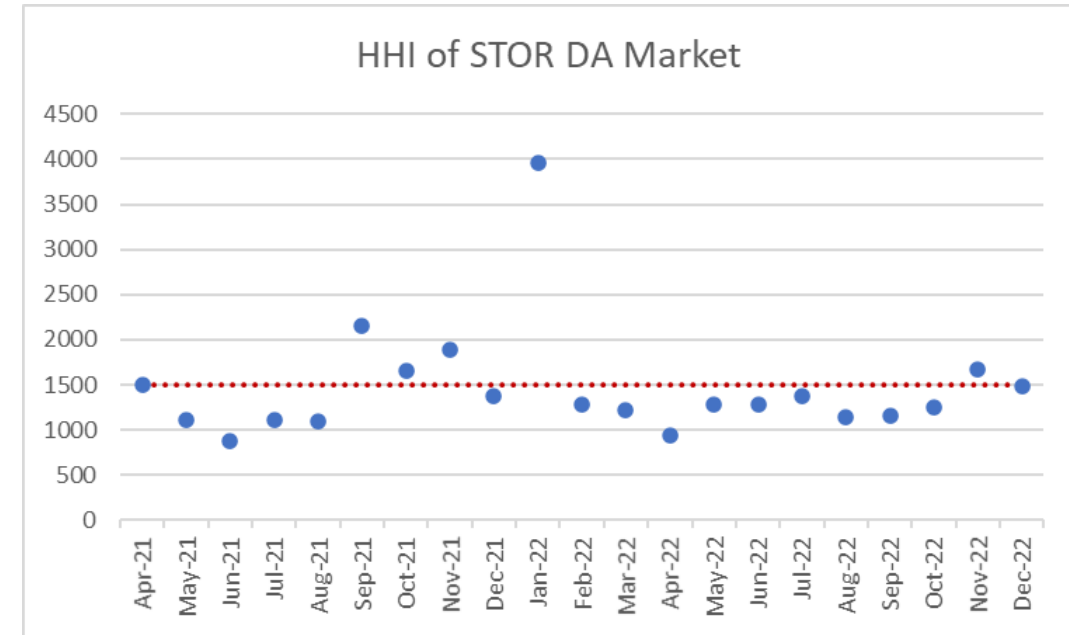
For the same service window, one unit is allowed to split its positive and negative capacity to provide different direction products of the same service. Same MW cannot be sold twice

Splitting possibilities		Dynamic Containment		Dynamic Moderation		Dynamic Regulation		Slow Reserve		Quick Reserve		Yes
		DCL	DCH	DML	DMH	DRL	DRH	PSR	NSR	PQR	NQR	
Dynamic Containment	DCL	N/A	Yes	Yes	Yes	Yes	Yes	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	N/A
	DCH	Yes	N/A	Yes	Yes	Yes	Yes	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	
Dynamic Moderation	DML	Yes	Yes	N/A	Yes	Yes	Yes	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	N/A
	DMH	Yes	Yes	Yes	N/A	Yes	Yes	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	
Dynamic Regulation	DRL	Yes	Yes	Yes	Yes	N/A	Yes	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	N/A
	DRH	Yes	Yes	Yes	Yes	Yes	N/A	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	
Slow Reserve	PSR	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	N/A	Yes	Not for Day 1	Not for Day 1	N/A
	NSR	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Yes	N/A	Not for Day 1	Not for Day 1	
Quick Reserve	PQR	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	N/A	Yes	N/A
	NQR	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Not for Day 1	Yes	N/A	



# Payment Mechanism

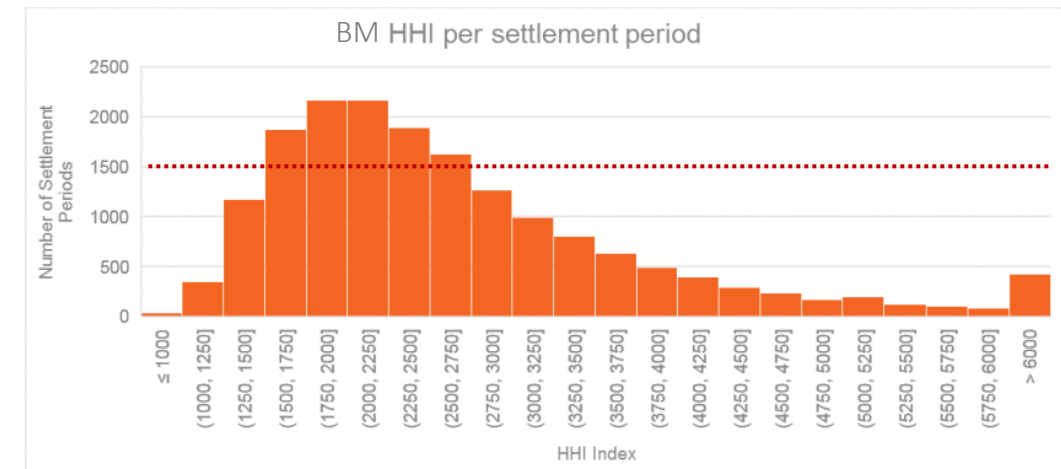
Criteria	Availability	Utilisation
Homogeneity	✓	✗
Full Information	✓	✗
Competition	✓	✓
Proposed Payment Mechanism	Pay-as-clear	Pay-as-bid



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

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

## Procurement Design

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



# Q&A Sessions

ESO Team



# 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 24<sup>th</sup> April
- If you have any questions, contact us: [box.futureofbalancingservices@nationalgrideso.com](mailto:box.futureofbalancingservices@nationalgrideso.com)
- Industry follow-up webinar on Thursday 30<sup>th</sup> March to cover the following areas:
  - Crossovers
  - Onboarding
  - Q&A

Sign up to 30<sup>th</sup> March Webinar here>>>>



[Webinar Sign up](#)

