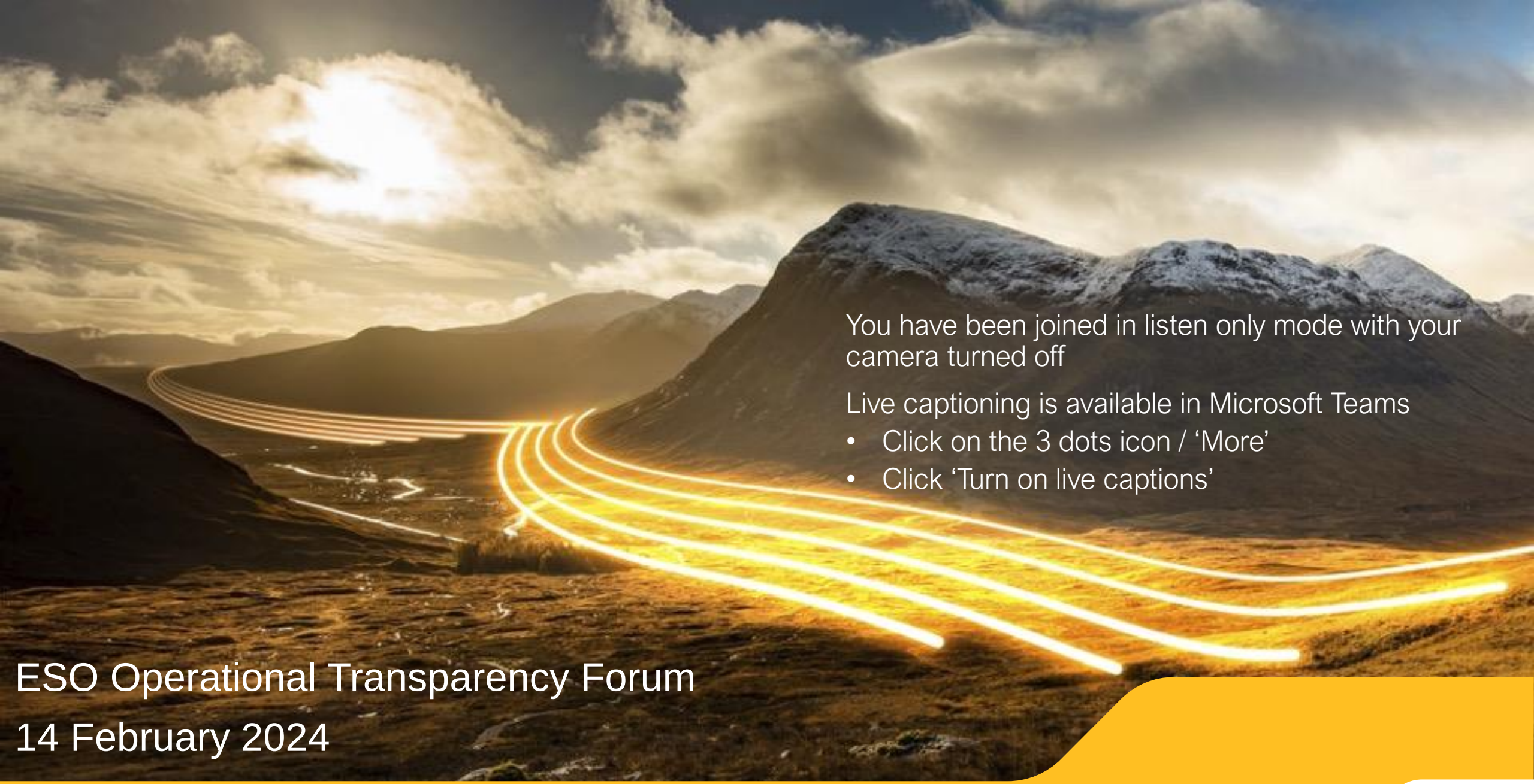

You have been joined in listen only mode with your camera turned off

Live captioning is available in Microsoft Teams

- Click on the 3 dots icon / ‘More’
- Click ‘Turn on live captions’

ESO Operational Transparency Forum

14 February 2024

ESO

Introduction | Sli.do code #OTF

To ask questions live and provide us with post event feedback go to Sli.do and join event code #OTF.

- **Ask your questions as early as possible** as our experts may need time to ensure a correct answer can be given live.
- **Please provide your name or organisation**. This is an operational forum for industry participants therefore questions from unidentified parties will not be answered live. If you have reasons to remain anonymous to the wider forum please use the advance question or email options given on the slide.
- **Questions will be answered in the upvoted order whenever possible**. We will take questions from further down the list when: the answer is not ready; we need to take the question away or the topic is outside of the scope of the OTF.
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- **All questions will be recorded and published.** Questions which are not answered on the day will be included, with answers, in the slide pack for the next OTF.
- **Ask questions in advance** (before 12:00 on Monday) at: https://forms.office.com/r/k0AEfKnai3
- **Ask questions anytime** whether for inclusion in the forum or individual response at: box.NC.customer@nationalgrideso.com

Stay up to date on our webpage: https://www.nationalgrideso.com/OTF

Future deep dive / focus topics

Today

Future

Managing Storm Conditions – date tbc

If you have suggestions for future deep dives or focus topics please send them to us at: box.NC.customer@nationalgrideso.com and we will consider including them in a future forum

C16 Annual Review 2024

We welcome industry's views on the proposed changes within our consultation.

Standard Condition Licence C16 "Procurement and use of balancing services" sets out the obligation on the ESO to publish five statements addressing the procurement and use of balancing services. In accordance with C16 of its Transmission Licence, we are conducting an annual review of all licence statements, we have proposed changes to the five statements which we invite industry to comment on.

Our official consultation is open from the **18th January 2024**. Please respond by **5pm on 15th February 2024.**

Please find the consultation documents on our C16 webpage.

If you would like to receive notification of future C16 events, consultations and updates, then please sign up to our mailing list.

Any questions, please contact balancingservices@nationalgrideso.com

Upcoming FSO Webinars

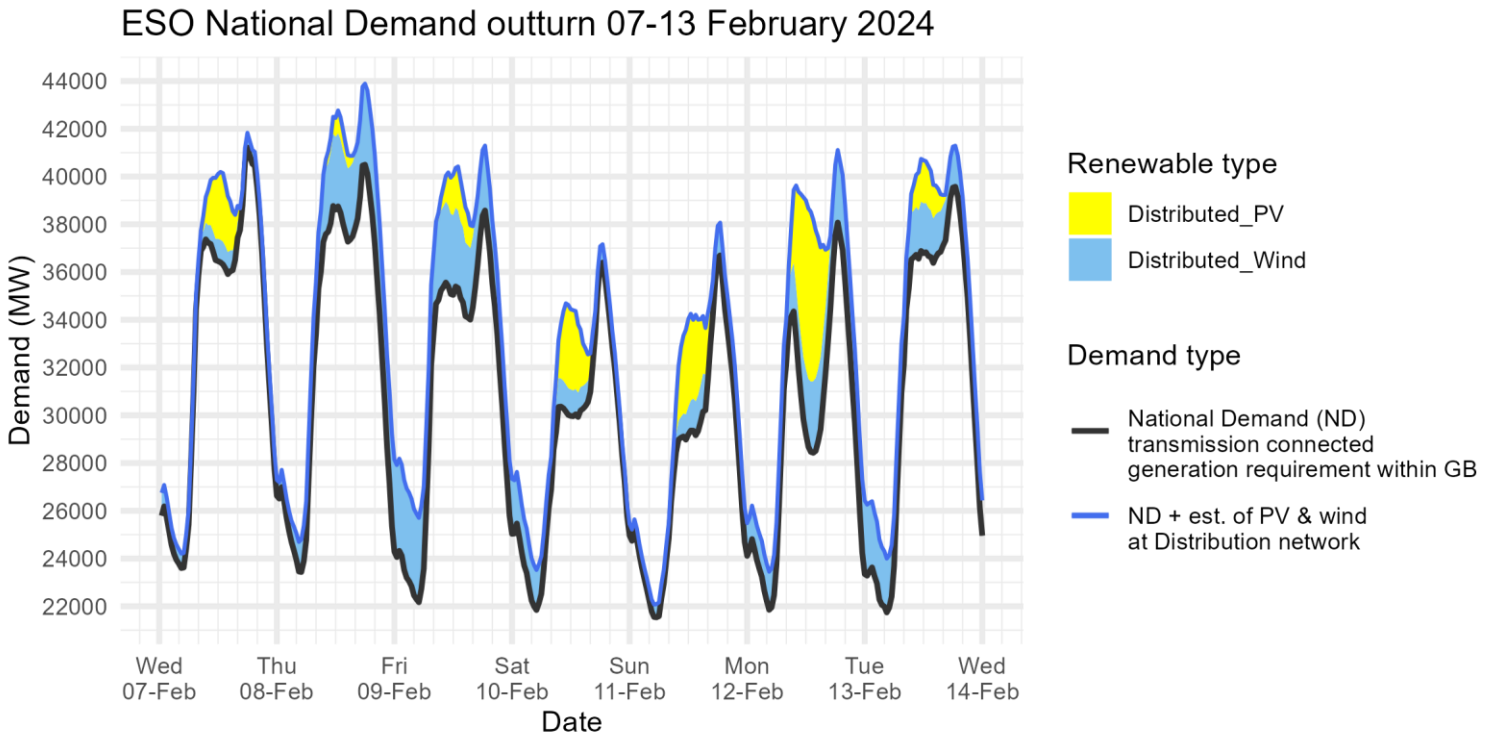
Join us in our upcoming webinars to learn more about the new responsibilities of the FSO from Day 1, how these will evolve and how we can work together to deliver a net zero energy system that balances sustainability with affordability and security.

Resilience and Security	Strategic Planning	Market Development
26 February, 11:00	**1 March, 10:30**	**6 March, 10:00**
Find out how the FSO is establishing a Directorate of Resilience and Emergency Management that will take a whole system perspective when considering resilience and security for GB.	Find out how the FSO will deliver national and regional energy planning bringing electricity, gas and hydrogen plans together to efficiently deliver net-zero.	Find out how the FSO will drive the evolution of market arrangements across the whole energy system to facilitate security of energy supply and deliver investible markets at the most equitable cost to consumers.

Sign up via the registration links on the ESO website and LinkedIn

Becoming the Future System Operator (FSO) | ESO (nationalgrideso.com)

Demand | Last week demand out-turn



Date	Forecasting Point	FORECAST (Wed 07 Feb) National Demand (GW)	FORECAST (Wed 07 Feb) Dist. wind (GW)	OUTTURN National Demand (GW)	OUTTURN Triad Avoidance est. (GW)	OUTTURN N. Demand adjusted for TA (GW)	OUTTURN Dist. wind (GW)
07 Feb	Evening Peak	41.5	0.6	41.2	0.0	41.2	0.6
08 Feb	Overnight Min	23.9	1.2	23.4	n/a	n/a	1.4
08 Feb	Evening Peak	40.6	2.8	40.5	0.0	40.5	3.4
09 Feb	Overnight Min	21.5	3.7	22.2	n/a	n/a	3.5
09 Feb	Evening Peak	38.2	2.8	38.6	0.0	38.6	2.7
10 Feb	Overnight Min	21.8	1.8	21.8	n/a	n/a	1.7
10 Feb	Evening Peak	36.1	1.2	36.4	0.0	36.4	0.8
11 Feb	Overnight Min	21.5	1.4	21.5	n/a	n/a	0.6
11 Feb	Evening Peak	37.2	1.8	36.7	0.0	36.7	1.4
12 Feb	Overnight Min	22.4	1.6	21.9	n/a	n/a	1.6
12 Feb	Evening Peak	41.4	1.3	38.1	0.0	38.1	3.0
13 Feb	Overnight Min	24.0	1.1	21.7	n/a	n/a	2.3
13 Feb	Evening Peak	41.8	0.9	39.6	0.0	39.6	1.7

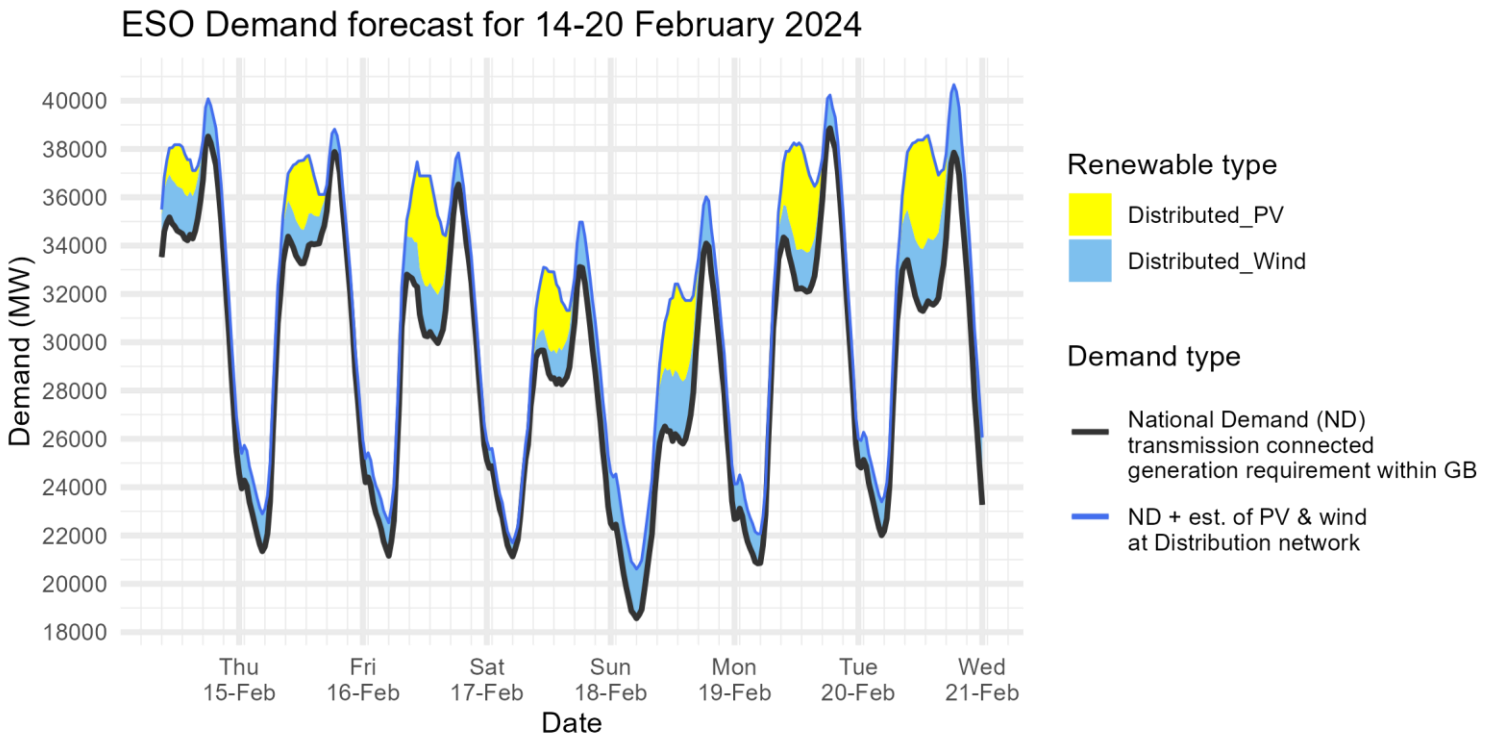
The black line (National Demand ND) is the measure of portion of total GB customer demand that is supplied by the transmission network.

ND values **do not include** export on interconnectors or pumping or station load

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.

Historic out-turn data can be found on the ESO Data Portal in the following data sets: Historic Demand Data & Demand Data Update

Demand | Week Ahead



		FORECAST (Wed 14 Feb)	
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)
14 Feb 2024	Evening Peak	38.5	1.6
15 Feb 2024	Overnight Min	21.3	1.5
15 Feb 2024	Evening Peak	37.9	0.9
16 Feb 2024	Overnight Min	21.2	1.4
16 Feb 2024	Evening Peak	36.5	1.3
17 Feb 2024	Overnight Min	21.1	0.6
17 Feb 2024	Evening Peak	33.1	1.9
18 Feb 2024	Overnight Min	18.6	2.0
18 Feb 2024	Evening Peak	34.1	1.9
19 Feb 2024	Overnight Min	20.8	1.2
19 Feb 2024	Evening Peak	38.9	1.4
20 Feb 2024	Overnight Min	22.0	1.4
20 Feb 2024	Evening Peak	37.9	2.7

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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 and peak demand. This is based on information available to National Grid ESO as of 14th 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 interconnector flows are equal to those in the Base case presented in the Winter Outlook.

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.

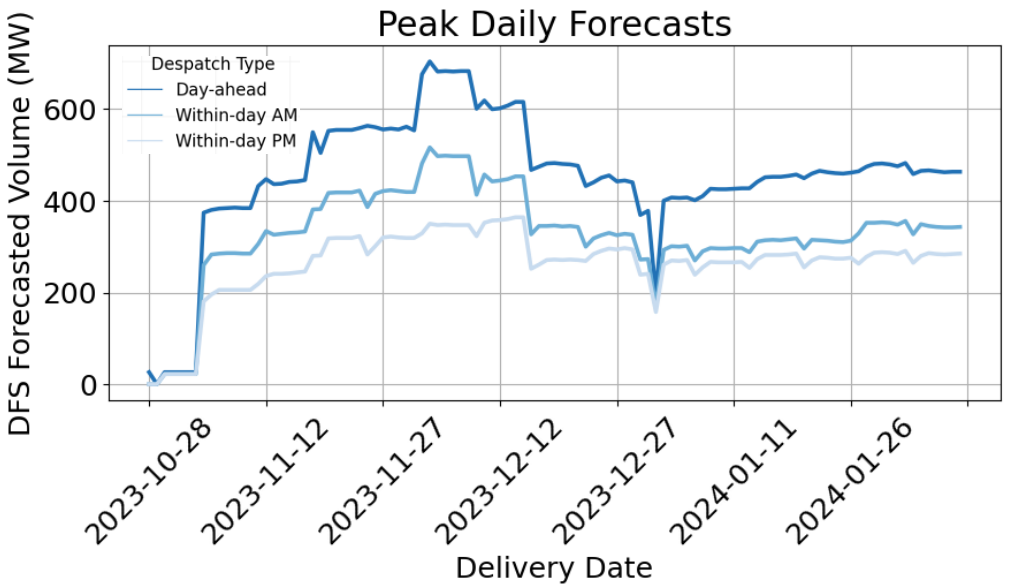
For lower (and potentially negative) surplus values, then this indicates operational margins could be tight and that there is a higher likelihood of the ESO needing to use its tools, such as issuing margins notices. We expect there to be sufficient supply available to respond to these signals to meet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

Margins are adequate for the next week.

Day	Date	Notified Generation (MW)	Wind (MW)	IC Flows* (MW)	Peak demand (MW)	Indicative surplus (MW)
Thu	15/02/2024	42451	5720	3370	38490	8880
Fri	16/02/2024	42562	7390	3370	37350	11640
Sat	17/02/2024	42562	8390	3370	33920	16120
Sun	18/02/2024	43004	10640	3370	34440	18360
Mon	19/02/2024	43879	6620	3370	39340	10120
Tue	20/02/2024	44155	13130	3370	39730	15580
Wed	21/02/2024	43915	14110	3370	40420	15510

*Interconnector flow in line with the Winter Outlook Report Base Case but will ultimately flow to market price

Demand Flexibility Service



Despatch Time	Number of events		
	Live	Test (GAP £3,000/MWh)	Test (GAP £0/MWh)
Day-ahead	2	2	0
Within day 1	0	3	1
Within day 2	0	2	1
Total	**2**	**7**	**2**

Latest events:

Delivery Date: 8th February 2024

Period: 18:00 to 19:00 h

Type: Test, Within day 2, GAP = 0£/MWh

We received close to 350 MW from 23 participants, with bids at a range of prices between £1,000/MWh and £3,000/MWh.

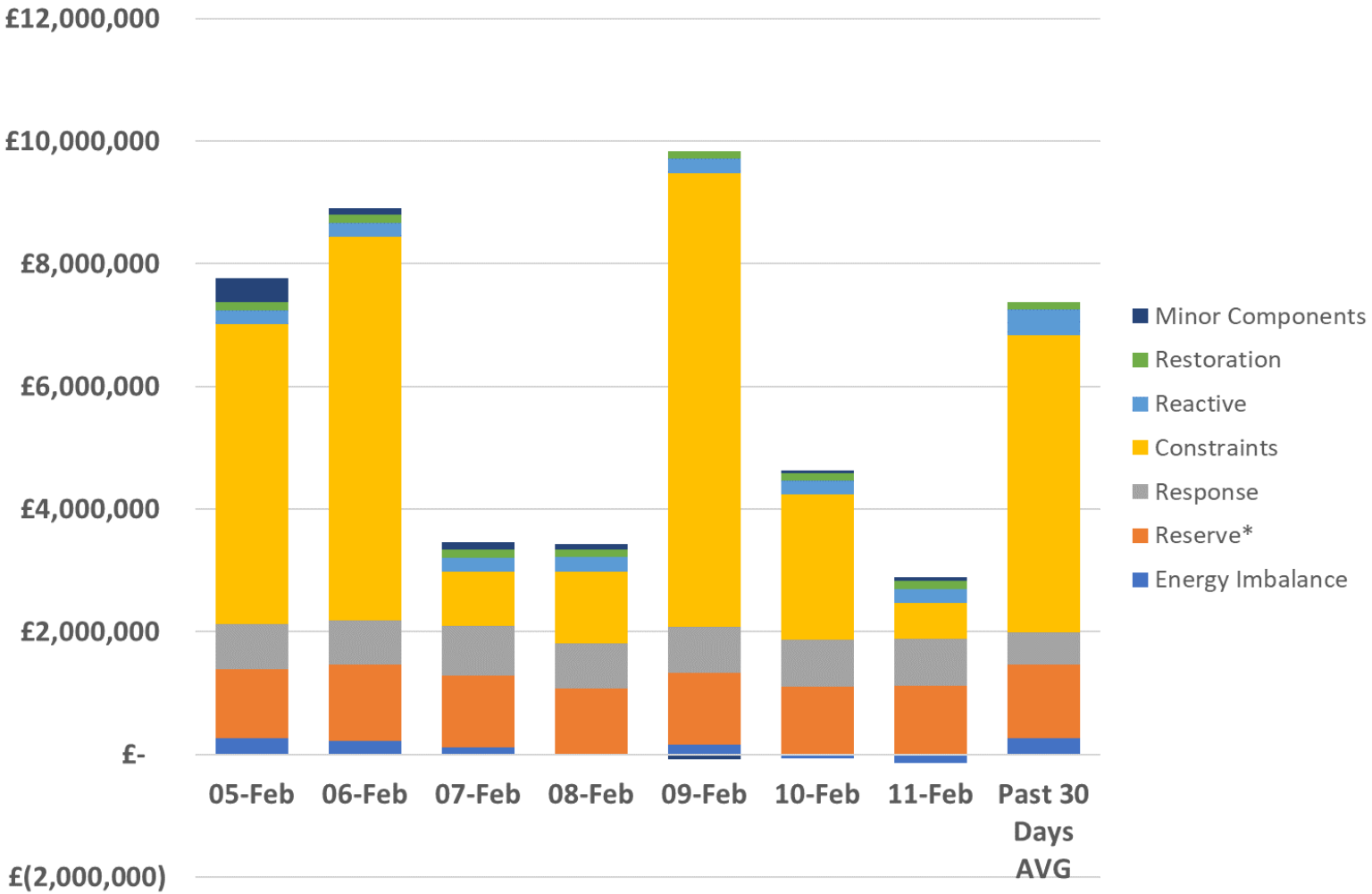
The maximum price accepted was £1,725/MWh. This was sufficient to meet 100% of the target for both periods (175 MW).

The volume procured on this event serves to maximise the learnings on the price sensitivity of demand. Additionally it will allow us to assess the effect of competitive pricing on participant forecast accuracy and delivery rates.

https://www.nationalgrideso.com/data-portal/demand-flexibility-service

ESO Actions | Category costs breakdown for the last week

Date	Total (£m)
05/02/2024	7.8
06/02/2024	8.2
07/02/2024	3.5
08/02/2024	3.4
09/02/2024	9.8
10/02/2024	4.6
11/02/2024	2.7
Weekly Total	39.9
Previous Week	68.2

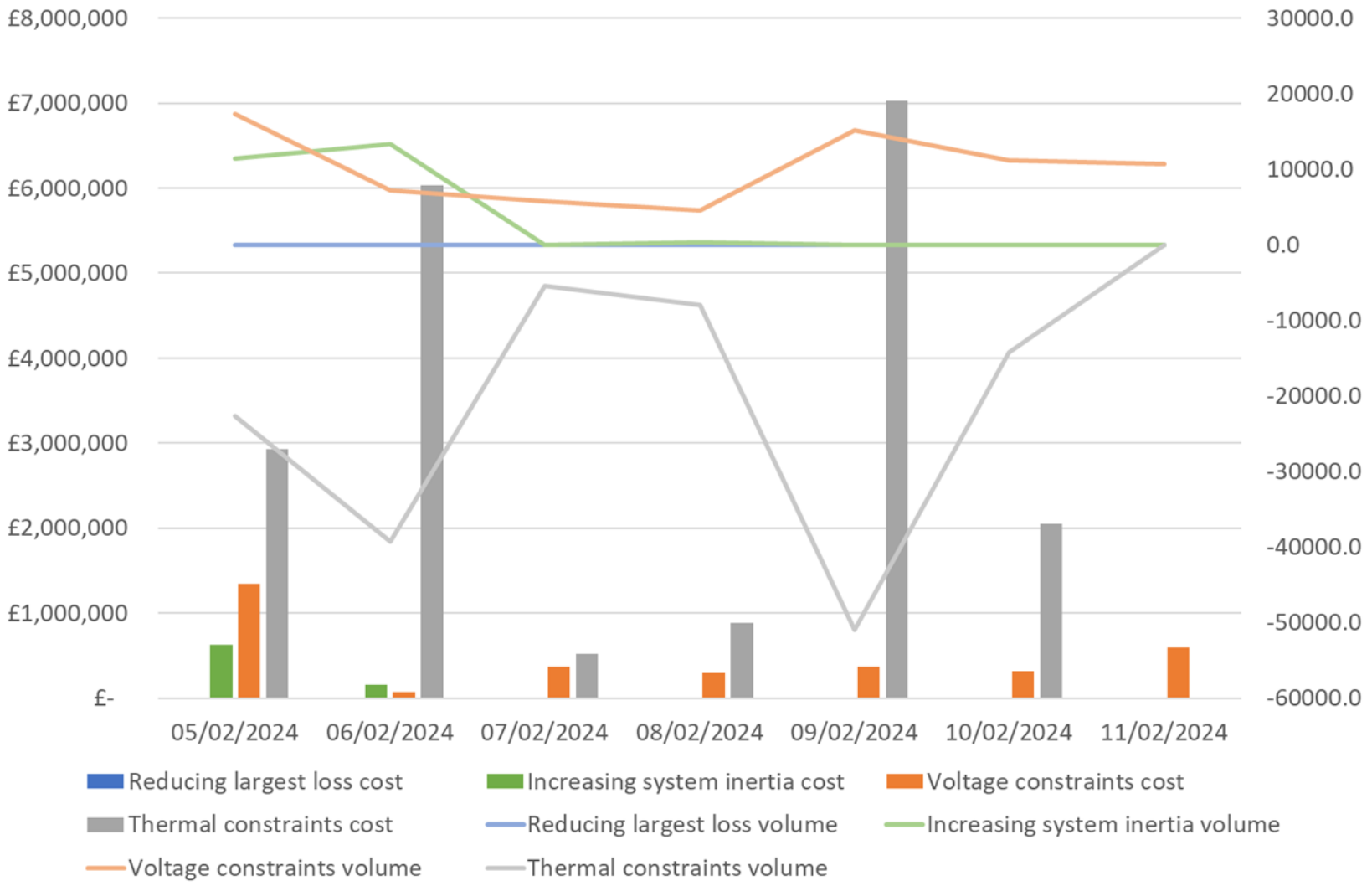


Constraints and Reserve costs were the key cost component for the week.

Please note that all the categories are presented and explained in the MBSS.

Data issue: Please note that due to a data issue on a few days over the last few months, the Minor Components line in Non-Constraint Costs is capturing some costs on those days which should be attributed to different categories. It has been identified that a significant portion of these costs should be allocated to the Operating Reserve Category. Although the categorisation of costs is not correct, we are confident that the total costs are correct in all months. We continue to investigate and will advise when we have a resolution.

ESO Actions | Constraint Cost Breakdown



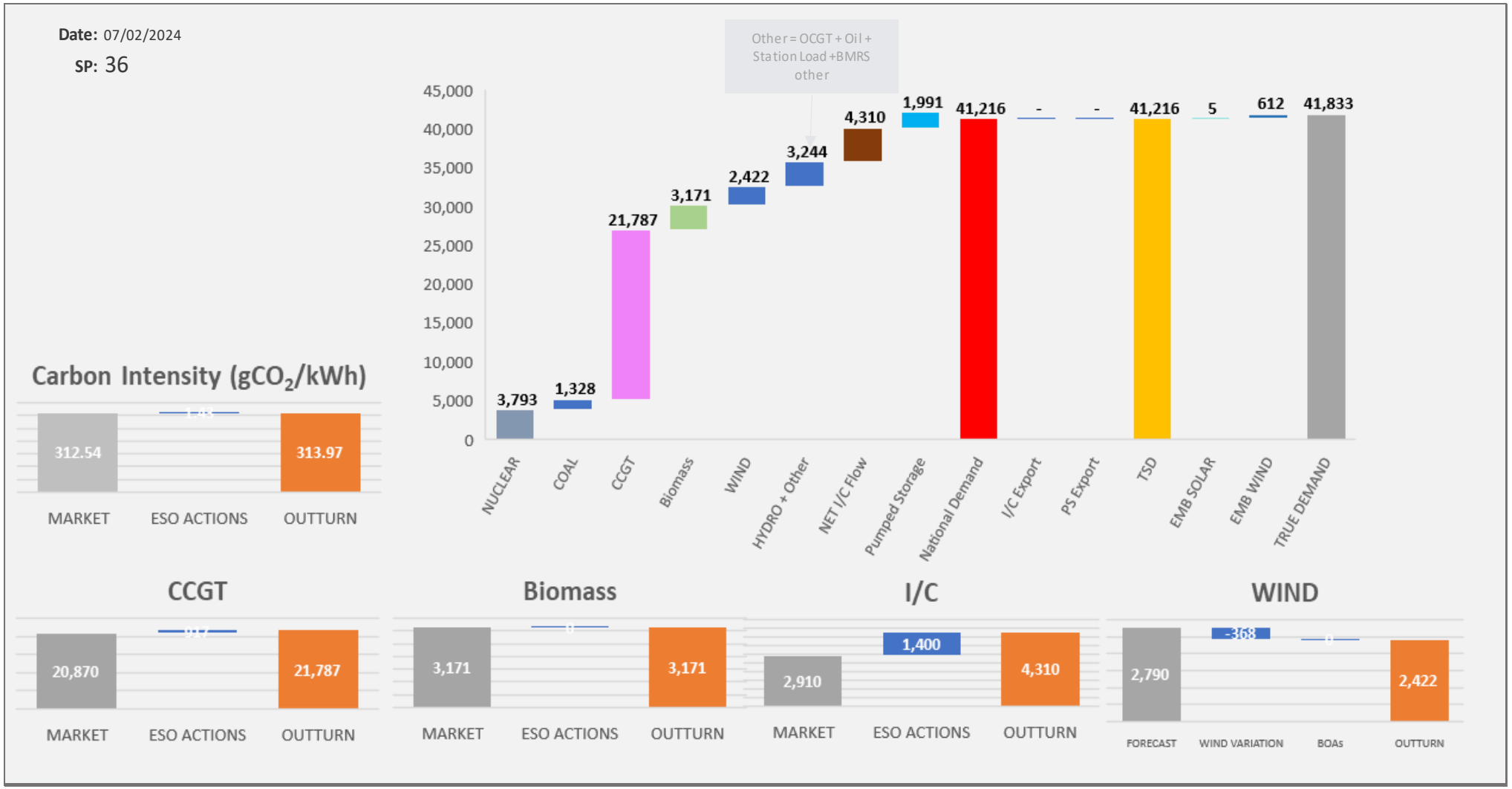
Thermal – network congestion
Actions were required to manage thermal constraints throughout the week except on the Sunday, with the most significant costs on Monday, Tuesday and Friday.

Voltage
Intervention was required to manage voltage levels throughout the week.

Managing largest loss for RoCoF
No intervention was required to manage largest loss.

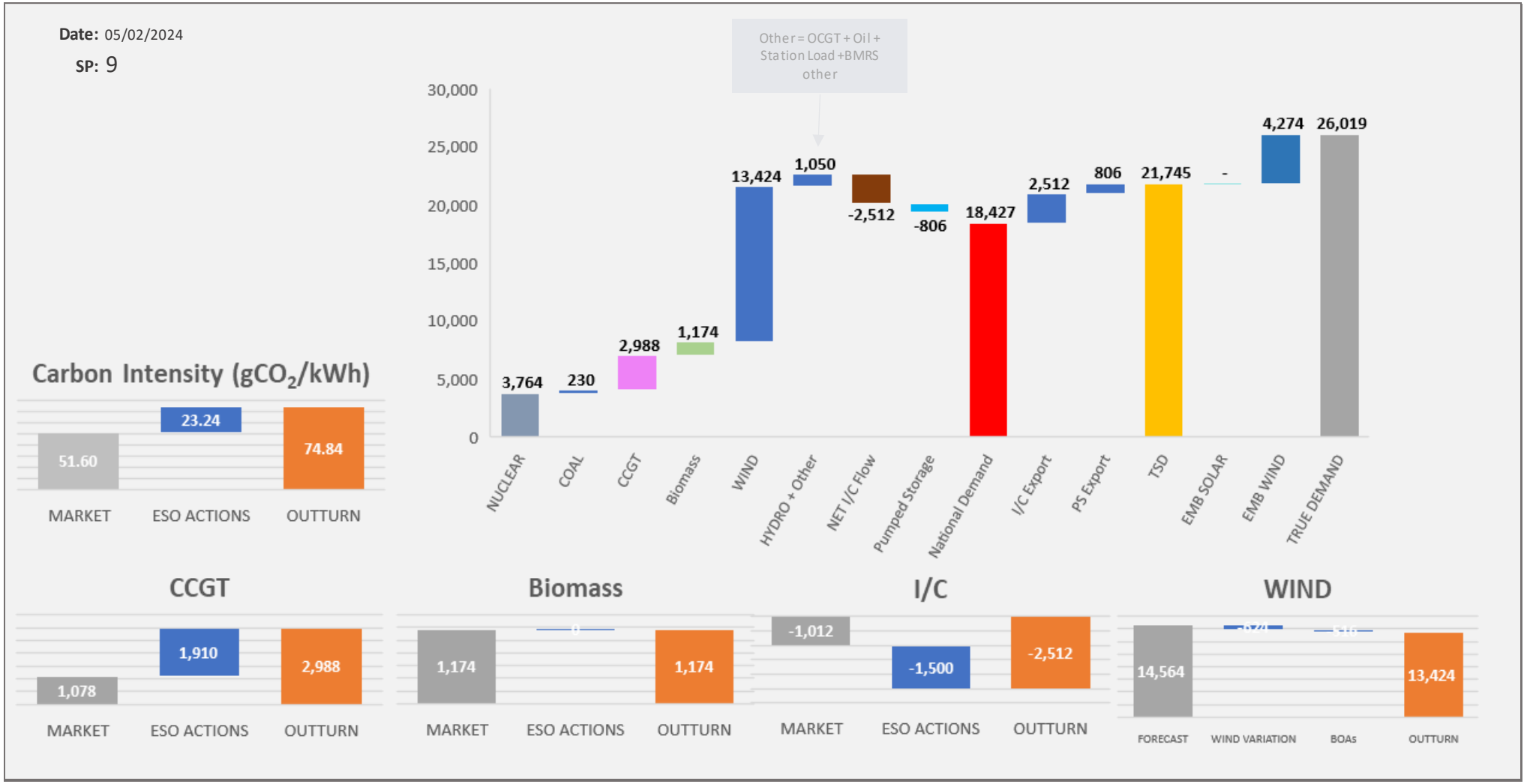
Increasing inertia
Intervention was required to manage System Inertia on Monday and Tuesday.

ESO Actions | Wednesday 7 February – Peak Demand – SP spend ~£82k



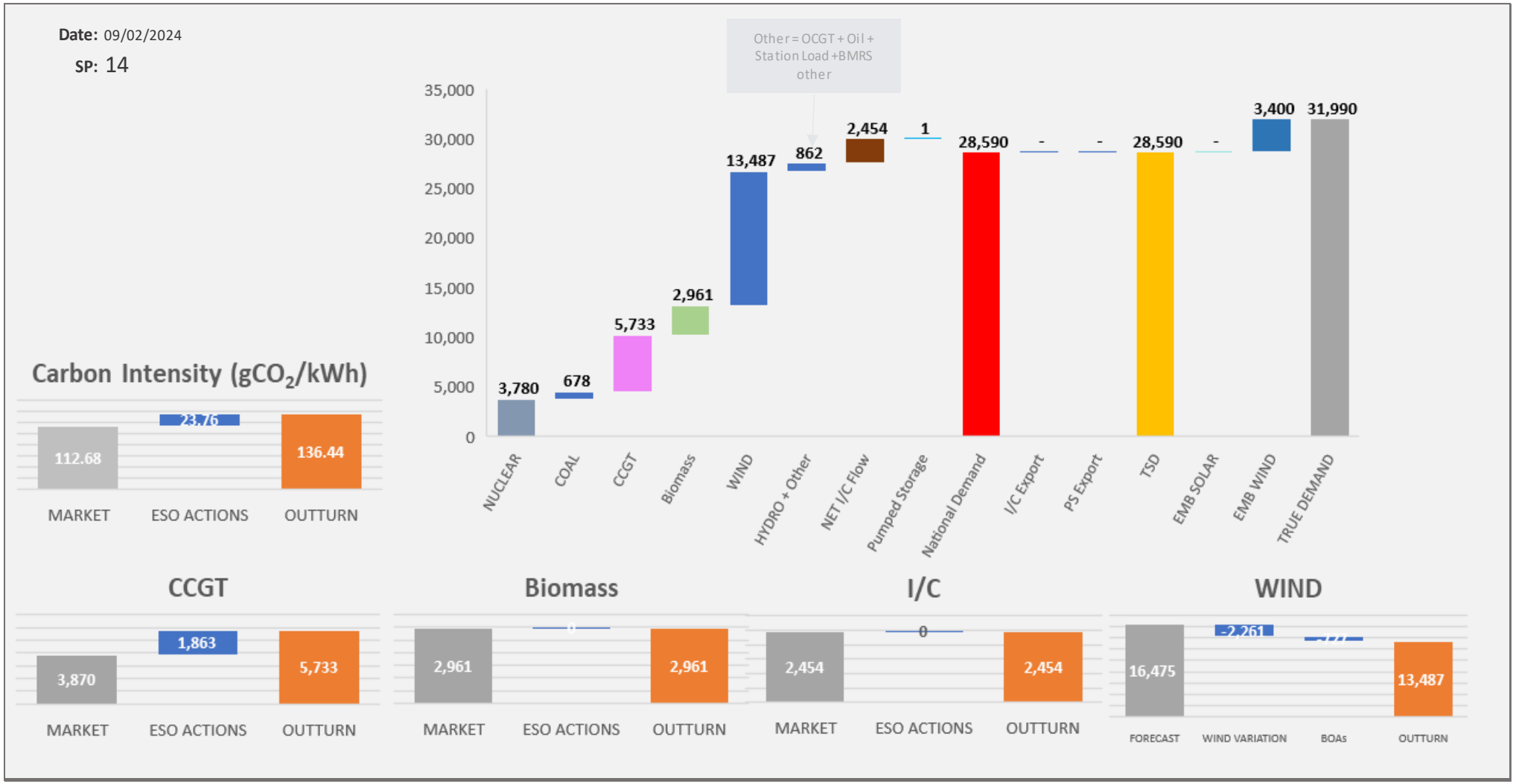
Carbon Intensity data on data portal: https://data.nationalgrideso.com/carbon-intensity1/carbon-intensity-of-balancing-actions

ESO Actions | Monday 5 February – Minimum Demand – SP Spend ~£187k



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

ESO Actions | Wednesday 9 February – Highest SP Spend ~£249k



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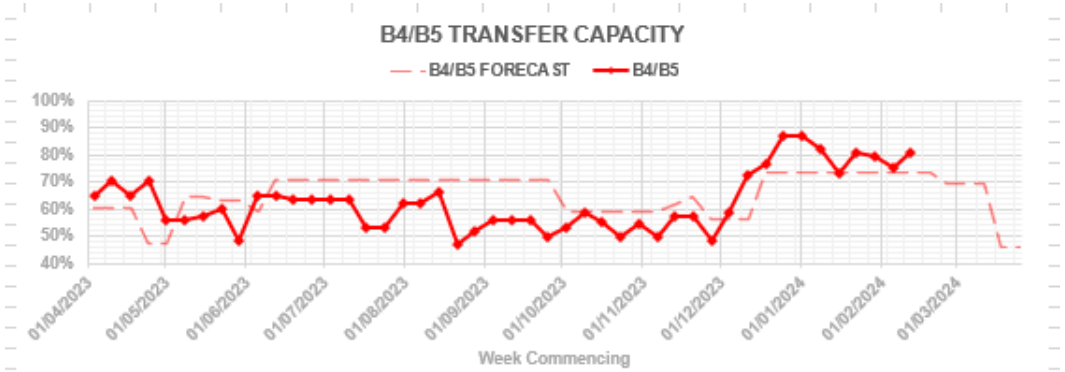
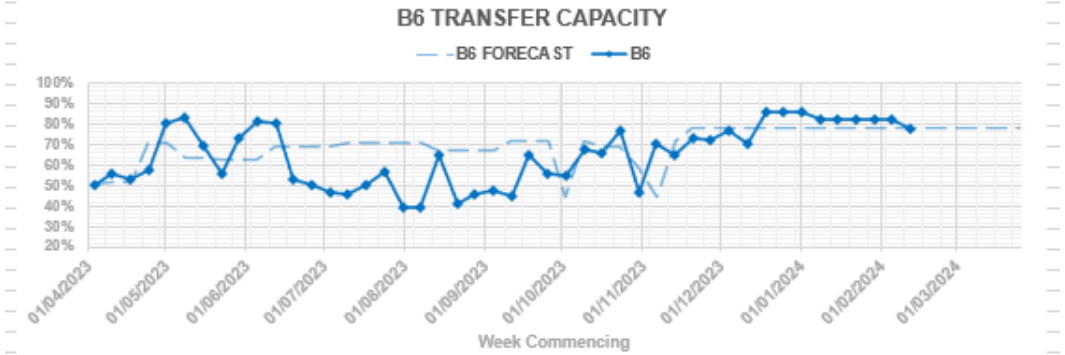
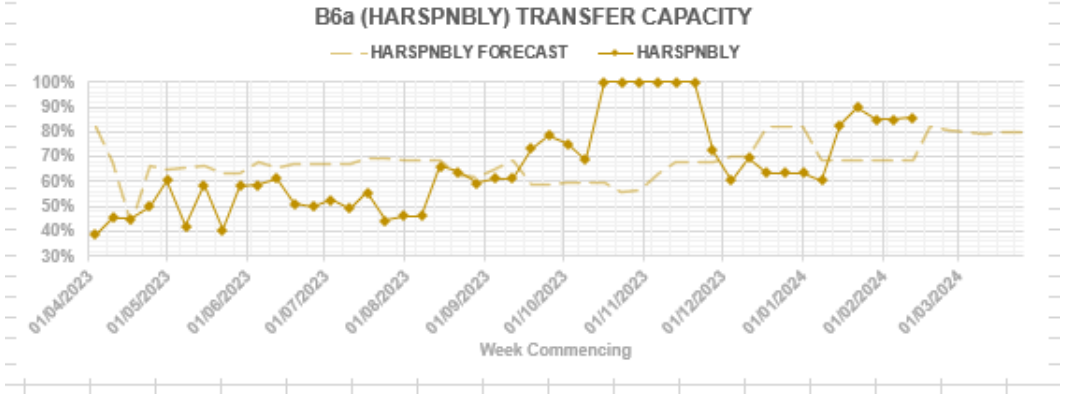
Sli.do code #OTF

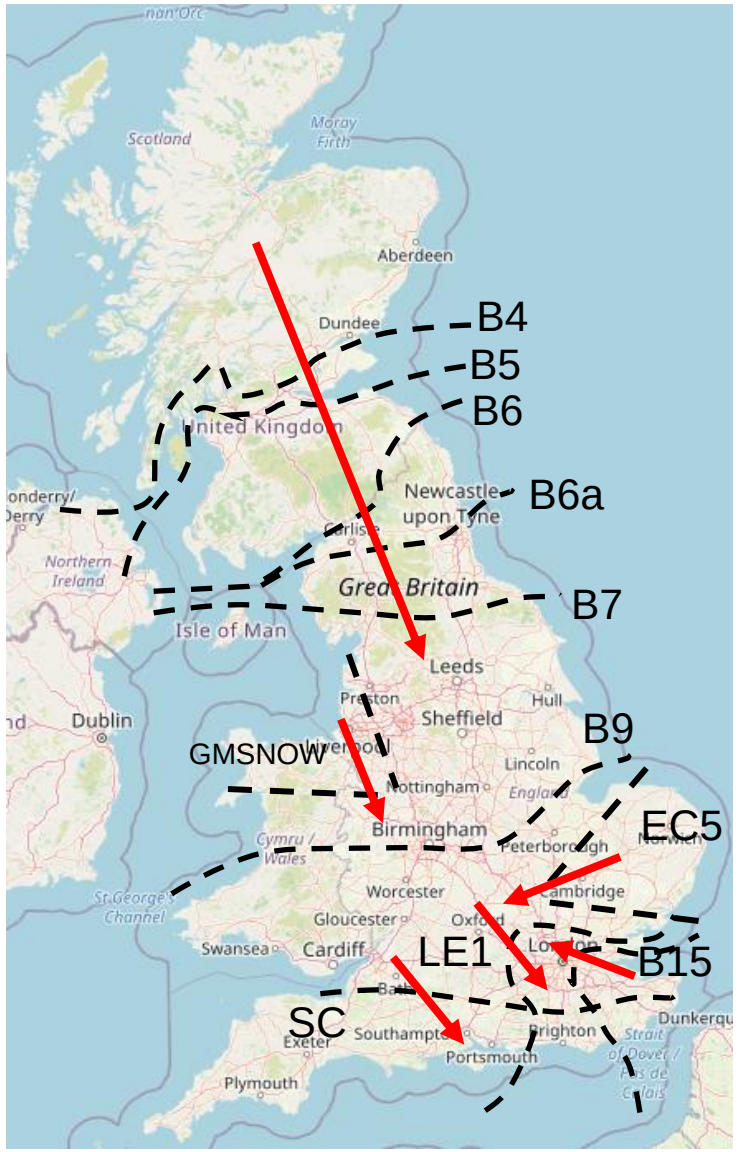
Transparency | Network Congestion





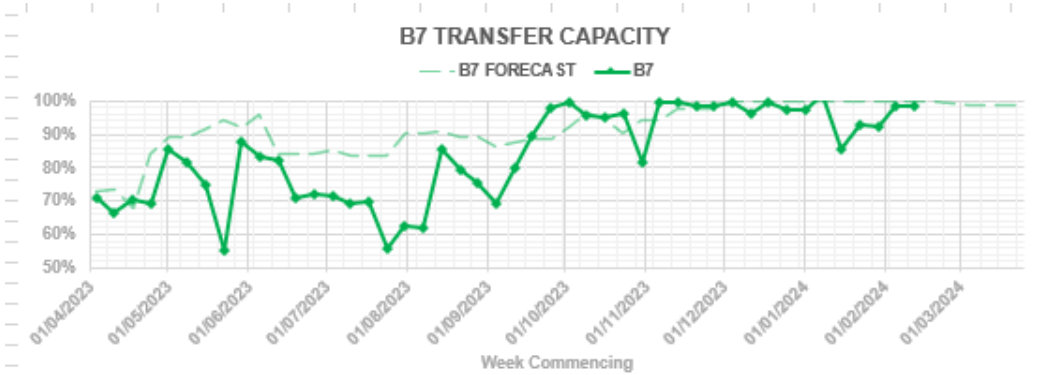


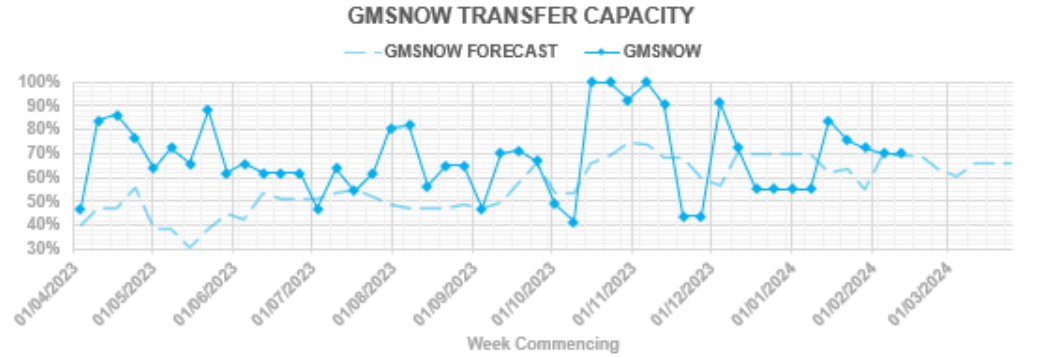
Boundary	Max. Capacity (MW)	Current Capacity (%)
B4/B5	3400	81%
B6	6800	78%
B6a	8000	86%
B7	8325	98%
GMSNOW	4700	70%
EC5	5000	92%
LE1	8500	81%
B15	7500	86%
SC	7300	100%

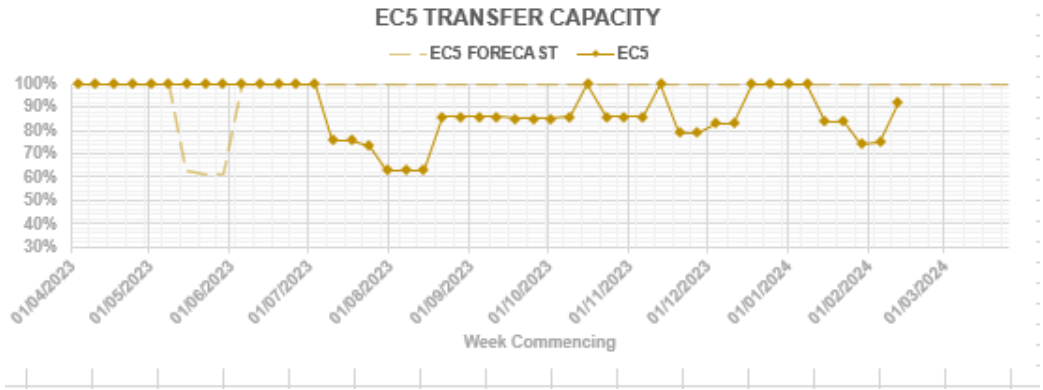


Day ahead flows and limits, and the 24-month constraint limit forecast are published on the ESO Data Portal:
https://data.nationalgrideso.com/data-groups/constraint-management

Transparency | Network Congestion







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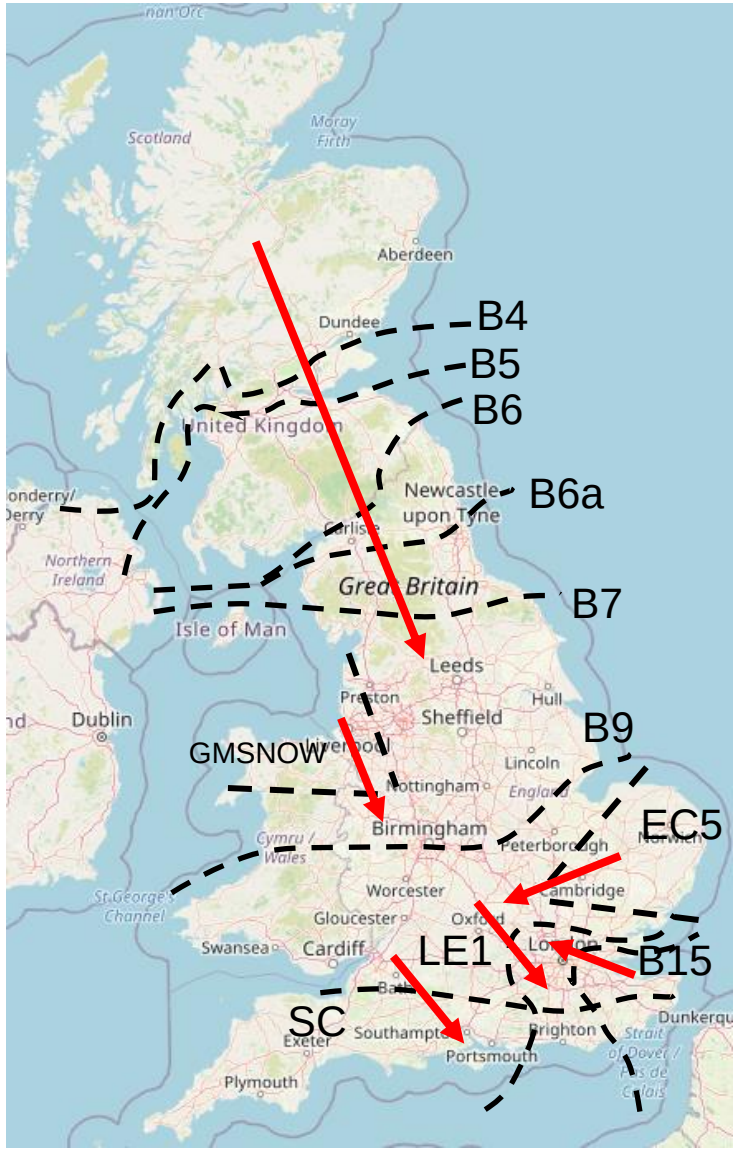

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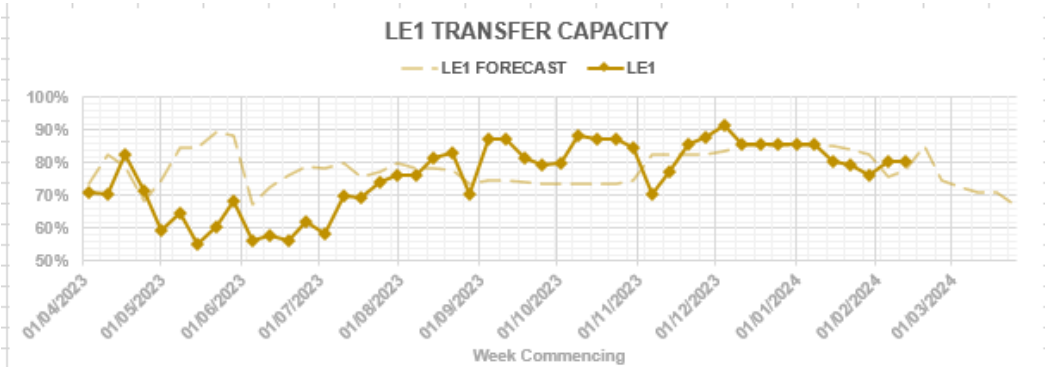

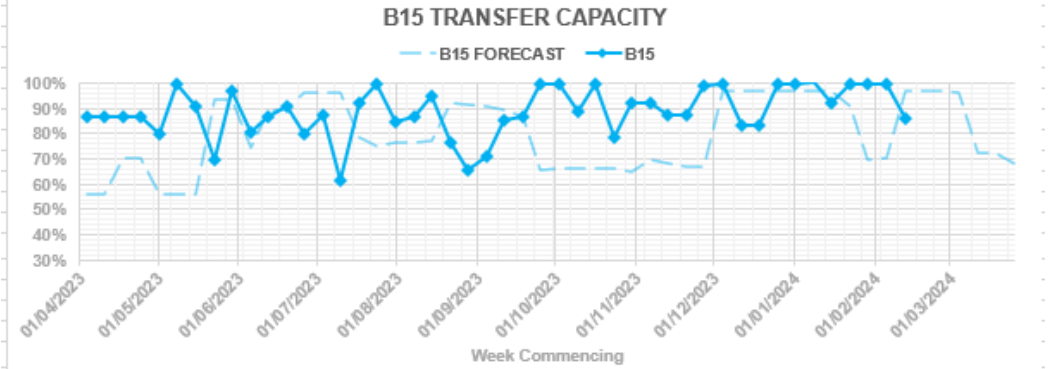

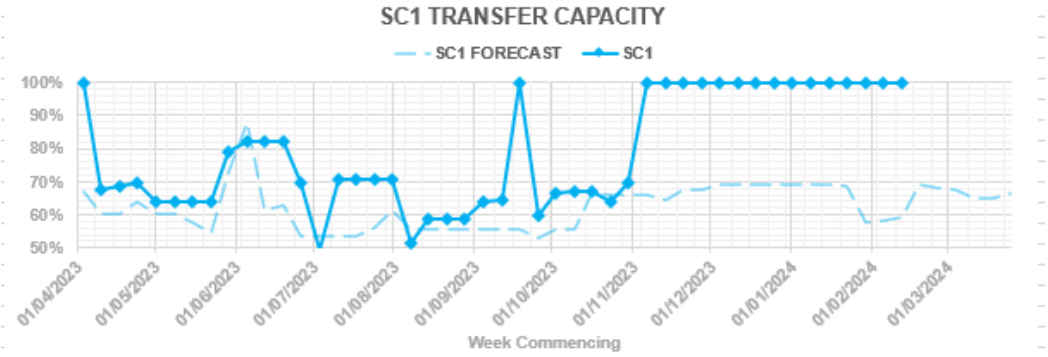

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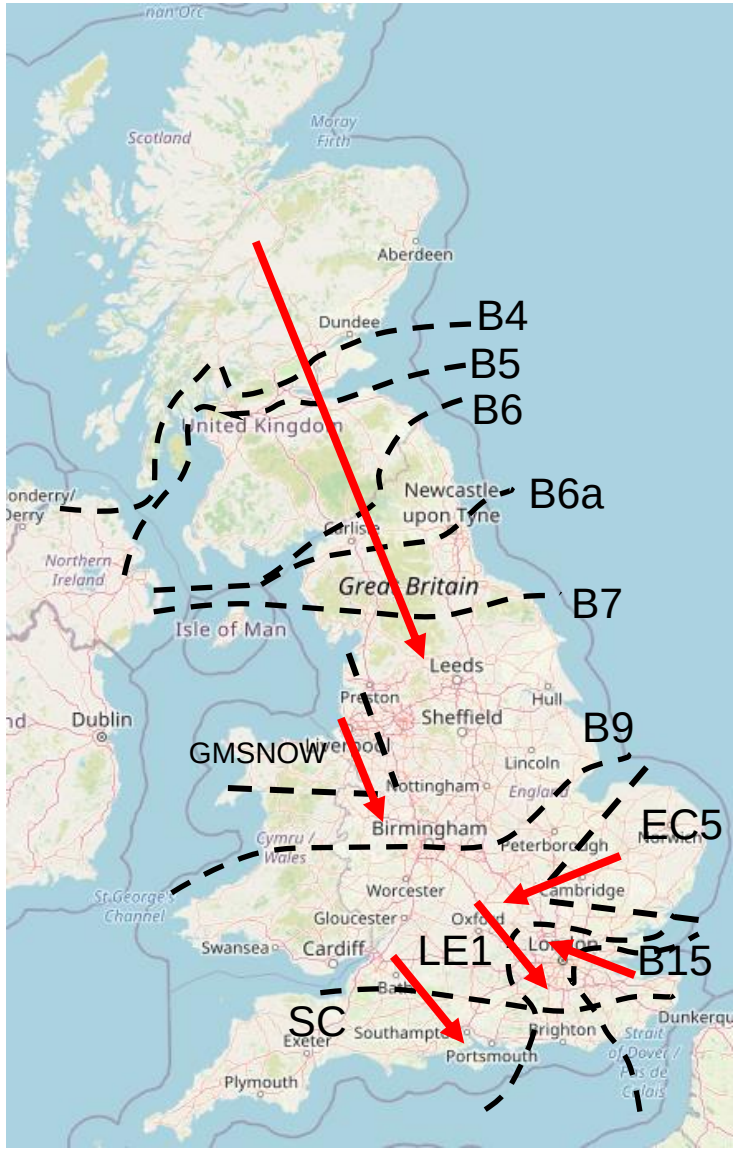

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Advance questions

Q: Could you please provide some commentary around why the DFS event on 2 February only accepted c170MW of a requested 200MW, given that the additional requested volume was available at prices much lower than accepted bids from previous events?

A: To maximise our learnings for the long-term evolution and capabilities of the service we need to understand the ability of the service to deliver at different price thresholds. At a level of £2,500/MWh we were able to secure 80% of the volume requirement from a range of providers at a lower level than the Guaranteed Acceptance Price. This will provide insight into the feasibility of the service and the capabilities of the participants at a different price level to previous tests.

Previously asked questions - DFS

Q: £2,500/MWh is expensive compared to the power price. If it was a genco at this price they may have Ofgem on their back! How many tests, at these sorts of prices should be allowed? Licence obligations around "economic and efficient" spring to mind.

Q: I am struggling to understand why you accept such high priced DFS for a "test". This volume displaces cheaper power, lowering some gencos' incomes and costing customers money. How is this compatible with your licence.

A: The DFS Market Information Report sets out the strategy for the remainder of Winter 2023/24. We have moved to competitive testing as soon as possible in order to remove the Guaranteed Acceptance Price. We are aiming to discover the price sensitivity of demand so that we can inform the future direction of demand side flexibility.

Q: Follow up to Lisa's question - is the ESO recording (and publish) the total price differential amount (cost?) of taking higher priced DFS over other providers?

A: We publish the procurement costs of DFS https://www.nationalgrideso.com/data-portal/demand-flexibility-service and Balancing Mechanism prices are available on the Elexon website https://www.bmreports.com/bmrs/?q=help/about-us so the information is available for comparisons to be made.

Previously asked questions

Q: Is ESO satisfied with the delivery performance of batteries in respect of the Dynamic FR services at present? It would seem that considerably more High volume is being delivered, relative to Low volume, irrespective of the MW that are contracted and the system frequency outturn...

A: We have performance monitoring in place for our dynamic response services to check services are delivering as expected. It may be that this question refers to different procurement amounts (which drives different delivery), which reflects both the different risks we are securing against with low and high response products and also the costs of alternative actions which sometimes lead to different levels of procurement against the same requirement volume. Note as well that our frequency security standards are different for low frequency (where we are able to go below 49.5Hz for up to 60 seconds) and high frequency where we cannot.

Please get in touch if that does not address your query box.NC.Customer@nationalgrideso.com

Q: Scottish constraints - can you split it between thermal constraints and the inertia constraints in Scotalnd as they are different.

A: We will incorporate this as part of the review based on the OTF survey feedback. However, this breakdown is published in the Monthly Balancing Services Summary (MBSS) which can be found here: https://www.nationalgrideso.com/data-portal/mbss

Previously asked questions

Q: Are there concerns over future grid inertia constraints as wind turbine/battery build out continues.

A: Inertia and short circuit levels, which we group as stability, are key metrics we monitor as part of our role as system operator. We have world first capability to monitor the inertia of the system in real time through our partnerships with GE and Reactive technologies. Carrying the most efficient amount of inertia is also a key part of the Frequency Risk and Control Report which we conduct annually and sets out the minimum inertia levels for us to hold to.

Looking into the future, we expect to operate the system at inertia levels down to 102 GVA.s as set out in the Operability strategy report. This level is when we have high amounts of inverter based resources (renewables, BESS, HVDC links) operating and is required to ensure system resilience for any large faults.

As the amount of inverter based resources continues to grow on the network our needs for inertia and short circuit level requirements will increase. We have implemented three phases of our stability pathfinders which are now evolving into Y-4, Y-1 and DA stability markets to ensure that we forecast and signal to the market the future requirements and suitable routes to procure the capacities of these vital services.

Previously asked questions

Q: Does INDO (used to determine Triads) exclude Battery Storage? The Elexon Glossary doesn't specify it, but it seems reasonable given Pumped Storage is excluded.

A: We can confirm that all Balancing Mechanism Units (BMUs) are included in INDO.

INDO (Initial National Demand Out-Turn) is a term defined in the BSC. The glossary definition referred to in the question is provided at this link. [Glossary Term: Initial National Demand Out-Turn - Elexon BSC]

National Demand:

The amount of electricity supplied from the Grid Supply Points

plus

- that supplied by Embedded Large Power Stations, and
- National Electricity Transmission System Losses

minus

- the Demand taken by Station Transformers
- the Demand taken by Pumped Storage Units
- the Demand taken by Electricity Storage Modules

does not include

- any exports from the National Electricity Transmission System across external Interconnections.

Transmission System Demand:

The amount of electricity supplied from the Grid Supply Points

plus

- that supplied by Embedded Large Power Stations, and
- exports from the National Electricity Transmission System across External Interconnections, and
- National Electricity Transmission System Losses, and

includes

- the Demand taken by Station Transformers
- the Demand taken by Pumped Storage Units
- the Demand taken by Electricity Storage Modules

Reminder about answering questions at the ESO OTF

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- **All questions will be recorded and published** All questions asked through Sli.do will be recorded and published, with answers, in the Operational Transparency Forum Q&A on the webpage: https://www.nationalgrideso.com/what-we-do/electricity-national-control-centre/operational-transparency-forum
- **Takeaway questions** – these questions will be included in the pack for the next OTF, we may ask you to contact us by email in order to clarify or confirm details for the question.
- **Out of scope questions** will be forwarded to the appropriate ESO expert or team for a direct response. We may ask you to contact us by email to ensure we have the correct contact details for the response. These questions will not be managed through the OTF, and we are unable to forward questions without correct contact details. Information about the OTF purpose and scope can be found in the appendix of this slide pack

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Audience Q&A Session

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

Feedback

Please remember to use the feedback poll in sli.do after the event.

We welcome feedback to understand what we are doing well and how we can improve the event for the future.

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

Appendix

Purpose and scope of the ESO Operational Transparency Forum

Purpose

The Operational Transparency Forum runs once a week to provide updated information on and insight into the operational challenges faced by the control room in the recent past (1-2 weeks) and short term future (1-2 weeks). The OTF will also signpost other ESO events, provide deep dives into focus topics, and allow industry to ask questions.

Scope

Aligns with purpose, see examples below:

In Scope of OTF

Material presented i.e.: regular content, deep dives, focus topics
ESO operational approach & challenges
ESO published data

Out of Scope of OTF

Data owned and/or published by other parties
e.g.: BMRS is published by Elexon
Processes including consultations operated by other parties e.g.: Elexon, Ofgem, DESNZ
Data owned by other parties
Details of ESO Control Room actions & decision making
Activities & operations of particular market participants
ESO policy & strategic decision making
Formal consultations e.g.: Code Changes, Business Planning, Market development

Managing questions at the ESO Operational Transparency Forum

- OTF participants can ask questions in the following ways:
  - Live via Sli.do code #OTF
  - In advance (before 12:00 on Monday) at https://forms.office.com/r/k0AEfKnai3
  - At any time to box.NC.Customer@nationalgrideso.com

- **All questions asked through Sli.do** will be recorded and published, with answers, in the Operational Transparency Forum Q&A on the webpage: Operational Transparency Forum | ESO (nationalgrideso.com)
- **Advance questions** will be included, with answers, in the slide pack for the next OTF and published in the OTF Q&A as above.
- **Email questions** which specifically request inclusion in the OTF will be treated as Advance questions, otherwise we will only reply direct to the sender.
- **Takeaway questions** – we may ask you to contact us by email in order to clarify or confirm details for the question.
- **Out of scope questions** will be forwarded to the appropriate ESO expert or team for a direct response. We may ask you to contact us by email to ensure we have the correct contact details for the response. These questions will not be managed through the OTF, and we are unable to forward questions without correct contact details. Information about the OTF purpose and scope can be found in the appendix of this slide pack