You have been joined in listen only mode with your camera turned off

# ESO Operational Transparency Forum

23 February 2022

nationalgridESO

# Introduction | Sli.do code #OTF

**Please visit www.sli.do and enter the code #OTF to ask questions & provide us with post event feedback.**

We will answer as many questions as possible at the end of the session. We may have to take away some questions and provide feedback from our expert colleagues in these areas during a future forum. **Ask your questions early in the session to give more opportunity to pull together the right people for responses.**

**To tailor our forum and topics further we have asked for names (or organisations, or industry sector) against Sli.do questions. If you do not feel able to ask a question in this way please use the email:** box.NC.Customer@nationalgrideso.com

These slides, event recordings and further information about the webinars can be found at the following location:
https://data.nationalgrideso.com/plans-reports-analysis/covid-19-preparedness-materials

**Regular Topics**

Questions from last week
Business continuity
Demand review
Costs for last week
Outlook
Constraints

**Focus Areas**

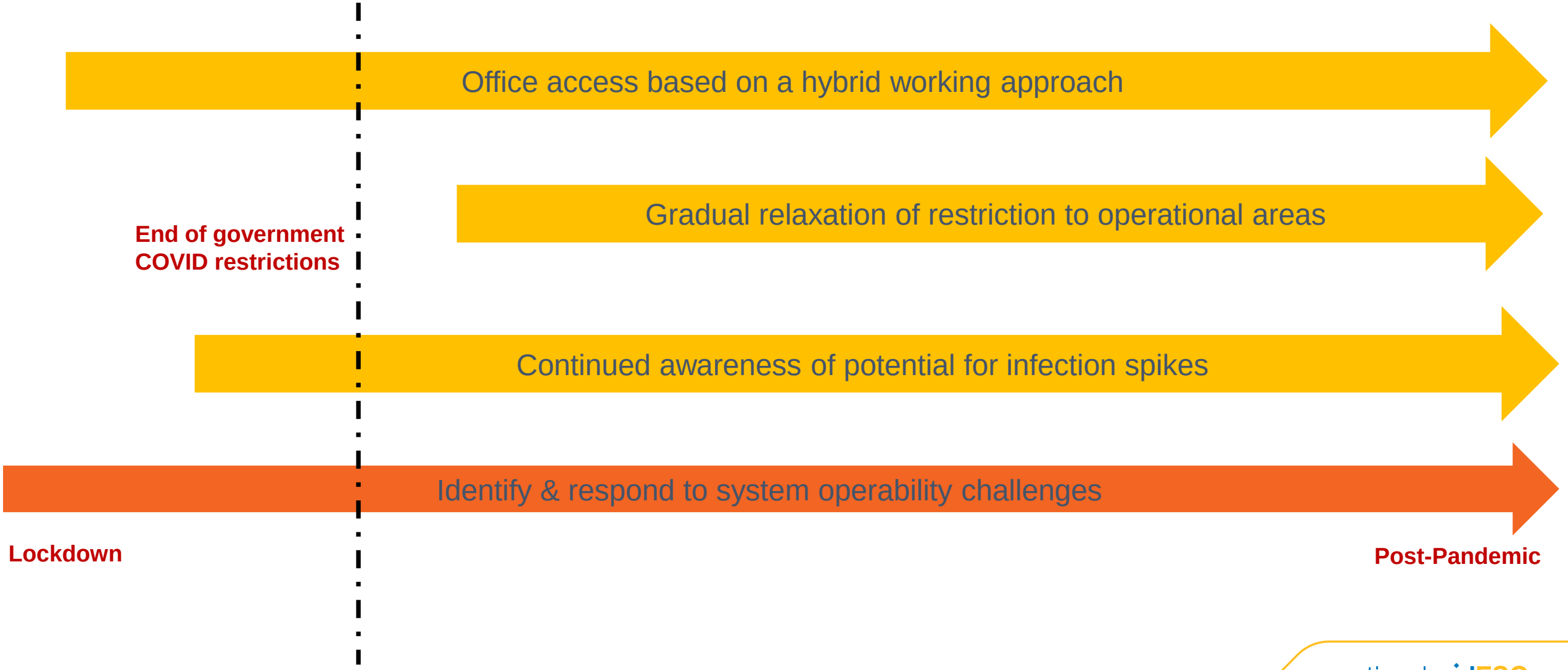
Constraint Sterilised Headroom

Frequency Response Publications

Markets Forum Day signpost

Domestic Reserve Scarcity Trial Update

# Protecting critical staff to maintain critical operations



# Future forum topics

**While we want to remain flexible to provide insight on operational challenges when they happen, we appreciate you want to know when we will cover topics.**

**We have the following deep dives planned:**

Date TBC - Manifest Error Process Overview

DC Performance Monitoring Update

# Questions outstanding from previous weeks

Q: Why the backward step by the ESO in terms of transparency of removing restoration costs visibility - this is a terrible retrograde step - how does the ESO justify this in terms of all the ESO's talk of improving transparency - here the ESO is hiding this information under 'others'

A: We apologise for the inconvenience caused by us making this step. This was made to simplify rather than attempt to hide anything. We can split the cost back out again from next month.

Q: Are Irish interconnectors still considered reliable. they seem to declare themselves unavailable when Irish TO sees fit, regardless of price differentials ( also goes towards, should they continue to get cap mech payments)

A: We don't comment on provider reliability. As we would do with any market participant we would use compliance processes should concerns arise.

# Questions outstanding from previous weeks

Outstanding questions we are still working on

Q: How are the SO-SO balancing trades and emergency trades (volume and price) reported real time to the market? If they are not reported real time what steps is the ESO taking NOW to introduce this transparency immediately?

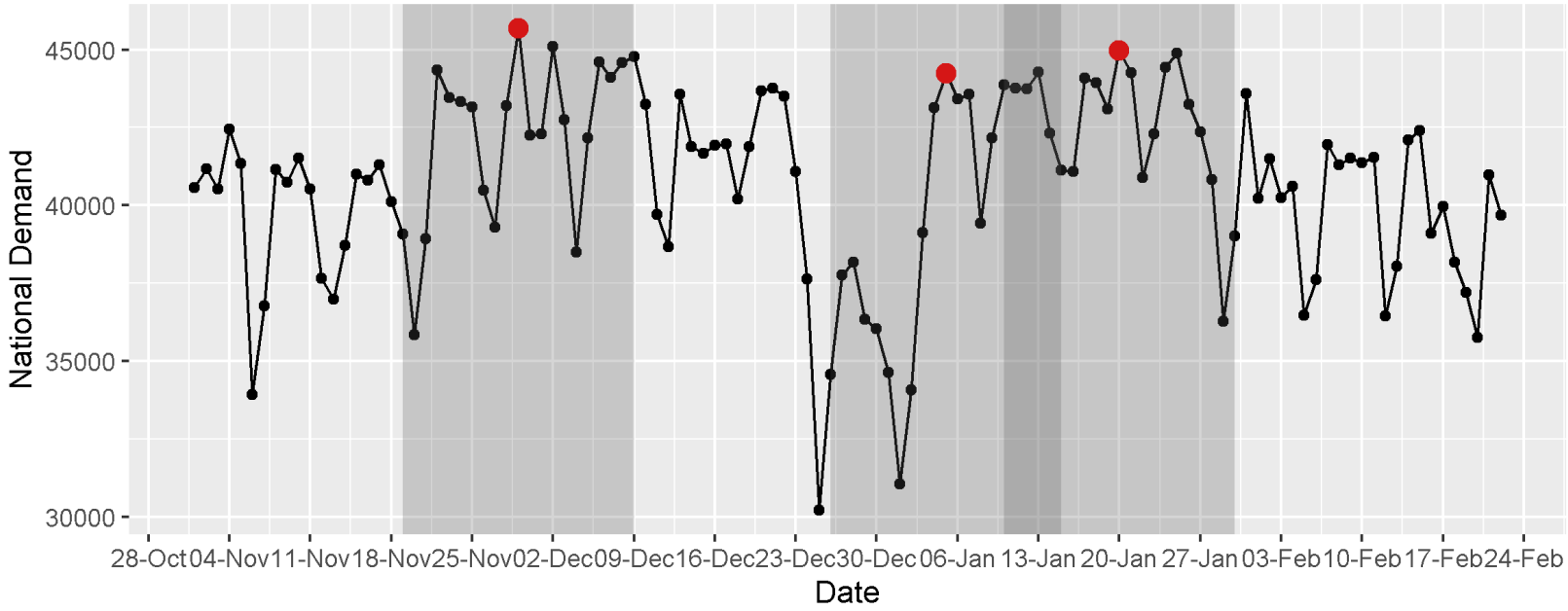
Q: Does REMIT data always take priority over PN/MEL data? E.g. with Keadby currently, we should ignore FPN/MEL's because REMIT says 0MW even though FPN/MEL may not. I.e. does this hierarchy always prevail?

Q: For assets participating in DC, if 10% of capacity is not held back when tendering (as per the rules), will this lead to punishment for those breaching this rule?

Q: Please can you provide a circular or some kind of update on the SP's/Dates that will be affected by the updated BSAD data.....otherwise we have to manually search through all of history to work out what has changed from a cashout perspective

Q: Thanks for the reply re So-SO trades. It was that area rather than NGESO Market Unilateral Interconnector Trading actions I was looking at. Just to see if the 'Neighbours' initiate more late notice activity. Referring to: Is there any indication of the dates and Volumes of SO-SO Trading initiated by Trading parties?. Noting that Ireland have a more volatile system with frequent large scale curtailment of Wind.

# Demand | Indicative Peak National Demand



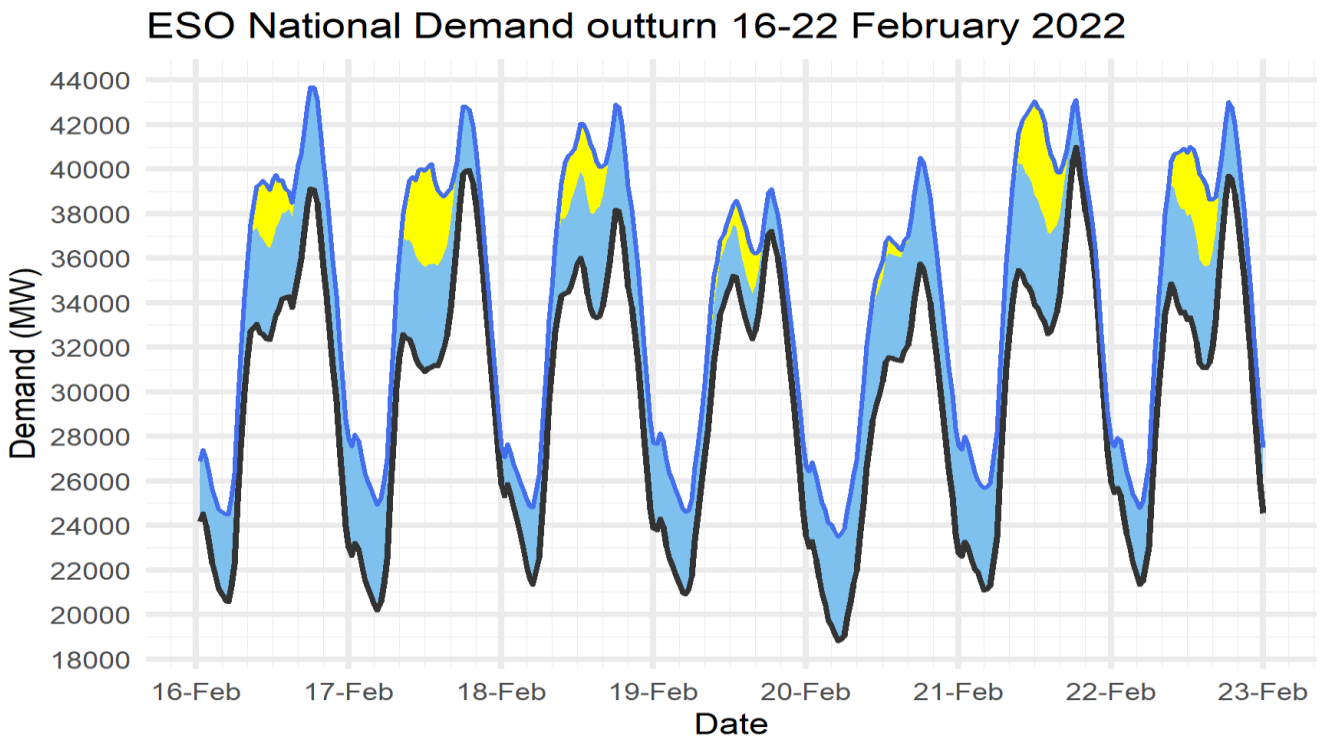

| ESO operational metering | | | |
|---|---|---|---|
| Date | Time (HH ending) | National Demand (MW) | Estimated triad avoidance (HH corresponding with the time of the peak) (MW) |
| 29/11/2021 | 1730 | 45679 | 0 |
| 20/01/2022 | 1730 | 44977 | 400 |
| 05/01/2022 | 1800 | 44245 | 0 |

We present National Demand operational metering because triad demand is calculated on the basis of demand excluding interconnector exports. This definition of demand is neither National Demand nor Transmission Demand, but more closely tracked by National Demand.

National Demand does not include station load.

Indicative triad demand on Elexon's BMRS website quotes "GB Demand" which is based on the Transmission System Demand definition (it adds 500MW of station load onto the National Demand).
It shows time as half hour beginning.

# Demand | Last week demand out-turn

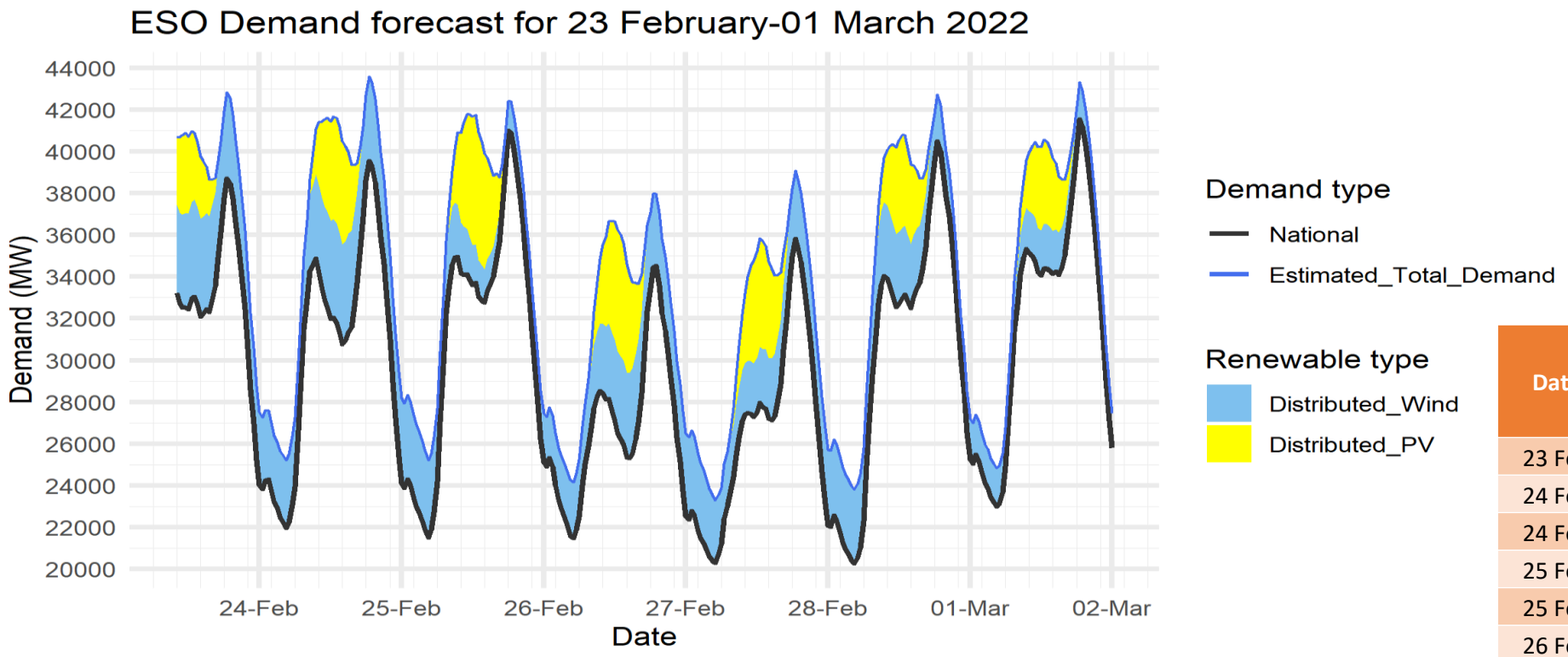



| | | FORECAST (Wed 16 Feb) | | OUTTURN | | | |
|---|---|---|---|---|---|---|---|
| Date | Forecasting Point | National Demand (GW) | Dist. wind (GW) | National Demand (GW) | Triad Avoidance est. (GW) | N. Demand adjusted for TA (GW) | Dist. wind (GW) |
| 16 Feb | Evening Peak | 39.2 | 4.5 | 39.1 | 0.0 | 39.1 | 4.6 |
| 17 Feb | Overnight Min | 19.7 | 4.7 | 20.2 | n/a | n/a | 4.7 |
| 17 Feb | Evening Peak | 41.1 | 2.7 | 40.0 | 0.0 | 40.0 | 2.7 |
| 18 Feb | Overnight Min | 22.1 | 3.2 | 21.4 | n/a | n/a | 3.5 |
| 18 Feb | Evening Peak | 39.5 | 4.0 | 38.2 | 0.0 | 38.2 | 4.8 |
| 19 Feb | Overnight Min | 20.8 | 3.2 | 20.9 | n/a | n/a | 3.7 |
| 19 Feb | Evening Peak | 37.6 | 2.3 | 37.2 | 0.0 | 37.2 | 1.9 |
| 20 Feb | Overnight Min | 20.2 | 3.1 | 18.8 | n/a | n/a | 4.7 |
| 20 Feb | Evening Peak | 36.0 | 4.2 | 35.8 | 0.0 | 35.8 | 4.8 |
| 21 Feb | Overnight Min | 19.7 | 4.2 | 21.1 | n/a | n/a | 4.6 |
| 21 Feb | Evening Peak | 41.7 | 2.4 | 41.0 | 0.0 | 41.0 | 2.2 |
| 22 Feb | Overnight Min | 21.6 | 3.3 | 21.4 | n/a | n/a | 3.4 |
| 22 Feb | Evening Peak | 40.2 | 3.8 | 39.7 | 0.0 | 39.7 | 3.4 |

The black line (National Demand) is the measure of portion of total GB customer demand that is supplied by the transmission network.

Blue line serves as a proxy for total GB customer demand. It includes demand supplied by the distributed wind and solar sources, but it does not include demand supplied by non-weather driven sources at the distributed network for which ESO has no real time data.

# Demand | Week Ahead



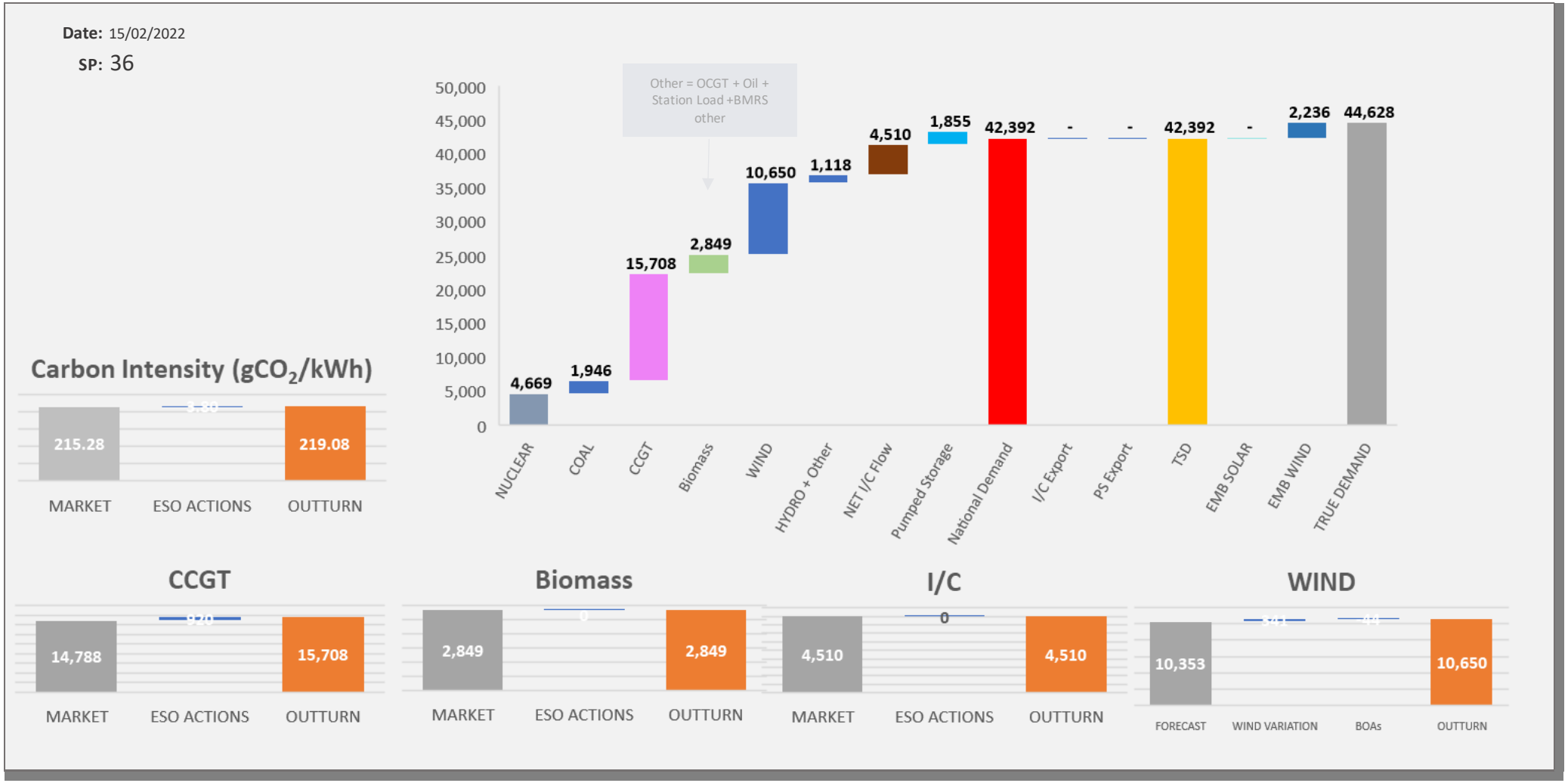

| | | FORECAST (Wed 23 Feb) | |
|---|---|---|---|
| Date | Forecasting Point | National Demand (GW) | Dist. wind (GW) |
| 23 Feb | Evening Peak | 38.7 | 4.1 |
| 24 Feb | Overnight Min | 22.0 | 3.2 |
| 24 Feb | Evening Peak | 39.5 | 4.0 |
| 25 Feb | Overnight Min | 21.5 | 3.7 |
| 25 Feb | Evening Peak | 41.0 | 1.4 |
| 26 Feb | Overnight Min | 21.5 | 2.7 |
| 26 Feb | Evening Peak | 34.5 | 3.5 |
| 27 Feb | Overnight Min | 20.3 | 3.0 |
| 27 Feb | Evening Peak | 35.8 | 3.3 |
| 28 Feb | Overnight Min | 20.3 | 3.6 |
| 28 Feb | Evening Peak | 40.5 | 2.2 |
| 01 Mar | Overnight Min | 23.0 | 1.8 |
| 01 Mar | Evening Peak | 41.5 | 1.7 |

The black line (National Demand) is the measure of portion of total GB customer demand that is supplied by the transmission network.

Blue line serves as a proxy for total GB customer demand. It includes demand supplied by the distributed wind and solar sources, but it does not include demand supplied by non-weather driven sources at the distributed network for which ESO has no real time data.

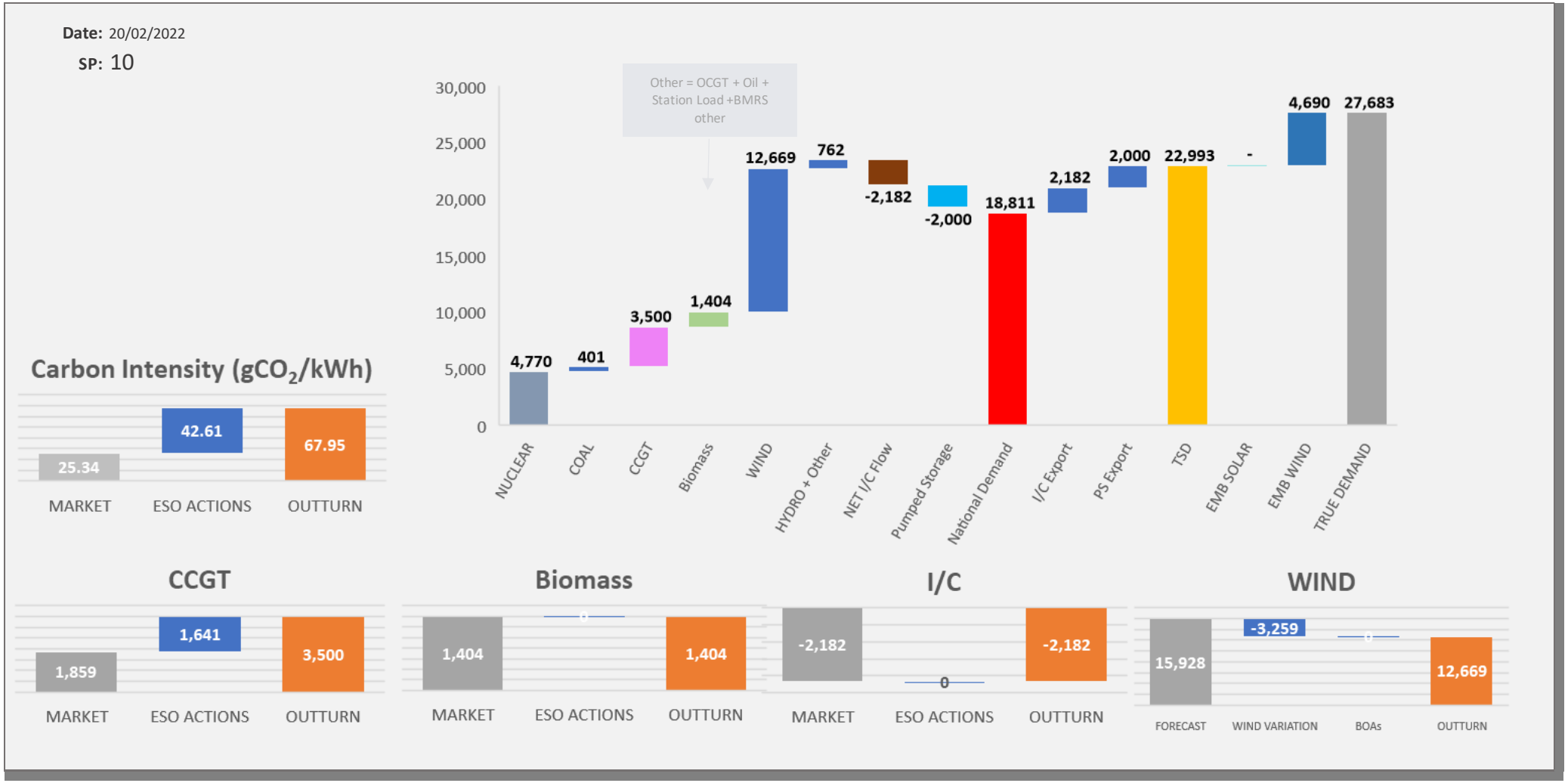
First time ESO shares its Triad Avoidance adjusted **National Demand** forecast is after 21:00 on D-1

# ESO Actions | Tuesday 15 February Peak



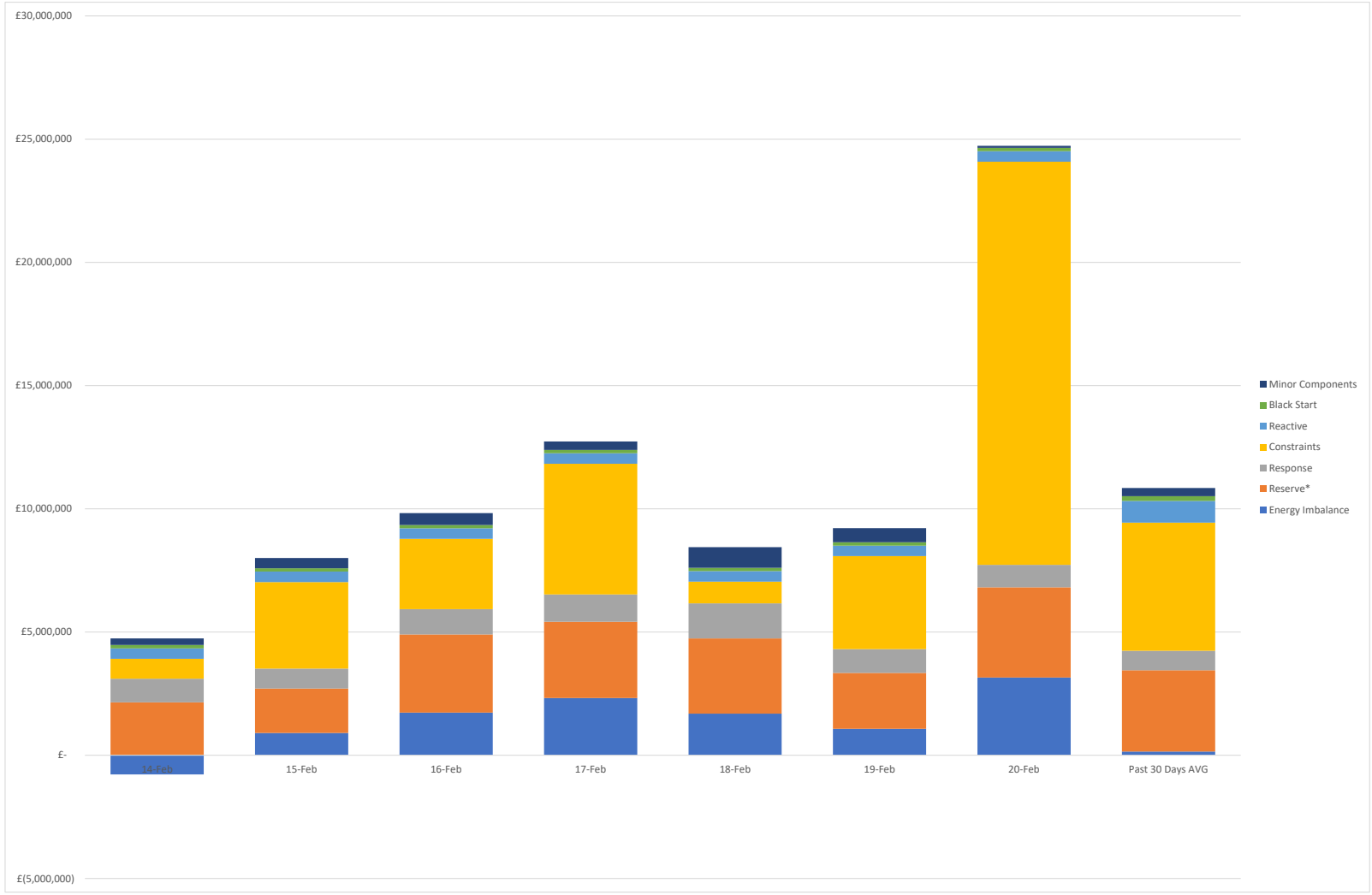

Carbon Intensity data on data portal: https://data.nationalgrideso.com/carbon-intensity1/carbon-intensity-of-balancing-actions

# ESO Actions | Sunday 20 February Minimum




Carbon Intensity data on data portal: https://data.nationalgrideso.com/carbon-intensity1/carbon-intensity-of-balancing-actions

# Transparency | Costs for the last week

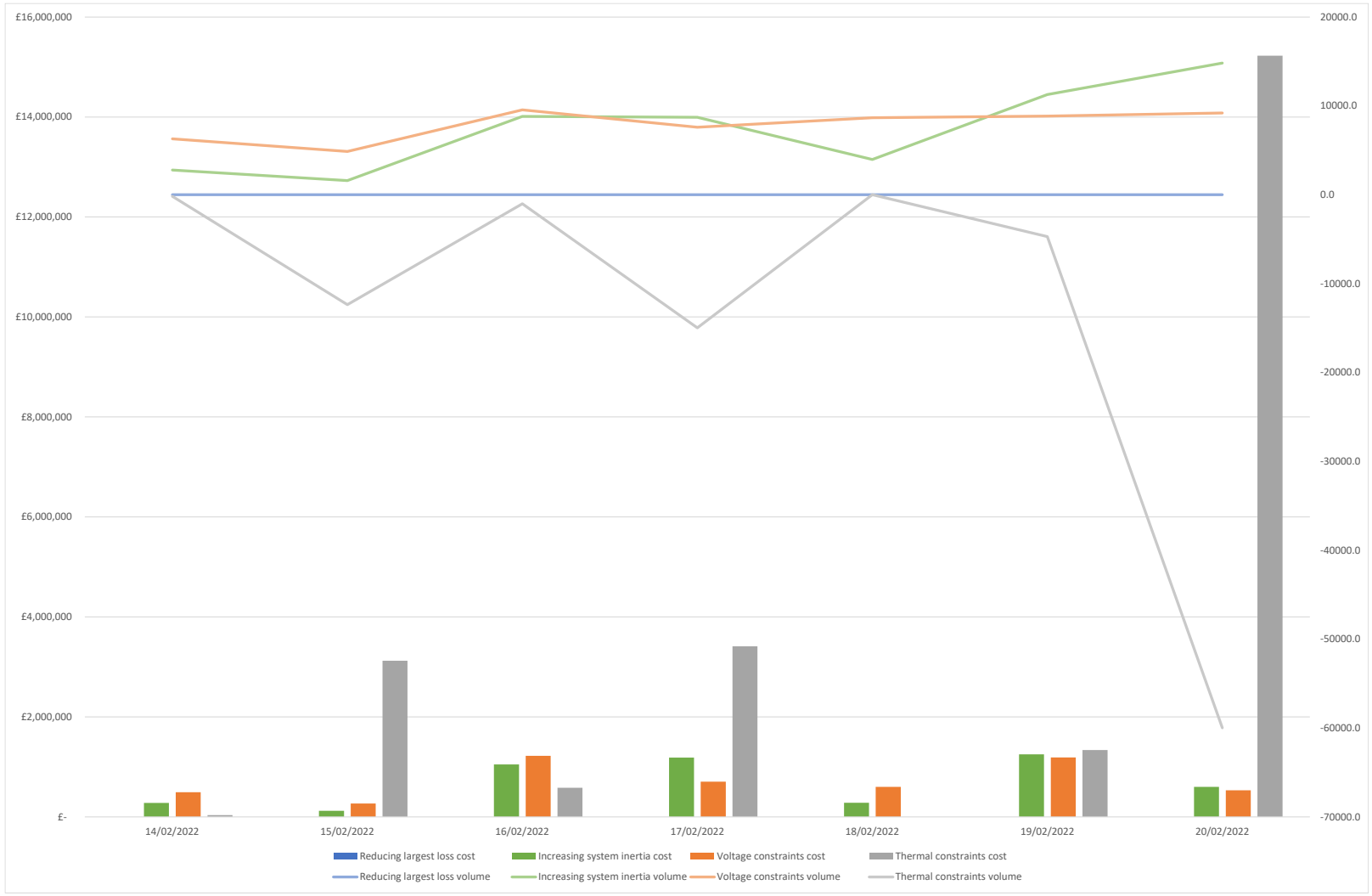



Sunday 20th was the most expensive day with a spend of nearly £25m. Thursday 17th the daily spend was around £13m.

The main component of the daily spend on most days of the week was costs associated to constraint actions.

**Past 30 Days Average added**

# Transparency | Constraint cost breakdown




**Thermal – network congestion**
Throughout all days, actions were required to manage thermal constraints, with little to no intervention required on Monday, Wednesday, Friday and Saturday. Large volume of actions were required on Sunday.

**Voltage**
Action taken to synchronise generation to meet voltage requirements were required throughout the week.

**Managing largest loss for RoCoF**
No intervention required to manage largest loss on interconnectors.

**Increasing inertia**
intervention required to increase minimum inertia every day
https://data.nationalgrideso.com/balancing/constraint-breakdown

# Operational margins: week ahead

## How to interpret this information

This slide sets out our view of operational margins for the next week. We are providing this information to help market participants identify when tighter periods are more likely to occur such that they can plan to respond accordingly.

The table provides our current view on the operational surplus based on expected levels of generation, wind, imports and peak demand. This is based on information available to National Grid ESO as of 23 February and is subject to change. It represents a view of what the market is currently intending to provide before we take any actions.

The indicative surplus is a measure of how tight we expect margins to be and the likelihood of the ESO needing to use its operational tools.

For higher surplus values, margins are expected to be adequate and there is a low likelihood of the ESO needing to use its tools. In such cases, we may even experience exports to Europe on the interconnectors over the peak depending on market prices.

For lower (and potentially negative) surplus values, then this indicates operational margins could be tight and that there is a higher likelihood of the ESO needing to use its tools, such as issuing margins notices. We expect there to be sufficient supply available to respond to these signals to meet demand.

Margins are adequate for the next seven days.

| Day | Date | Notified conventional generation (MW) | Wind (MW) | Interconnector availability (MW) | Peak demand (MW) | Indicative surplus (MW) |
|---|---|---|---|---|---|---|
| Thu | 24/02/2022 | 41360 | 15329 | 3750 | 39861 | 15202 |
| Fri | 25/02/2022 | 41494 | 5865 | 4250 | 40730 | 6657 |
| Sat | 26/02/2022 | 40861 | 14106 | 4250 | 35260 | 17593 |
| Sun | 27/02/2022 | 42722 | 13891 | 4250 | 36819 | 16987 |
| Mon | 28/02/2022 | 42904 | 10847 | 4250 | 40469 | 12620 |
| Tue | 01/03/2022 | 42927 | 5536 | 4250 | 42064 | 5885 |
| Wed | 02/03/2022 | 42906 | 8969 | 4250 | 41784 | 9361 |

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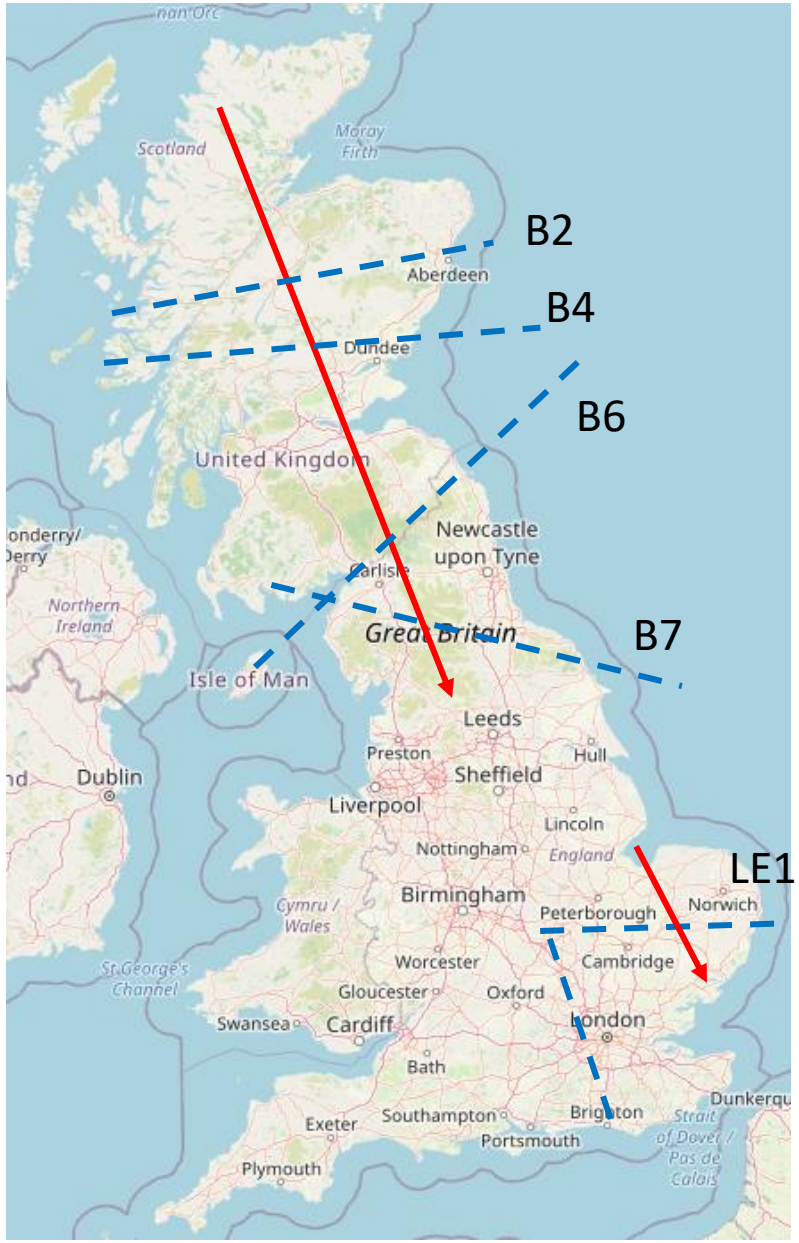
# Transparency | Constraint Capacity

| 100% transfer capacity (MW) | |
|---|---|
| B6 | 5400 |
| B7 | 8250 |
| B2/B4 | 2700 |




Day ahead flows and limits, and the 24 month constraint limit forecast are published on the ESO Data Portal:
https://data.nationalgrideso.com/data-groups/constraint-management

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# Headroom and Sterilized Headroom

The purpose of this presentation is to explain in a simple way what the Headroom of the generating units is and how it relates to constraints costs when operating the system.

£(Constraint Sterilized Headroom) => Constraint Costs

# Operating Reserve

Operating Reserve is needed to operate the transmission system securely enabling the frequency control by providing the reserve energy required to meet the demand when there are shortfalls, due to demand forecast changes or generation breakdowns.

It is made up of:

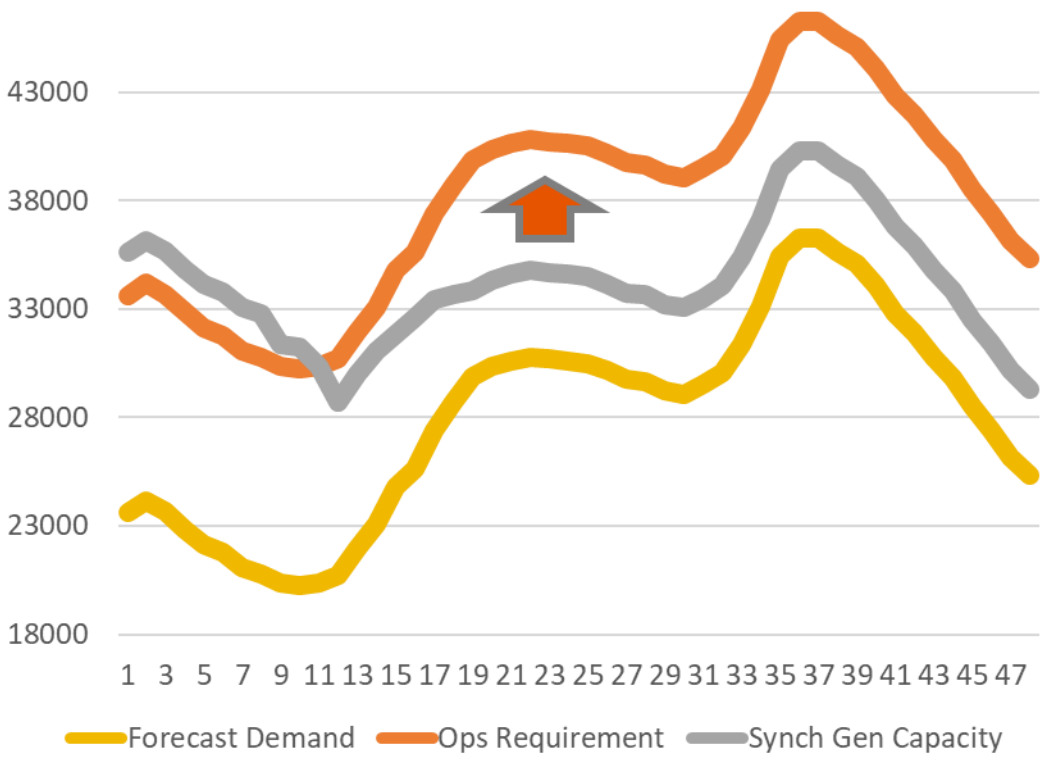
a) Scheduled Reserve: BM units and/or balancing services providers that are able to regulate their output automatically or on receipt of despatch instructions, providing Synchronized Generation Capacity.
b) STOR: capacity capable of generating (normally from standstill) or reducing demand within a defined period.

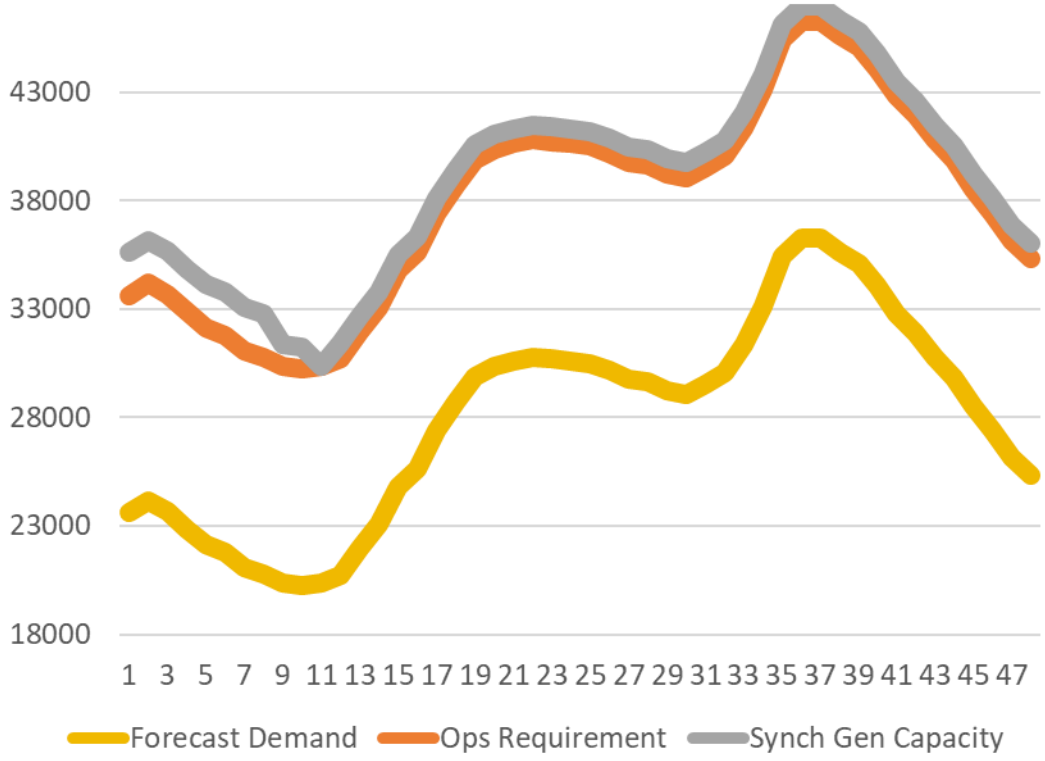
Where the difference between the Synchronized Generation Capacity available and the Forecast Demand is less than the Operating Reserve Requirements action must be taken to increase the Operating Reserve.

# Operating Reserve Requirements

Action must be taken to increase the Operating Reserve if:

[∑Synchronized Generation Capacity] – Forecast Demand < Operating Reserve Requirements



# Headroom and Sterilized Headroom

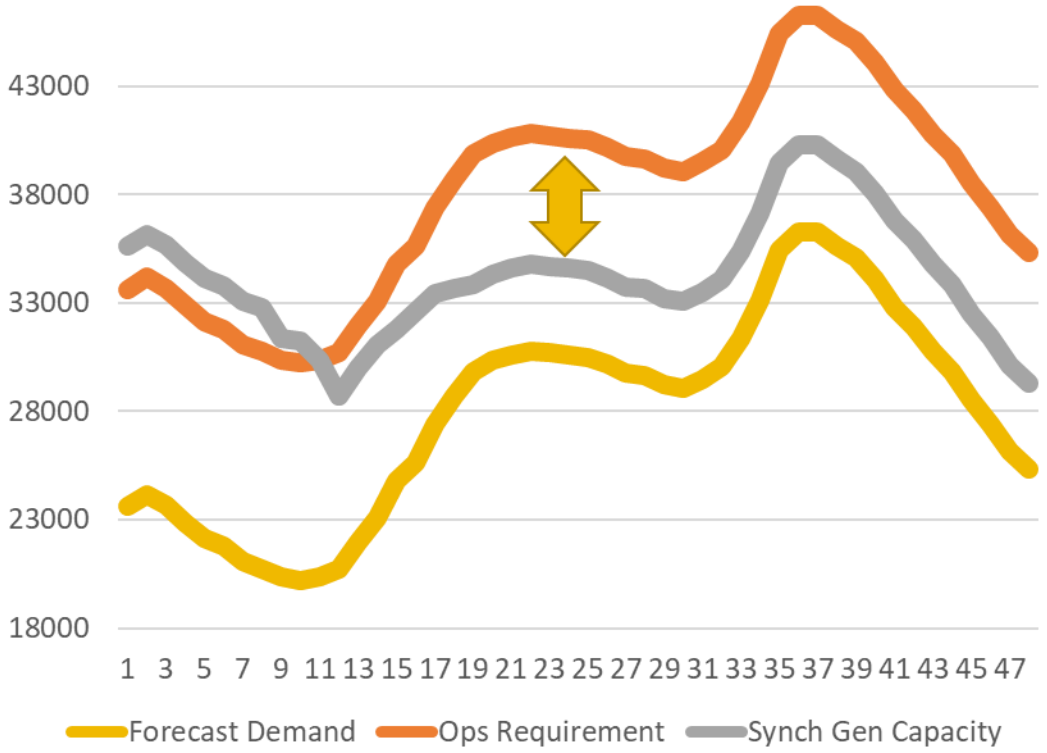
Headroom represents spare generation capacity on operating generating units which the ESO can potentially access to meet its Operating Reserve requirements.

Headroom become inaccessible if these generators are located behind an export constraint boundary

The Headroom that is available on the constrained generation become Sterilized Headroom and needs to be replaced elsewhere outside the constraint boundary through actions in the BM at a cost.

The cost of replacing this Sterilised Headroom can contribute materially to overall Constraint Costs.

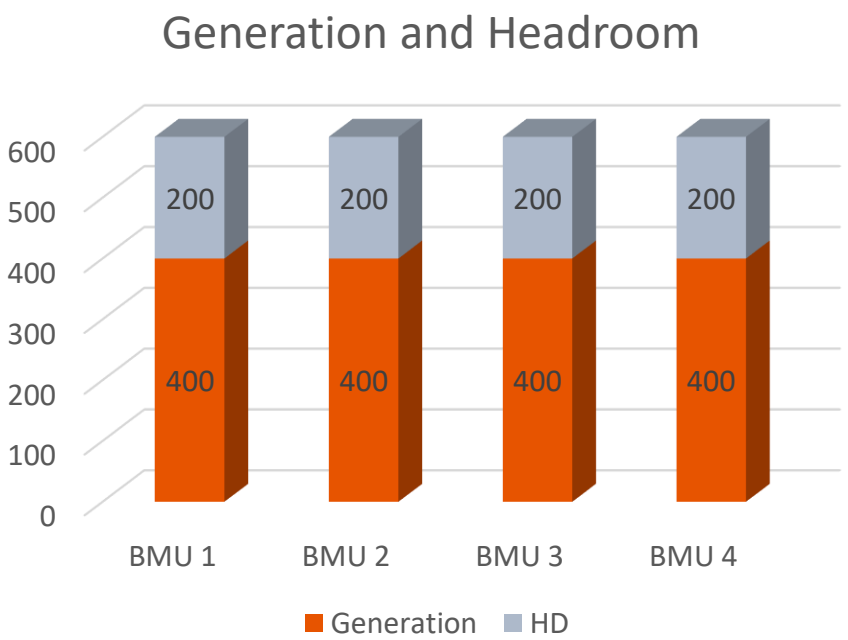
For this reason this cost is categorized as Constraint Sterilized Headroom.



# Headroom and Sterilized Headroom

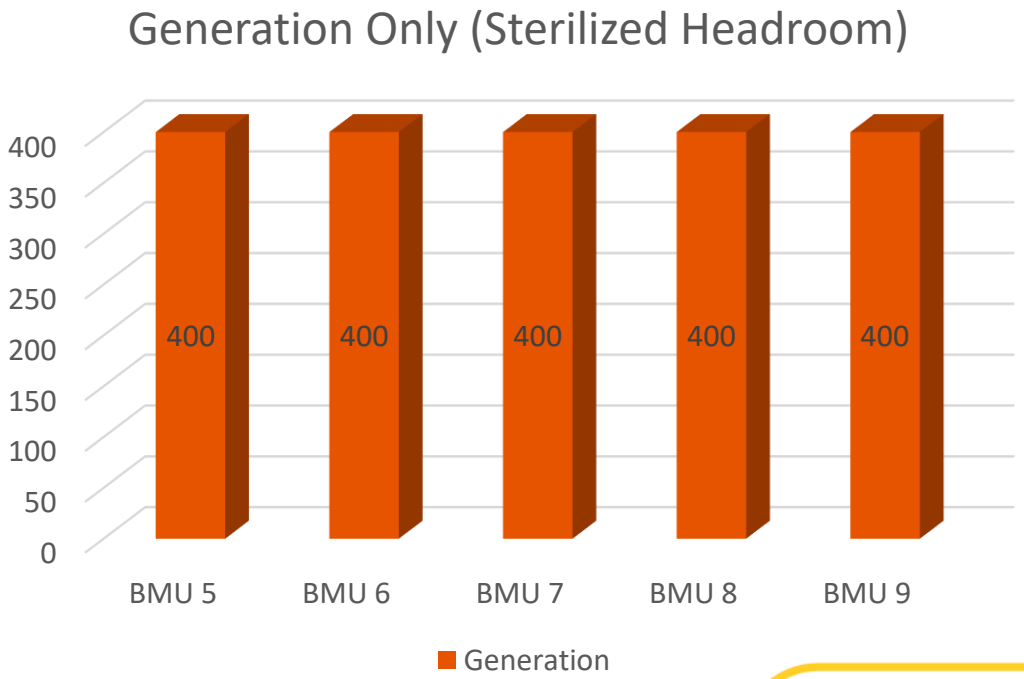
- 4x600MW BMUs running at 400MW each
- Generating 1600MW and creating 800MW Headroom

They are locally supplying a demand of 200MW and sending out to the rest of the network a power flow of 1400MW



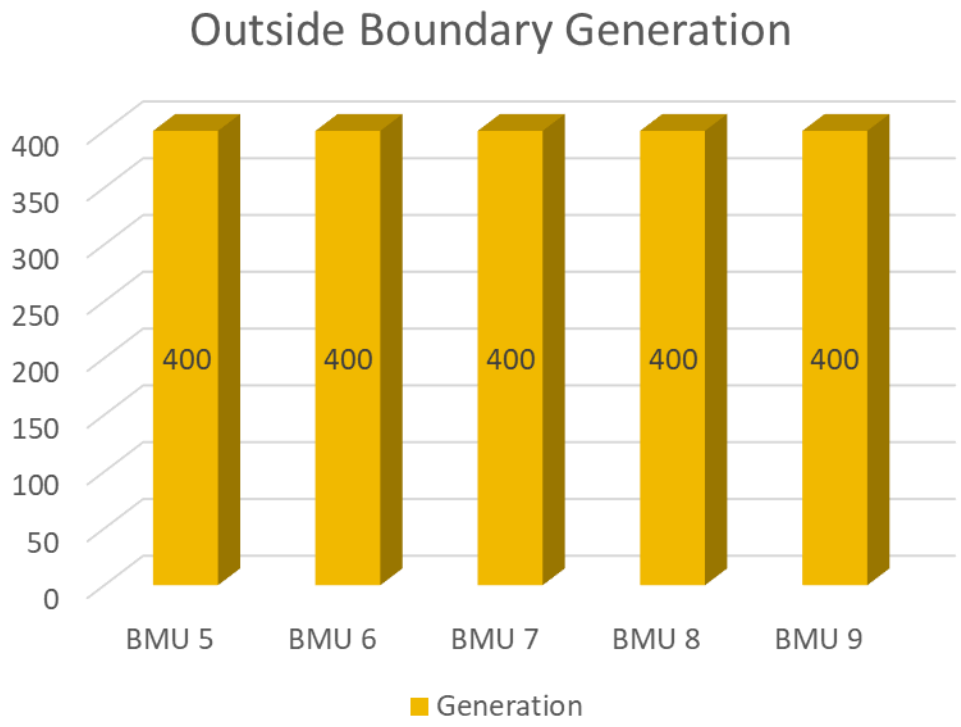

A constraint limit become active and only 1200MW can be exported

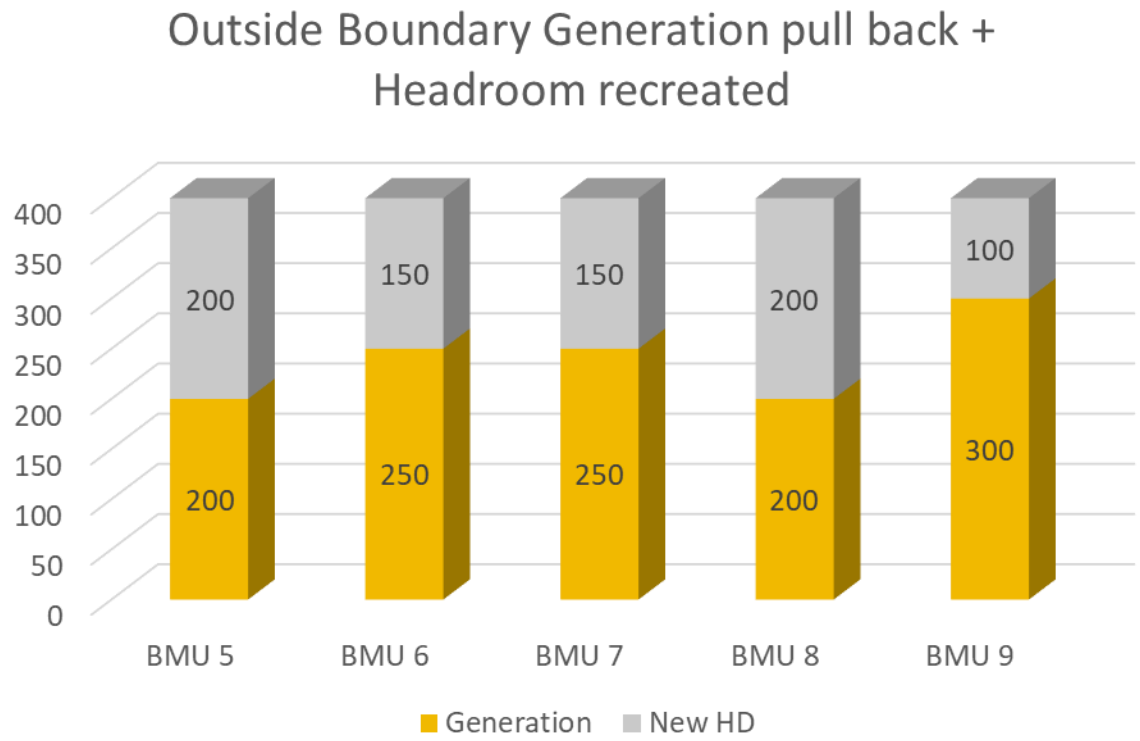
This means that the 800MW Headroom won't be available if/when required.



# Sterilized Headroom

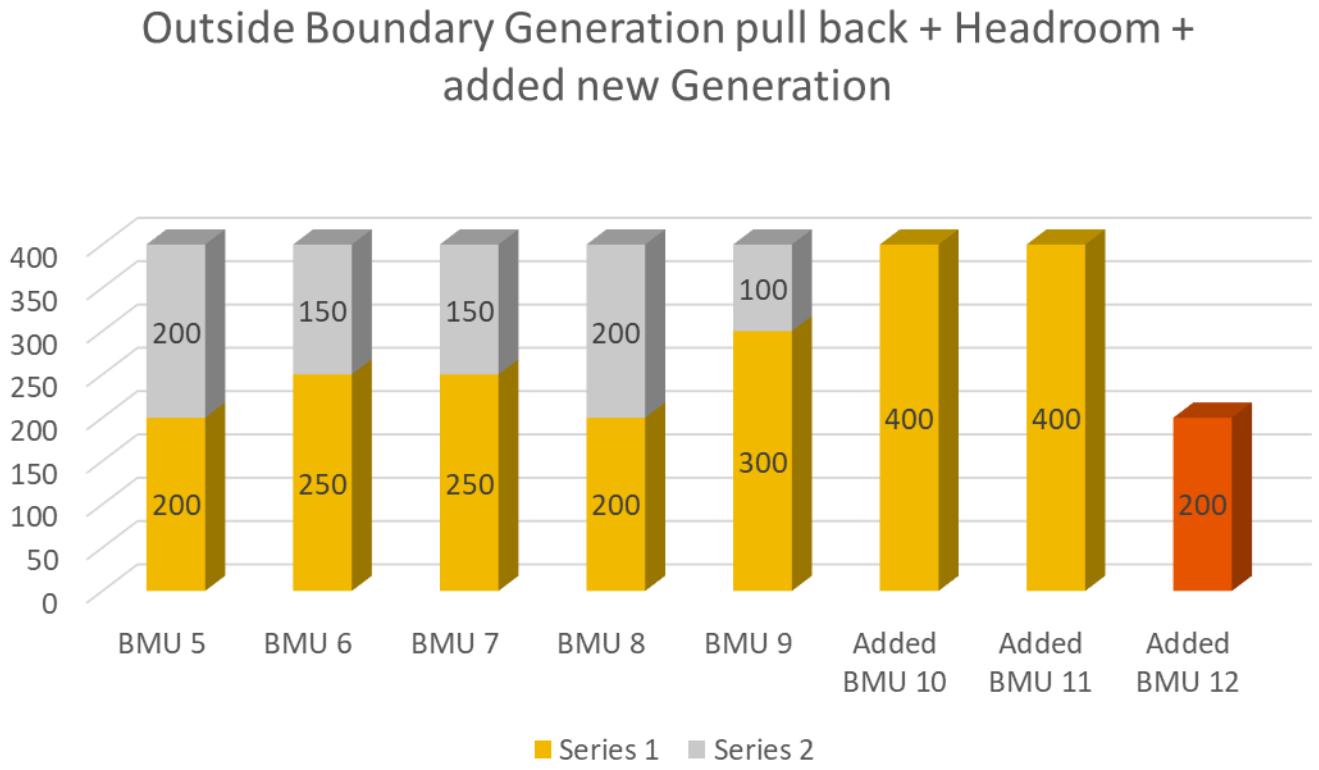
SO Actions outside constraint boundary:
1) Pull back units outside the constrained area to recreate the missing 800MW Headroom.



# Constraint Sterilized Headroom

SO Actions outside constraint boundary:
1) Pull back units outside the constrained area to recreate the missing 800MW Headroom.
2) Synchronize and instruct to generate additional units to cover for the energy removed due to action one and the energy that the constraint blocked, in our case is 200MW.




The cost for replacing the Sterilised Headroom can contribute materially to overall Constraint Costs.

For this reason this cost is classified as Constraint Sterilized Headroom.

# Constraint Sterilized Headroom Complexities

Sterilised Operating Reserve refers to BMUs which are unable to achieve maximum output as they are located behind a constraint boundary which cannot transmit all of the necessary power through the available assets

Constrained Margin Costs are incurred when actions are taken, which have the combined effect of:

- Replacing Sterilised Operating Reserve behind a constraint boundary
- Increasing the amount of Positive Reserve available for operation

The action must only partially replace Sterilised Operating Reserve and partially increase the amount of Positive Reserve available in order to have the spend associated classified as a Non-Constraint Cost and categorized as Constrained Margin Cost.

If the action is taken to completely replace Sterilised Operational margin then, this can be treated as Sterilized Headroom and the costs are assigned to Constraint Costs.

Cost categorisation is based on the total cost of the action. For constraints, this will be the cost of the action to resolve the constraint plus the calculated cost of replacing that energy. In a tight margin situation the cost of replacing energy is typically higher due to scarcity pricing in the market and so the Constraint Sterilized Headroom cost can become much higher should constraints be active on the system during periods of tight margin.

# Markets Forum Planning Update

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- **Date:** Tuesday 22nd March
- **Hybrid event**:
  - Capacity for 180 people at the RSA in London (on the Strand)
  - Option to join virtually
- **How to sign up**: sign up here
- **Who to contact**: planning team for questions (Kirsten Shilling, Vicky Allen, Frank Kasibante, Ruth Roberts, Izzie Sunnucks)

| Agenda | |
|---|---|
| **Presenting** | **Topic** |
| Market Development | Markets Roadmap |
| FSO | Update on FSO |
| Market Strategy | Net Zero Market Reform |
| Fintan | TBD |
| Panel Discussion | TBD |
| Networking | Opportunity to talk with Senior Leaders |

# Domestic Reserve Scarcity trial - update

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**Recap**

- NG ESO have collaborated with Octopus Energy on a trial exploring domestic flexibility within the suppliers smart meter customer base.
- Domestic households will be incentivised to reduce their demand across a 2-hour time period.
- Demand turn down events will be initiated at the day ahead stage, based on thresholds set in publicly available data.
- The trial period will until the end of March 2022, and look to enact up to 10 separate events.

**Update**

- Trial period live from 11/02, with customers being recruited in several waves across the last 2 weeks.
- 100,000 customers have opted in to participate in the trial already.
- Will be running a trial event this week (Thursday 24/02: 16:30 – 18:30), to build a reference point for forecasting, baselining and participation for future events. Increasing understanding of the accuracy of the chosen methodology and allowing for improvements to be made for live trial events.
- Given recent market conditions and no triggered events the thresholds initially chosen will be reviewed to ensure they still align with trial objectives. Any amendments to these will be reported at future OTF's.

**Useful Links**

- Original OTF presentation (02.02.2022)
- Octopus Energy Blog

# ESO Frequency Response Requirements Update – February 2022

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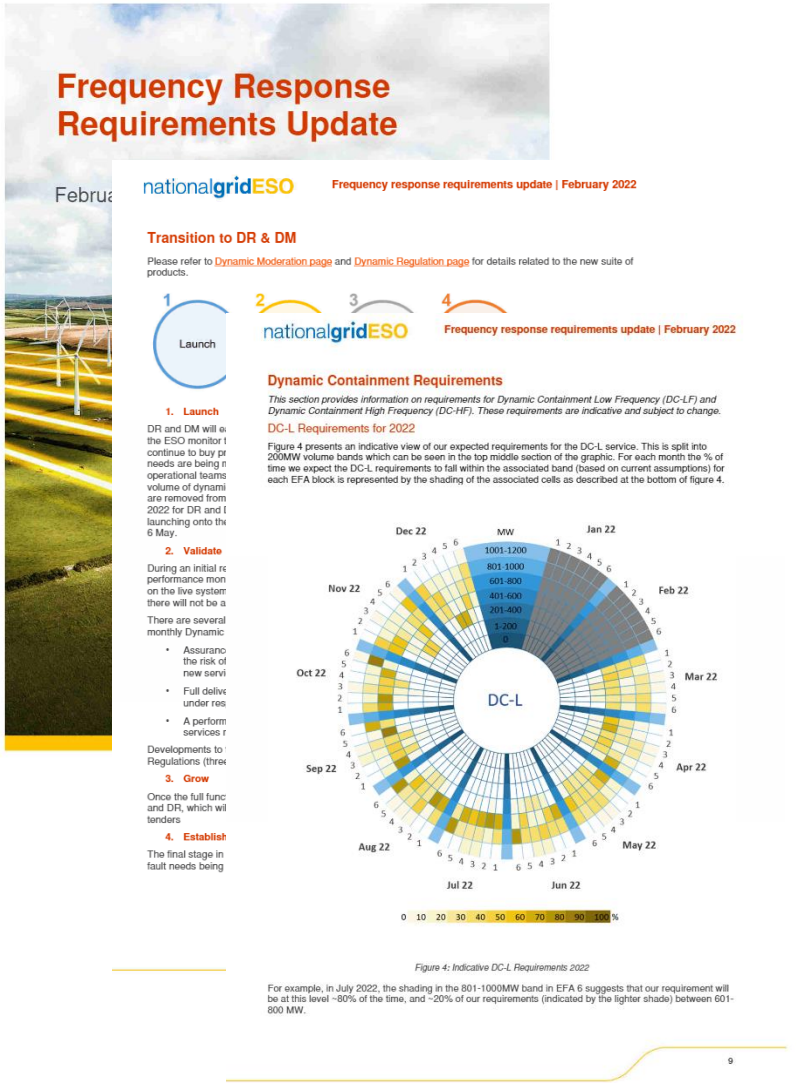
- **ESO Frequency Response Requirements Update:**
  - **[Published on the ESO Data Portal]**
  - **Includes details on our plans to transition to our new response services**
  - **Provides a view of indicative requirements for both the new services and existing services**



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# Audience Q&A Session

ⓘ Start presenting to display the audience questions on this slide.

# Q&A

**Please remember to use the feedback poll after the event. We welcome feedback to understand what we are doing well and how we can improve the event ongoing.**

If you have any questions after the event, please contact the following email address: box.NC.Customer@nationalgrideso.com

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