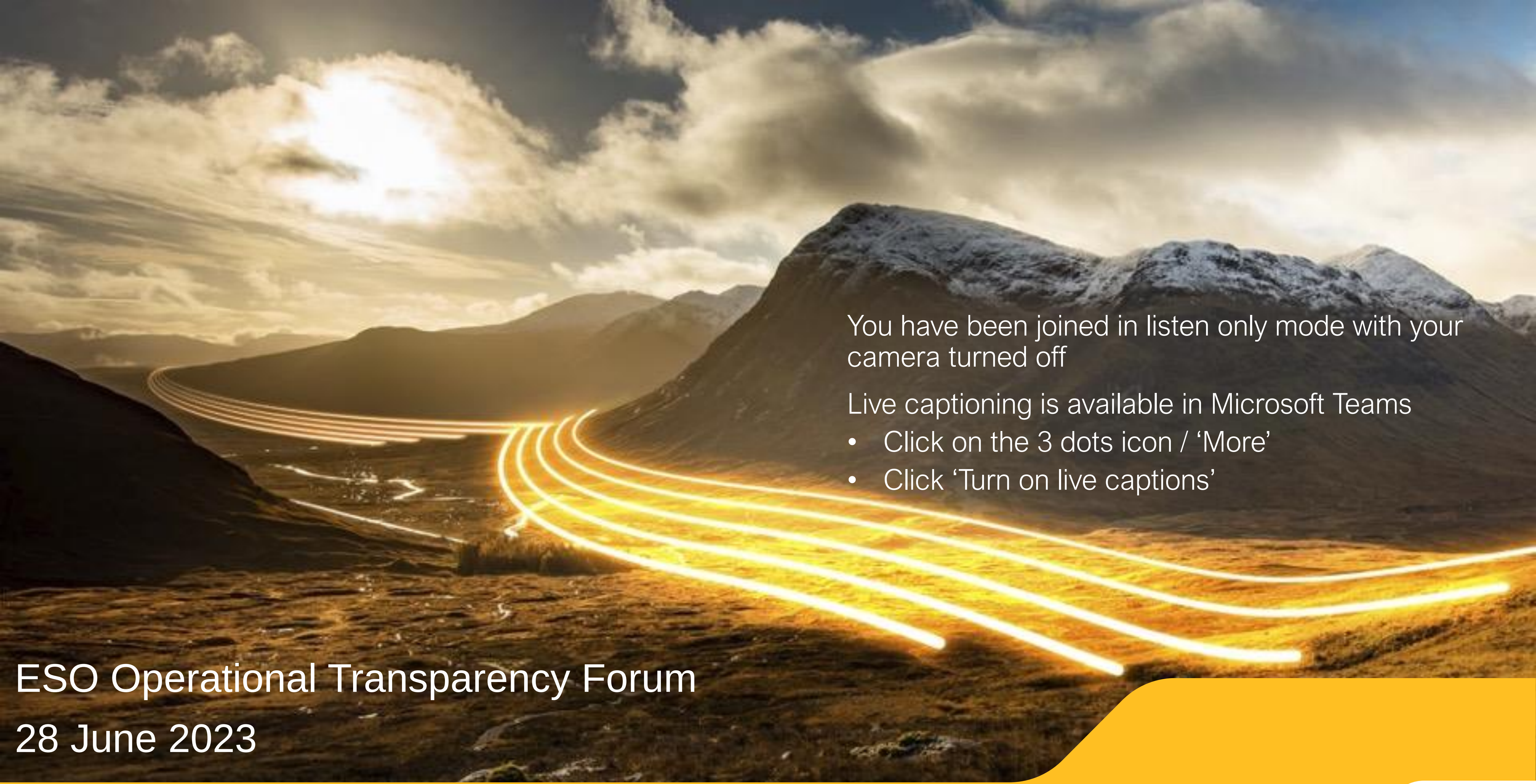


You have been joined in listen only mode with your camera turned off

Live captioning is available in Microsoft Teams

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

ESO Operational Transparency Forum

28 June 2023

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. This is also helpful if we need to ask for more information before we can answer.

If you do not feel able to ask a question in this way please use the **Advanced questions** option (see below) or email us at: box.NC.Customer@nationalgrideso.com

These slides, event recordings and further information about the webinars can be found at the following location:

Advanced question can be asked here: https://forms.office.com/r/k0AEfKnai3

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

Future deep dive / focus topics

Today – Balancing Markets Cost Review for Winter 22/23

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

Net Zero Market Reform webinar: conclusions from our assessment of investment policy support for net zero

Tuesday 4 July

09:30am – 12:30pm

Join us for:

- Conclusions from our assessment of investment policy options
- How investment policy could combine with reform of wholesale market design
- A dedicated panel discussion with industry experts
- Time for Q&A

Sign-up here

Your feedback will shape our final report, which will be published in the autumn.

If you have any questions, please email box.Market.Strategy@nationalgrideso.com. To keep up to date with the latest from the NZMR programme, do subscribe to our mailing list.

Balancing Reserve – Industry Webinar

Please join us for the Balancing Reserve Webinar on **28th June 2023 at 1pm UK time**.

The purpose of this webinar is to provide an overview of the Balancing Reserve project and provide further feedback subsequent to the ESO call for input on this topic.

We will also hold a Q&A session at the end of the presentation for any questions that you may have.

Industry Webinar - ESO Balancing Reserve

Wed, 28 Jun, 13:00 - 14:00 BST

Online event

Agenda

- Context for webinar & journey so far
- Feedback received as a result of call for information
- Summary of what we've been reviewing & latest thinking
- Timeline
- Q&A
- Next steps & close

Link to register

Last chance to register – please use the link to attend the meeting <u>today</u>

NTC Commercial Compensation Methodology

The consultation is now open until **Monday 3rd July 2023 at 5pm**:

https://www.nationalgrideso.com/industry-information/codes/balancing-settlement-code-bsc/c16-statements-and-consultations#NTC-commercial-compensation-methodology-consultation

- The Commercial Compensation Methodology, which was developed in 2021, outlines the commercial arrangements for payments relating to interconnector capacity restrictions resulting from Net Transfer Capacity (NTC) restrictions set by ESO.
- The control room uses NTCs when needed to restrict the import and/or export capacity of interconnectors to maintain security of supply or due to thermal constraints or system margins.
- Because NTCs are not market-based, ESO requires a derogation from Ofgem against Standard Licence Condition (SLC) C28 to use them.
- Ofgem has granted ESO a derogation against C28, until 30th September 2023, to use NTCs. They have requested that in advance of that date we consult with stakeholders on the NTC commercial compensation methodology, to ensure that it is clear and fit for purpose.

Next Steps

- The consultation documents are available in the link above – including a cover note, the amended methodology (tracked changes and clean version) and a response pro-forma.
- Interested parties can respond to the consultation, using the response pro-forma, by Monday 3rd July 2023 at 5pm.

North Sea Link (NSL) Net Transfer Capacity (NTC) Update

- ESO is aware that this is an area of significant interest to the industry
- ESO removed all restrictions on NSL from Monday 19th June following discussions with Statnett. Statnett removed their restrictions from Friday 23rd June
- NTC restrictions were required to manage system security. The risk to system security could not be reliably managed, at all times by alternative means, until this point
- ESO has been indicating to the market that the requirement for DC-H will be increased, since March 2023. Throughout this period, ESO have been reviewing the procurement volumes of DC-H and have now arrived at a position where we have met the new requirements for a period and have therefore gained the confidence to remove the restrictions
- Until this point we have not consistently had enough capacity in the DC-H market to provide confidence to Statnett that the risk of emergency actions being used to control flows was low enough to remove restrictions
- ESO will also be introducing an IT update which will increase the granularity of the NTC reason codes published on the Data Portal. This is expected to be implemented by the 1st July

Winter Contingency Contracts 23/24 Update

- At the request of Government, the ESO has undertaken discussions with the operators of two winter 2022/23 contingency coal plants to establish whether these arrangements could be extended for a further winter. These discussions have now concluded.
  - Both EDF and Drax have confirmed that they will not be able to make the coal units available next winter and have begun decommissioning their coal units.
  - Uniper's Ratcliffe-on-Soar coal unit that had a winter contingency contract last winter has returned to the market having secured a Capacity Market contract.

Next Steps

- The sale process of the coal purchased for the winter contingency coal units 2022/23 is in progress. Any revenue from the sale will be returned to BSUoS payers in the final settlement run.

Phase out of Dynamic FFR (DFFR)

A key milestone in frequency response reform is the phasing-out of monthly Dynamic FFR (DFFR). This will happen gradually as we develop and establish the new pre-fault dynamic frequency response products Dynamic Regulation (DR) and Dynamic Moderation (DM).

To enable a measured transition between the legacy and new suite of response services for frequency response providers and the ESO, we intend to reduce our DFFR requirements by 50MW for each EFA block per month whilst increasing the DR requirement by 30MW. Following the change in March 2023 to procure up to 200MW of DR a series of IT changes were required to facilitate further increases to the DR requirement.

There is a final IT change that raising the requirement is dependent on to ensure the visibility of non-BM units in balancing systems. This change is on track to take place in July and therefore enable the cap to be lifted from August 2023 onwards. As a result, we will procure 50MW less in this month's FFR tender round and continue to reduce the volumes as shown below:

Month of procurement	Month of Delivery	Dynamic FFR	DR Cap
July	August	200	230
August	September	150	260
September	October	100	290
October	November	0	350

Figure 1: Phasing out FFR with DR cap requirements for August 2023 onwards

We will continue to keep the impact of raising the DR volume cap under review and expect the final tender for DFFR to take place in September 2023 for volume delivery in October 2023. The requirement for this month will be 100MW.

Winter Balancing Costs Review

On 7th June the Winter Balancing Costs Review was published to identify the drivers of balancing costs and their trends across the winter period (November to March)

It is split into a summary report linked with the ESO balancing costs strategy and a detailed and independant report by LCP

https://www.nationalgrideso.com/document/281776/download (Summary Report)

https://www.nationalgrideso.com/document/281781/download (Full LCP Report)

The report only extends to the direct cost of BOA's and BSAD actions, and does not include ancillary services, it is aligned with the MBSS reported data but is based upon LCPs enact platform outputs

It is a data driven review but following feedback, qualatitive views will be captured and added through a follow up workshop on 25th July 13.30 – 16:00

Total Costs

BM Costs in Winter 2022/23 are down from the previous winter but still remain historically high

The total cost of Bids, Offers and ESO trades is down 20% between winters to £1.24Bn

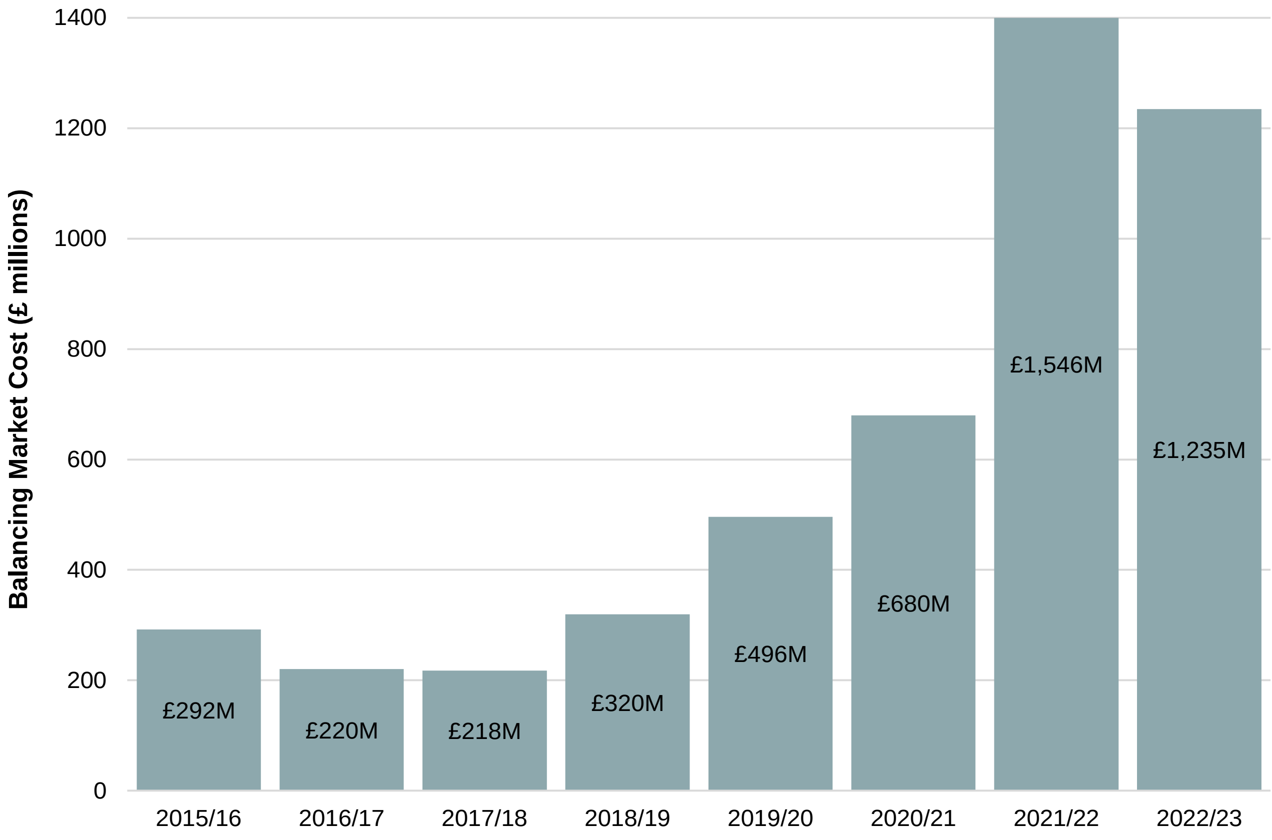
However this is historically very high due to:

- High gas prices, increasing the operating costs for gas generators and reducing competitive pressures on other fuel sources
- High costs associated with maintaining required reserve
- Very high and very low wind output scenarios this winter compared with average winters

High gas prices increase the costs for gas generators to operate thus marginal electricity costs have remained high in all markets.

This winter £756M (61%) of direct costs were for BM and trade acceptance of units which use gas to generate electricity.

Direct Costs of BOA and BSAD between November and March



Market Prices

Historically high costs have been driven by changes in market prices, but these are down compared with the previous winter

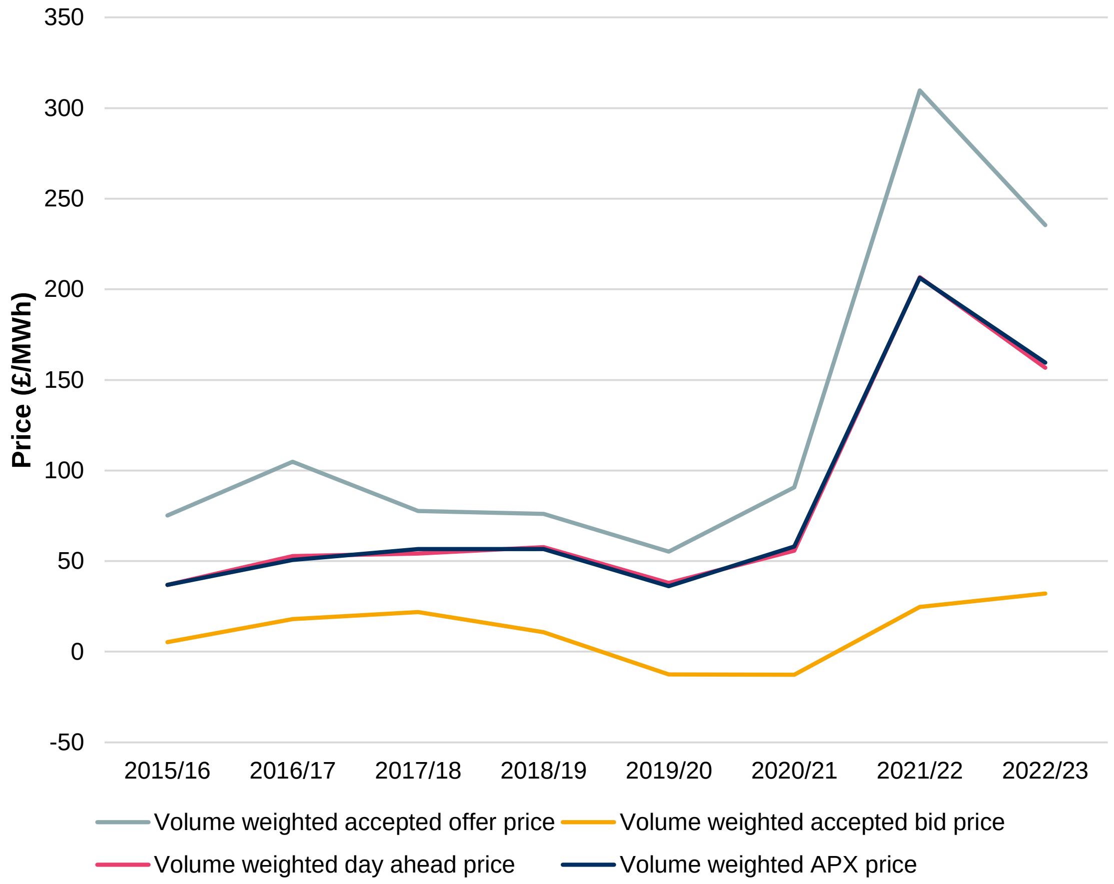
Compared to last winter, wholesale prices have reduced:

- The BM volume weighted average accepted offer price has reduced by **24%**
- The intra-day market price has reduced by **22%**
- The day-ahead market price has reduced by **24%**
- The intra-day gas price has reduced **29%**

Whilst these prices are lower than last year, they are historically very high:

- The BM volume weighted average accepted offer price has increased by **159%** compared to winter 2020/21
- The intra-day market price has increased by **175%** compared to winter 2020/21
- The day-ahead market price has increase by **181%** compared to winter 2020/21
- The intra-day gas price has increased **249%** compared to winter 2020/21

GB Prices Across Different Markets



Balancing Volumes

However balancing volumes have increased between winters remaining consistent with previous years

Compared to last winter, BM actions have increased:

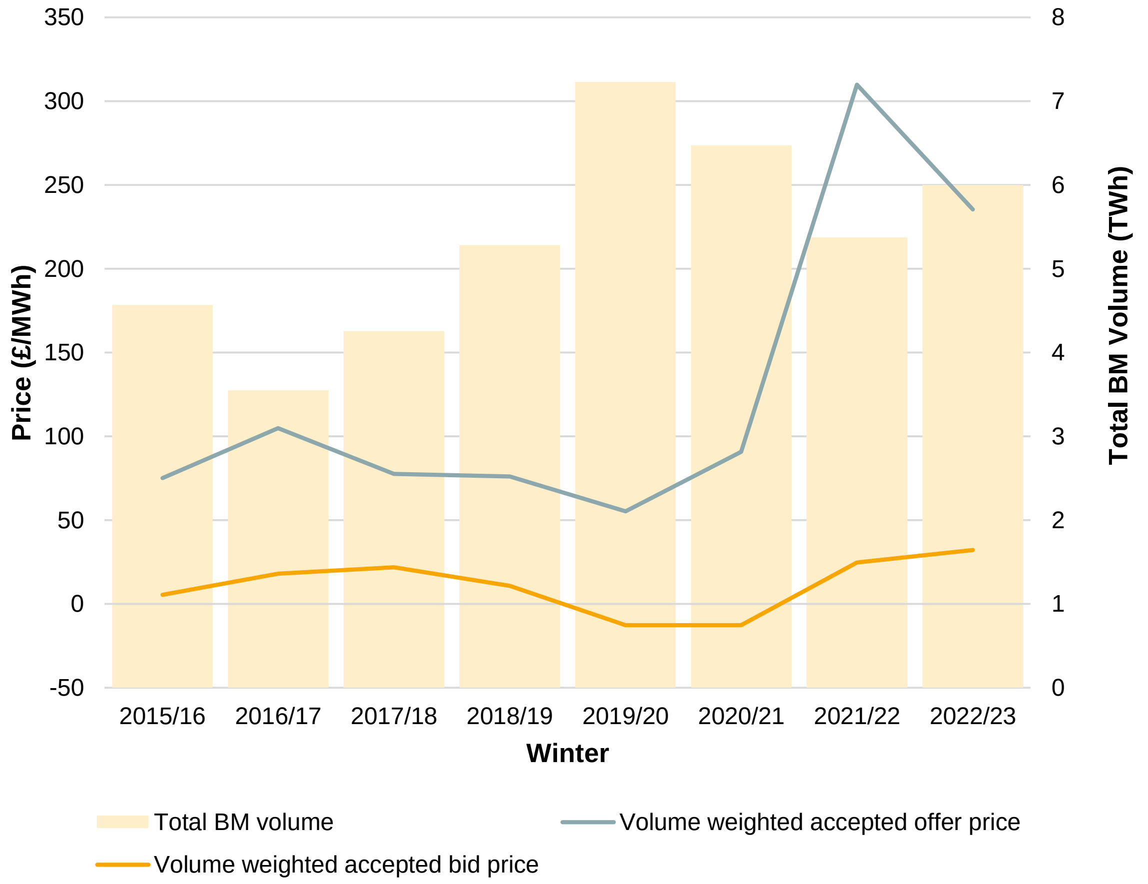
- The volume of actions was 6TWh, an increase of **12%.**

Key influencers of these changes in volumes when comparing with the previous winter were:

- An increase of **57%** in actions to manage import constraints & inertia
- An increase of **38%** in actions to manage reserve requirements
- An increase of **188%** in actions to manage footroom requirements
- A decrease of **22%** in actions to manage export constraints.

These are the 4 most significant magnitude changes of changes in MWh by classification category

Volumes of BM and BSAD Actions and Market Prices



Gas Prices

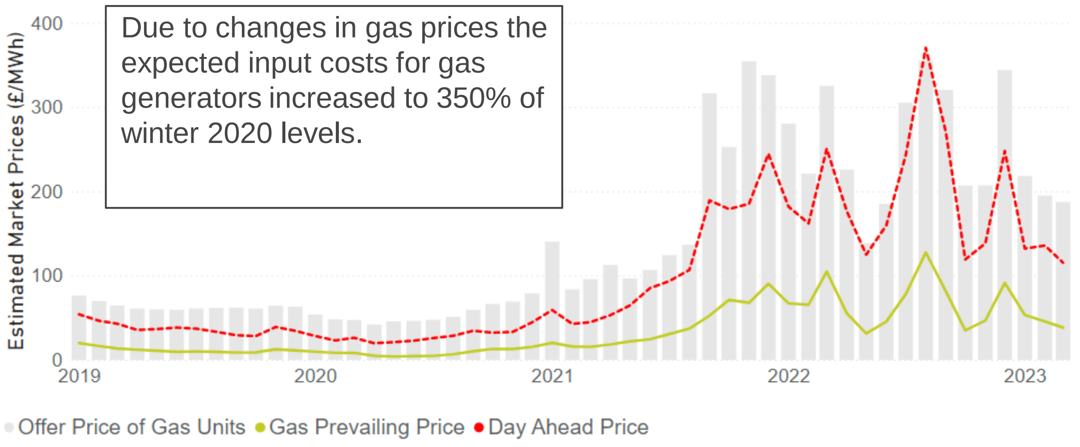
Gas prices are a key indicator of BM costs due to their impact on the short run marginal cost of CCGTs, on average this decreased by 29% between winters.

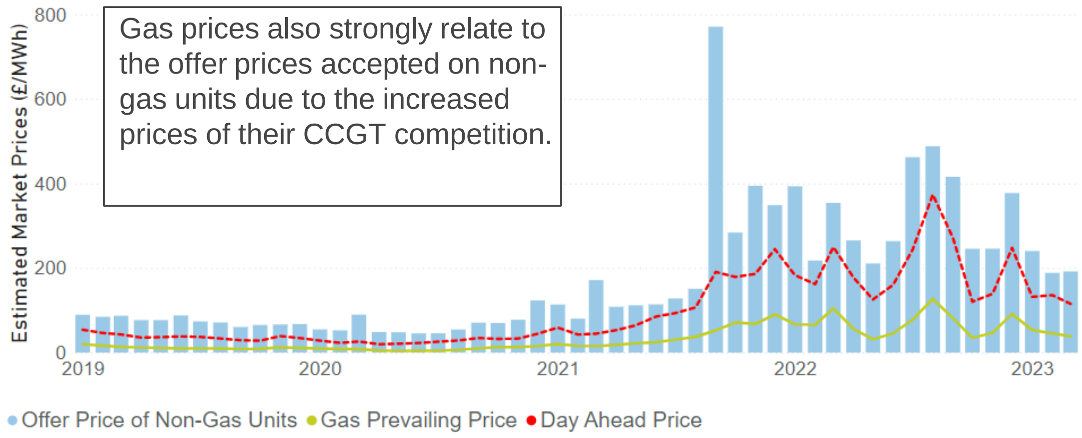
The average estimated Short Run Marginal Cost (SRMC) for a 50% efficient CCGT unit this winter was £164/MWh, down from the peak last winter of £231/MWh.

The most expensive days of winter for BM acceptance were not strongly correlated with SRMC as scarcity pricing from electricity did not correspond to scarcity pricing in gas markets

However, high gas prices were still a strong indicator of overall BM prices with the days with the top 10% of SRMC were 60% above the volume weighted average accepted offer price for winter

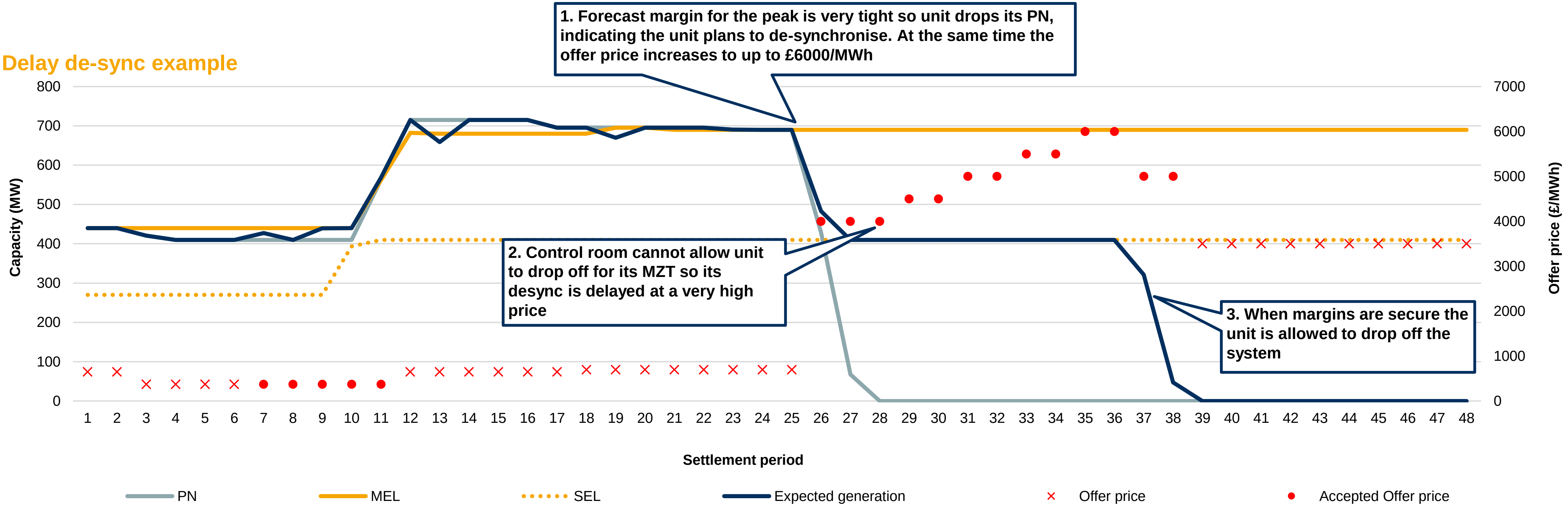
Whilst high gas prices strongly relate to offer price on gas units, they also strongly relate to prices on all other units.





System Margin – Delay De-sync

The balancing market review conducted in winter 2021/2022 identified a behaviour called 'delay de-sync' which contributed significantly to costs



System Margin – Delay De-sync

There was a £199M decrease in costs resulting from the delay de-sync strategy between winters.

This change is due to market driven behavioural changes to mostly remove sceanarios of very high pricing for extended periods

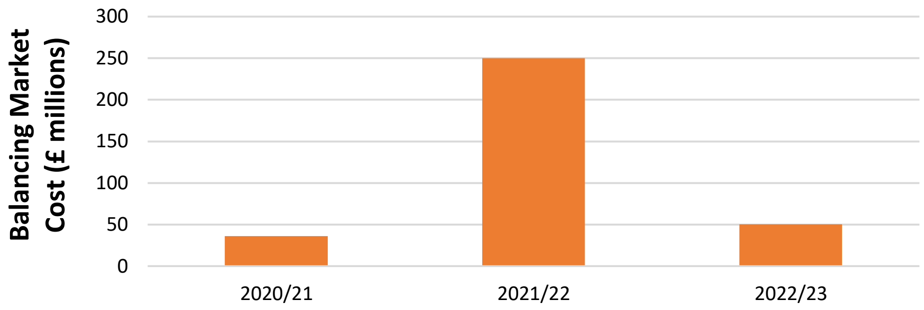
Units were observed to both profile their prices for the genunine periods of scarcity and reduce their BM prices substantially compared with previous winters

The ongoing consultation from Ofgem on the Inflexible Offer Licence Condition may prohibit this behaviour in the future but most the market has pro-actively responded

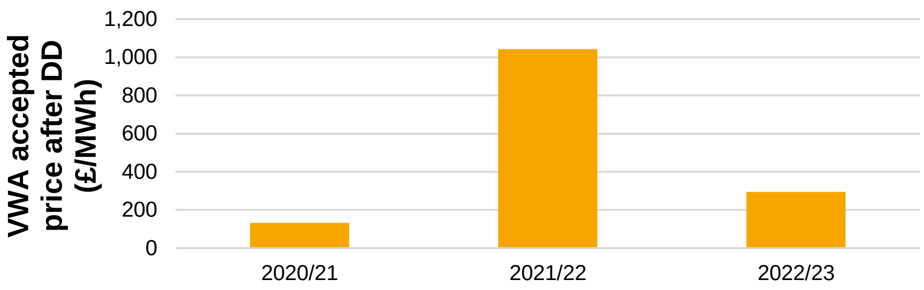
This reduction in total costs between winters from this behaviour driven by prices rather than volumes

It is an example of positive behavioural changes from market participants after being identified in the Balancing Market Review

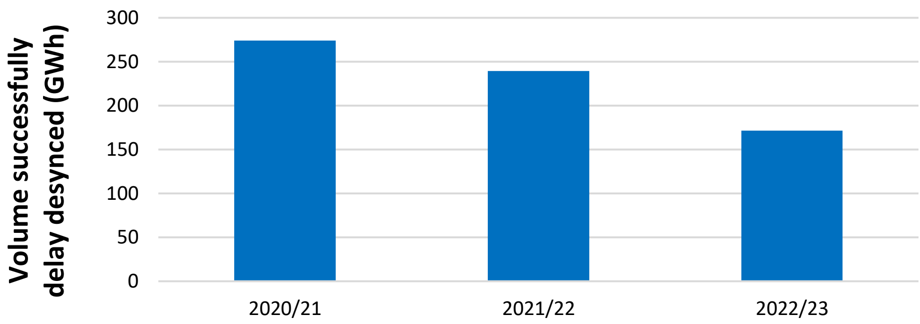
BM Cost Impact from 'Delay De-Sync'



BM Accepted Prices from 'Delay De-Sync'

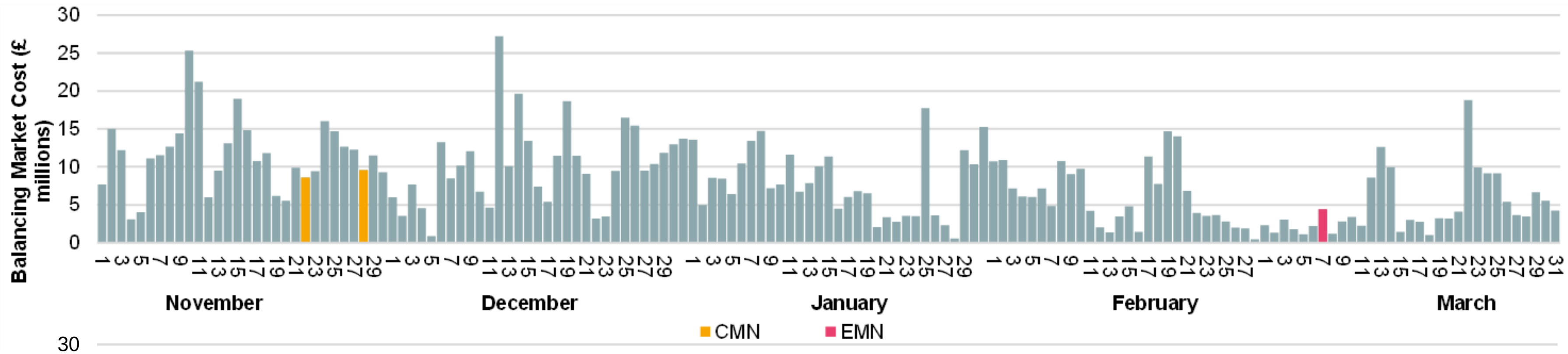


BM Accepted Volumes from 'Delay De-Sync'

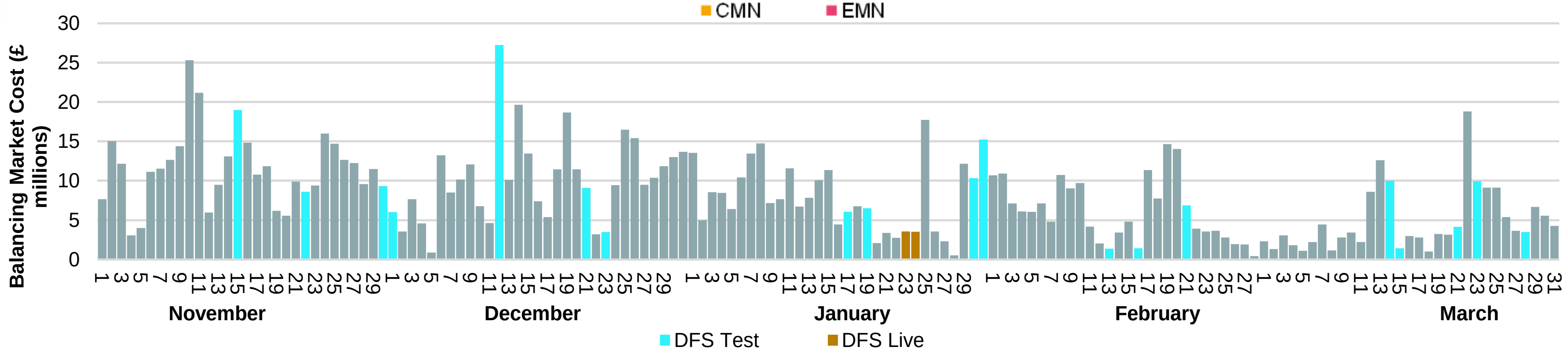


Enhanced Actions

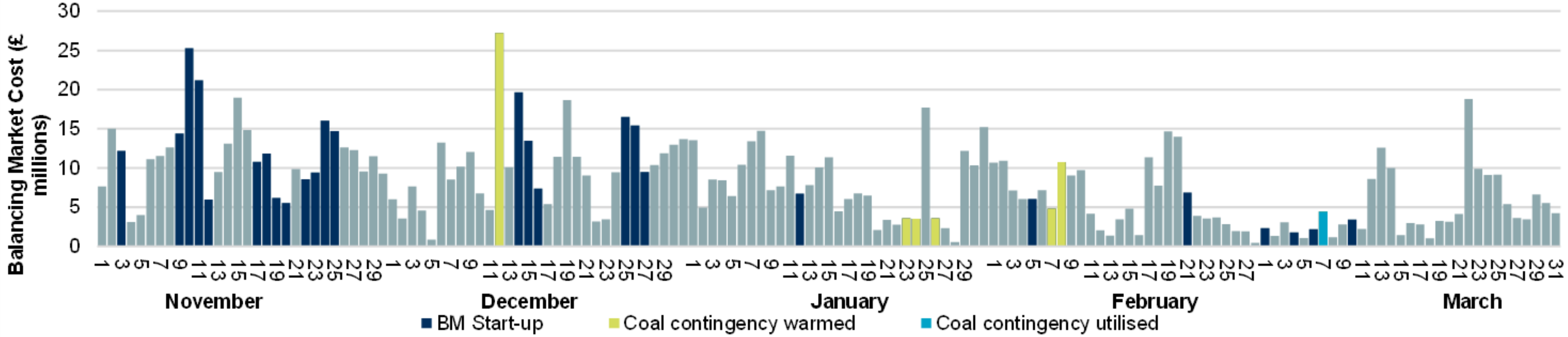
Market Notices



Demand Flexibility Service



Coal



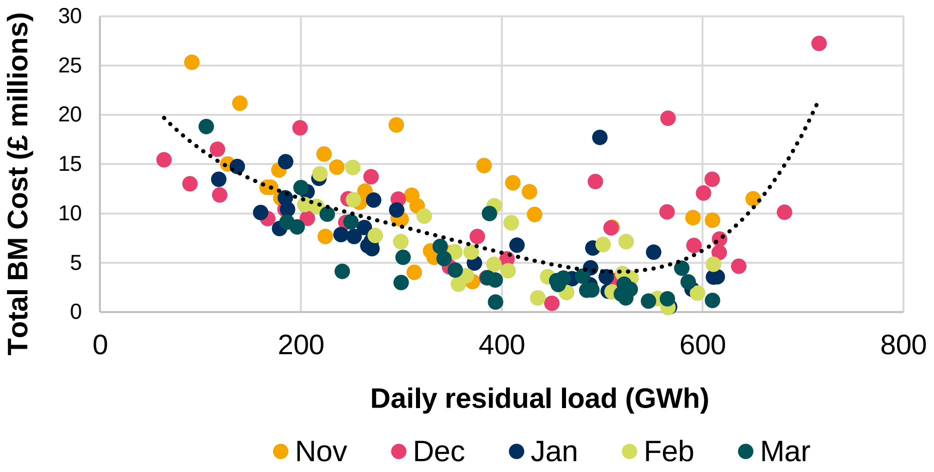
Wind and Demand Forecasting

High and low wind and demand scenarios lead to higher direct balancing costs

This winter, days with the highest 5% of wind output were nearly 2x more expensive than the average day this winter.

The highest cost day of winter 22/23 was in the lowest 5% of wind output days at £27.2M, as scarcity pricing and margin requirements led to significant costs to ensure security of supply.

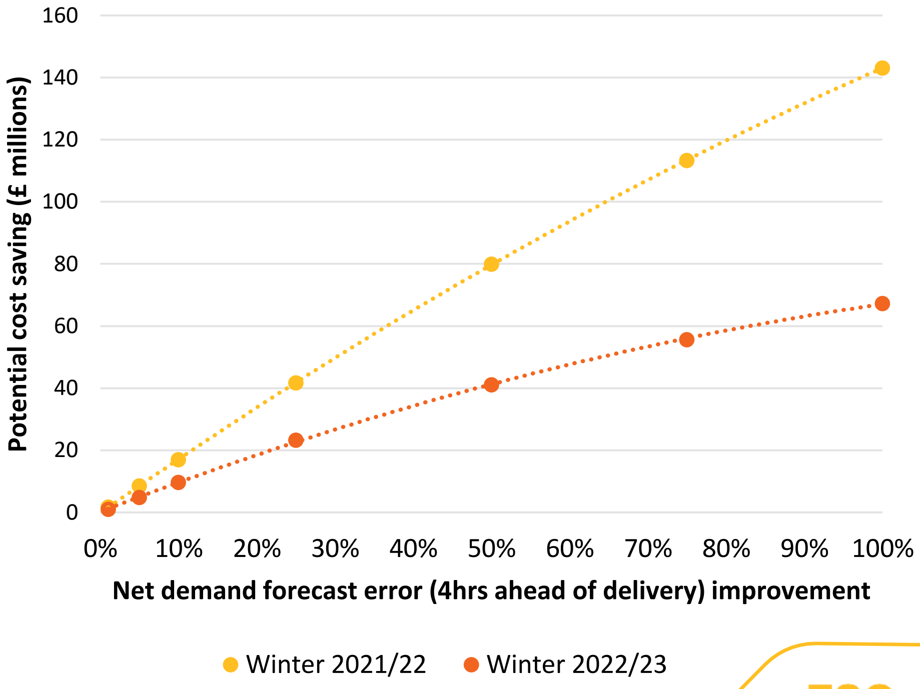
The costs of days with the highest 5% of demand were 67% higher than average, whilst days with the lowest 5% of demand were 30% higher.



Incremental improvements in demand and wind forecasting capability can lead to incremental cost savings

We are continually working to improve and update our forecasting methods as wed adapt to changing generation and improve accuracy.

If the net demand forecast error 4 hours ahead of delivery was reduced by 10% this winter approximately £9.7M could be saved*



**these are representative figures only assuming a consistent improvement allows for a reduction in the most expensive reserve MW held in any period*

Looking Forwards

Balancing Strategy	Key planned initiatives & improvements	Learnings from the winter balancing costs review
Network Planning and Optimisation	By 2026 it is currently estimated that these initiatives will lead to £8.8bn[1] in consumer savings. Core initiatives include: the Five-point plan to manage thermal constraints, Network Services Pathfinder Projects and Outage Optimisation.	The volume of export constraint actions was down this winter compared with previous winters as some improvement works begin to deliver. However, the residual load analysis demonstrates that reducing the peak volume of actions can have the most significant cost impact as days with very high thermal congestion driven by high winds become exponentially more expensive.
Commercial mechanisms	By 2026 it is currently estimated that these initiatives will lead to £1.1bn[1] in consumer savings. Core initiatives include: Future ancillary services, Local constraint markets and balancing reserve.	This report demonstrates that the volumes of BM actions taken to manage reserve increased compared to last winter but that the delay-desync commercial strategy was not as frequently associated with very high BM prices. However, the volumes of this behaviour remained consistent, demonstrating the continued need for a reserve product to explicitly procure against this operational requirement.
Control Room Actions	By 2026 it is currently estimated that these initiatives will lead to £867M[1] in consumer savings. Core initiatives include: Trading Activities, Constraint Optimisation and Inertia monitoring and forecasting.	This report demonstrates the potential that incremental increases in forecasting accuracy can lead to significant cost savings by avoiding some of the most expensive actions taken. This suggests continued investment into demand and wind forecasting would add consumer value.
Innovation & Technology	By 2026 it is currently estimated that these initiatives will lead to £1.5bn[1] in consumer savings. Core initiatives include FRCR, SO:TO optimisation and the Balancing Programme.	Since the introduction of Frequency Risk and Control Report (FRCR) BM actions have not been taken to curtail the largest loss for stability. However, volumes and costs of actions associated with increasing inertia have continued to increase, part of the 2025 carbon free operability work considers how to reduce this inertia requirement alongside initiatives such as pathfinders which will deliver inertia without synchronising conventional machines.

[1]*Based on the central assumptions within BP2, subject to changes based on wholesale prices.*

Help add qualitative input to the data driven report

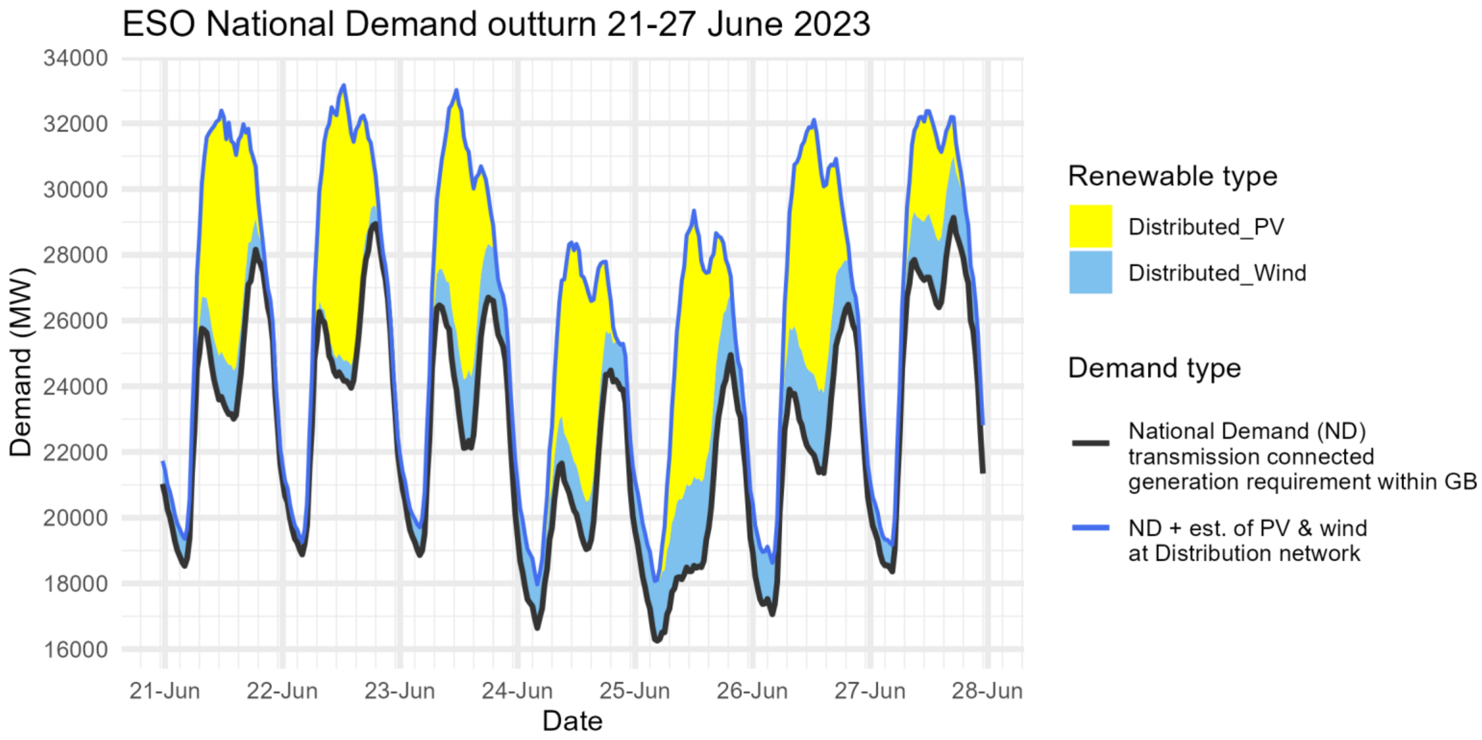
Qualatitive views will be captured and added through this follow up workshop on 25th July 13.30 – 16:00

Please register using the QR code or link below to be included and submit any advance questions or comments to be explored in more detail

https://forms.office.com/r/Bi764RP0un

We will also use this as an opportunity for you to share thoughts on our balancing costs strategy work or discuss market rules through breakout sessions

Demand | Last week demand out-turn



		FORECAST (Wed 21 Jun)			OUTTURN		
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)
21 Jun	Afternoon Min	23.7	1.5	6.4	23.0	1.5	6.9
22 Jun	Overnight Min	18.9	0.4	0.0	18.9	0.4	0.0
22 Jun	Afternoon Min	23.5	0.8	7.0	23.9	0.7	7.1
23 Jun	Overnight Min	18.6	0.6	0.0	18.9	0.8	0.0
23 Jun	Afternoon Min	22.0	2.3	5.9	22.1	2.1	7.4
24 Jun	Overnight Min	16.9	1.5	0.0	16.6	1.3	0.0
24 Jun	Afternoon Min	17.1	2.1	7.6	19.0	1.4	6.6
25 Jun	Overnight Min	15.9	1.8	0.5	16.3	1.8	0.1
25 Jun	Afternoon Min	17.1	2.8	7.1	18.5	2.7	7.7
26 Jun	Overnight Min	17.0	1.6	0.0	17.1	1.6	0.0
26 Jun	Afternoon Min	20.9	2.4	7.5	21.4	2.4	6.3
27 Jun	Overnight Min	17.8	1.5	0.0	18.4	0.8	0.0
27 Jun	Afternoon Min	21.8	2.2	6.6	26.4	2.0	2.9

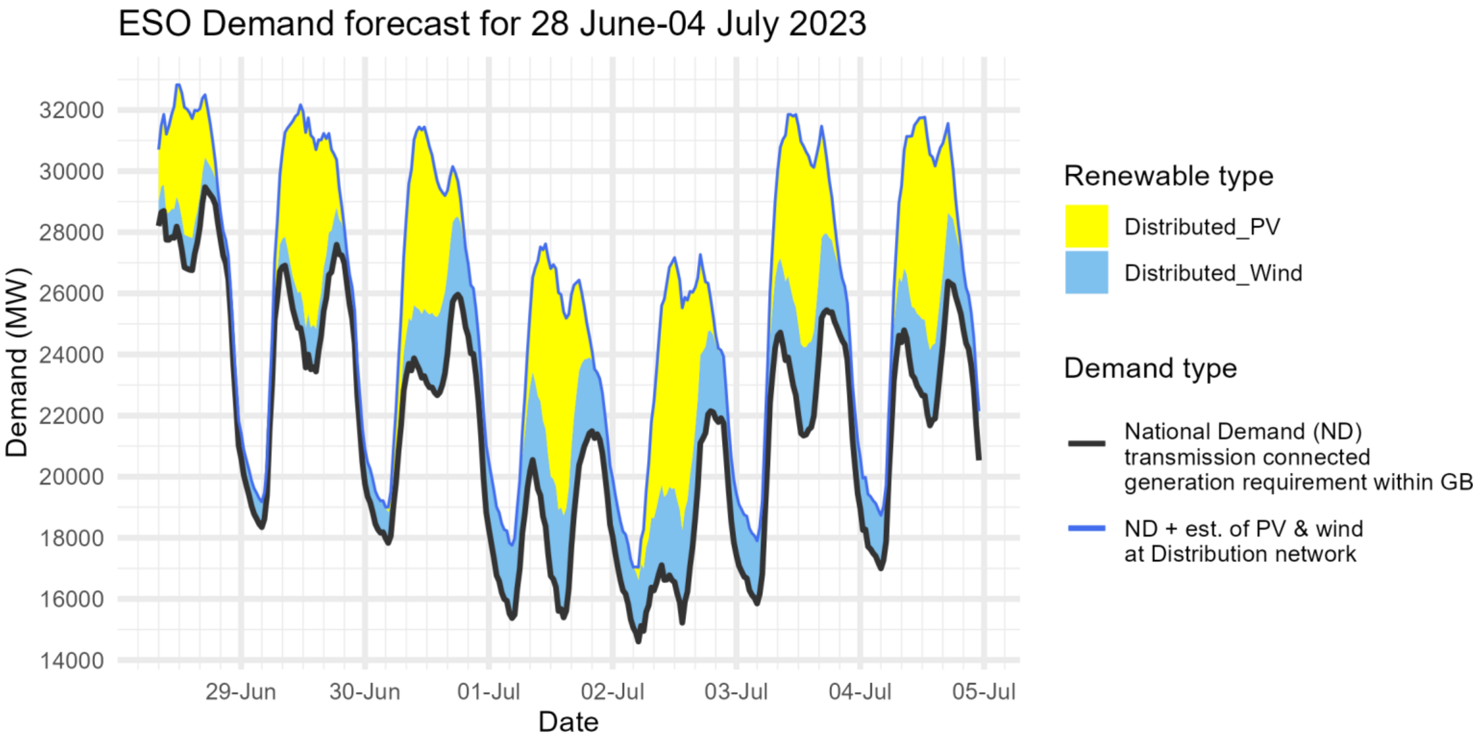
The black line (National Demand ND) is the measure of portion of total GB customer demand that is supplied by the transmission network.

ND values <u>**do not include**</u> 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 <u>does not include</u> 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 28 Jun)		
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)
28 Jun 2023	Afternoon Min	26.8	1.1	3.9
29 Jun 2023	Overnight Min	18.3	0.8	0.0
29 Jun 2023	Afternoon Min	23.4	1.4	5.9
30 Jun 2023	Overnight Min	17.8	1.0	0.2
30 Jun 2023	Afternoon Min	22.7	2.6	4.4
01 Jul 2023	Overnight Min	15.4	2.3	0.0
01 Jul 2023	Afternoon Min	15.4	3.3	6.7
02 Jul 2023	Overnight Min	14.6	2.0	0.4
02 Jul 2023	Afternoon Min	15.2	3.0	7.3
03 Jul 2023	Overnight Min	15.8	2.1	0.0
03 Jul 2023	Afternoon Min	21.3	2.9	6.6
04 Jul 2023	Overnight Min	17.0	1.7	0.0
04 Jul 2023	Afternoon Min	21.7	2.5	6.4

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

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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.

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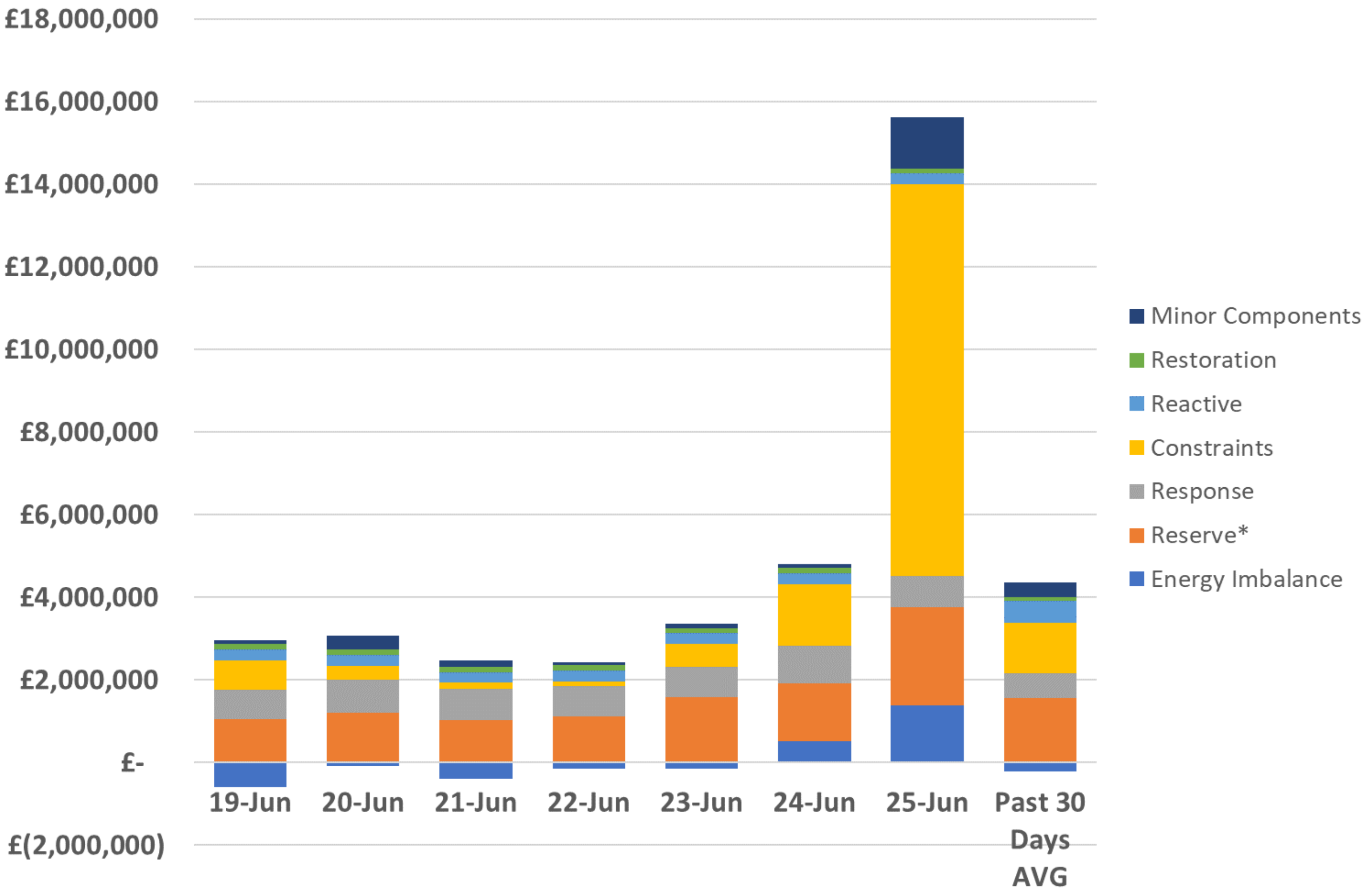
ESO Actions | Category costs breakdown for the last week



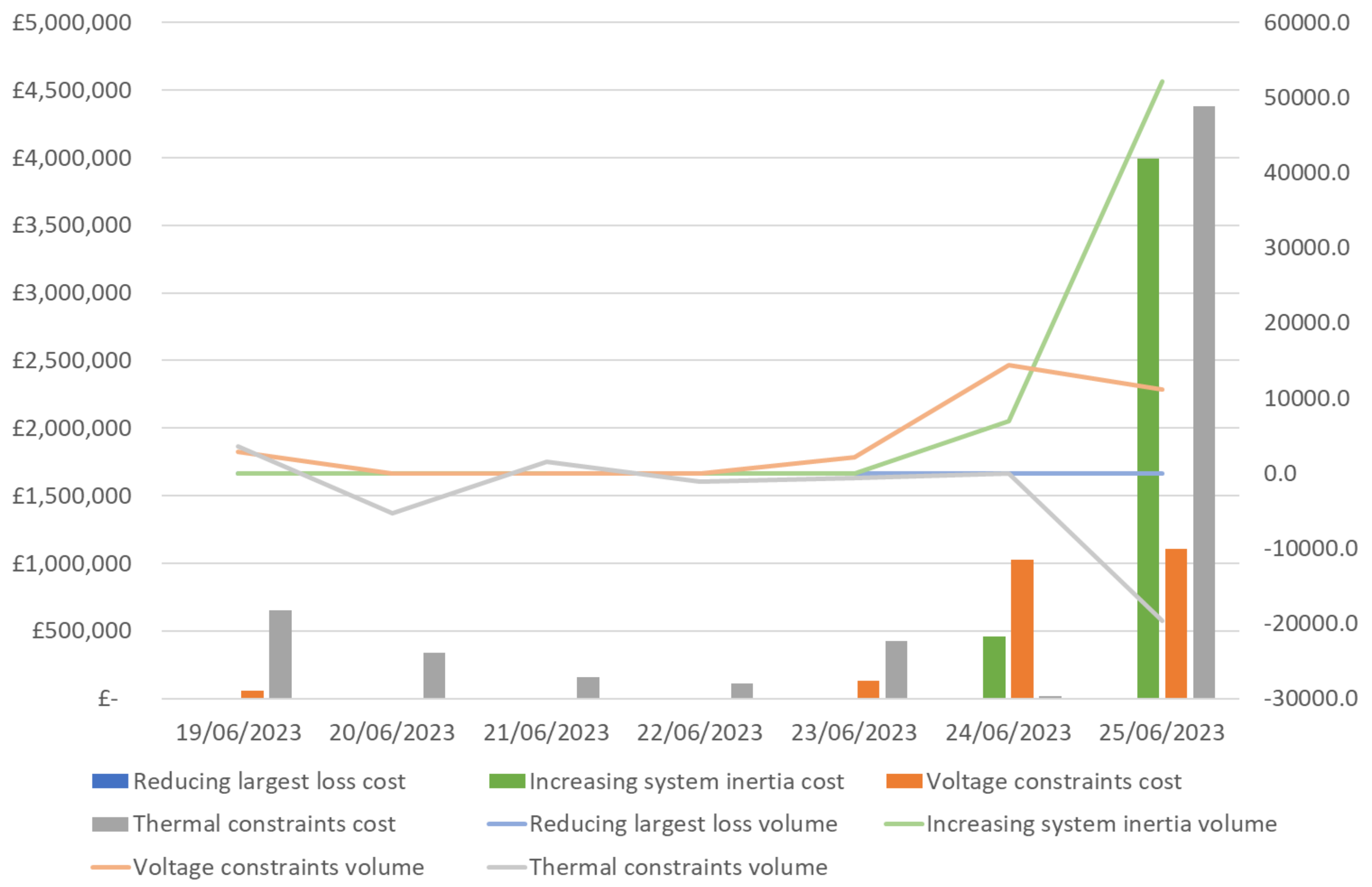
Date	Total (£m)
19/06/2023	2.4
20/06/2023	3.0
21/06/2023	2.1
22/06/2023	2.3
23/06/2023	3.2
24/06/2023	4.8
25/06/2023	15.6
Weekly Total	33.4
Previous Week	19.8

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



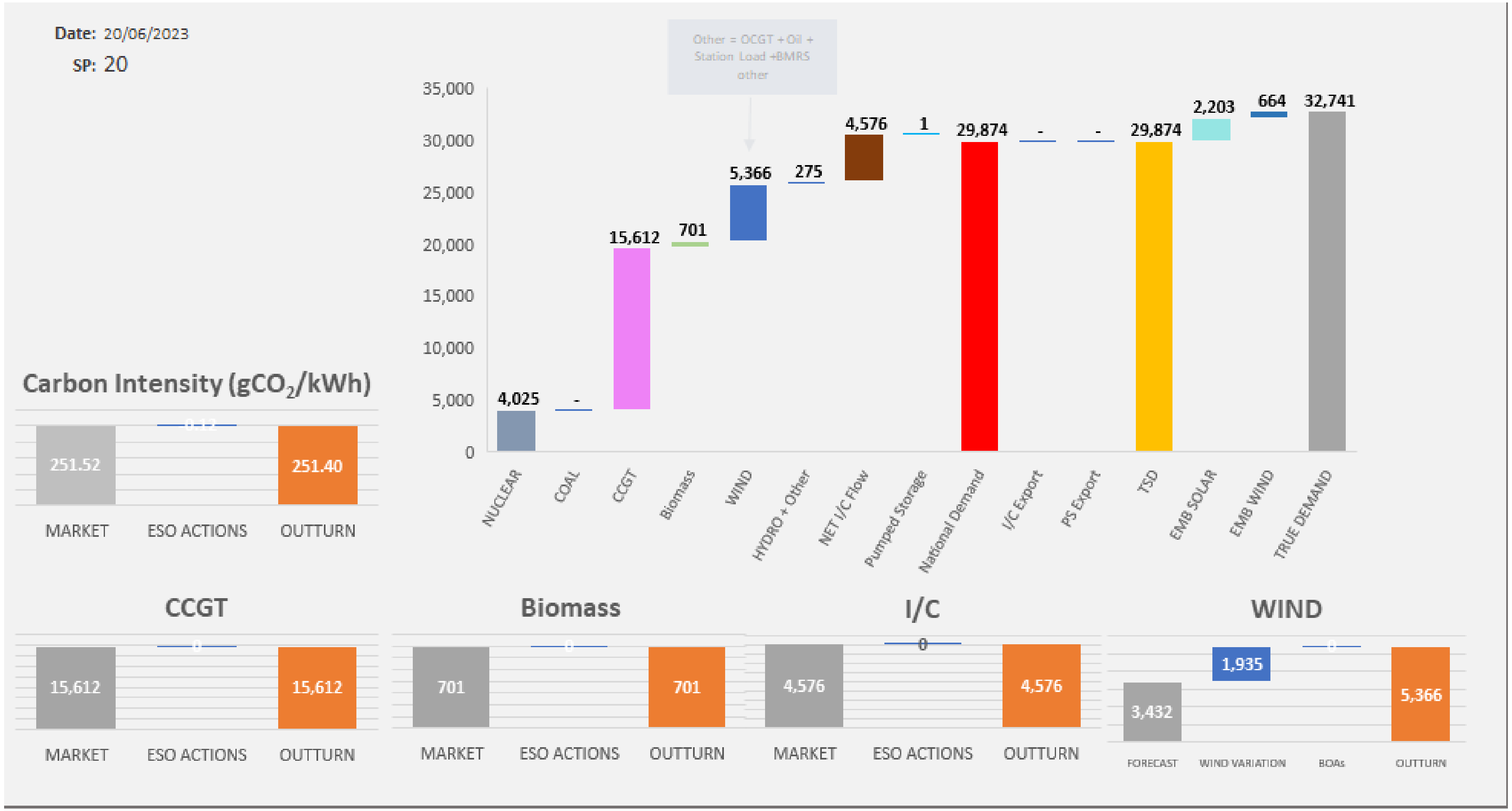
Thermal – network congestion
Actions were required to manage thermal constraints throughout the week.

Voltage
Intervention was required to manage voltage levels Mon, Fri, Sat and Sun.

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

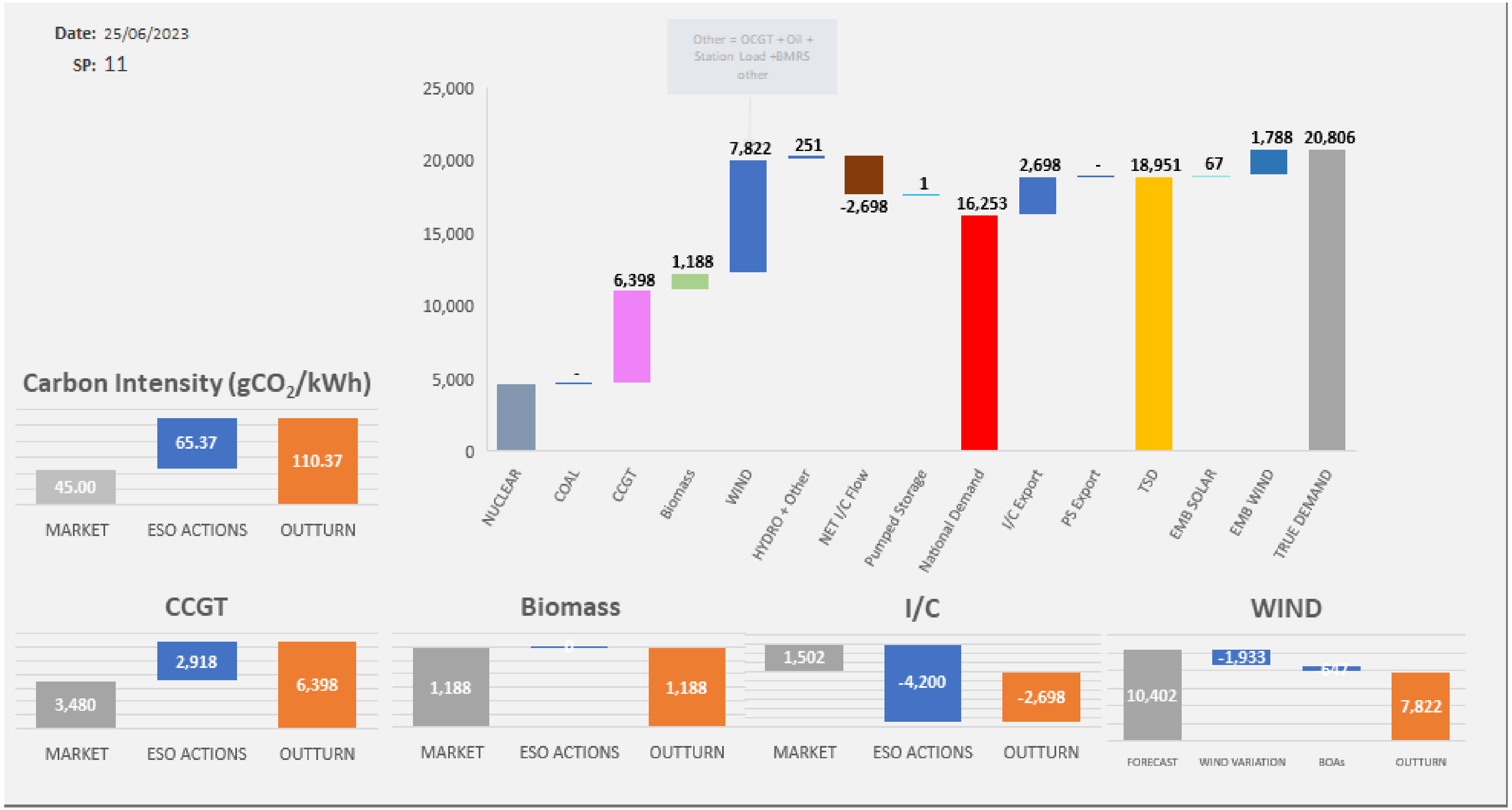
Increasing inertia
Intervention was required to manage system inertia Sat and Sun.

ESO Actions | Tuesday 20 June – Peak Demand – SP spend ~£-1600



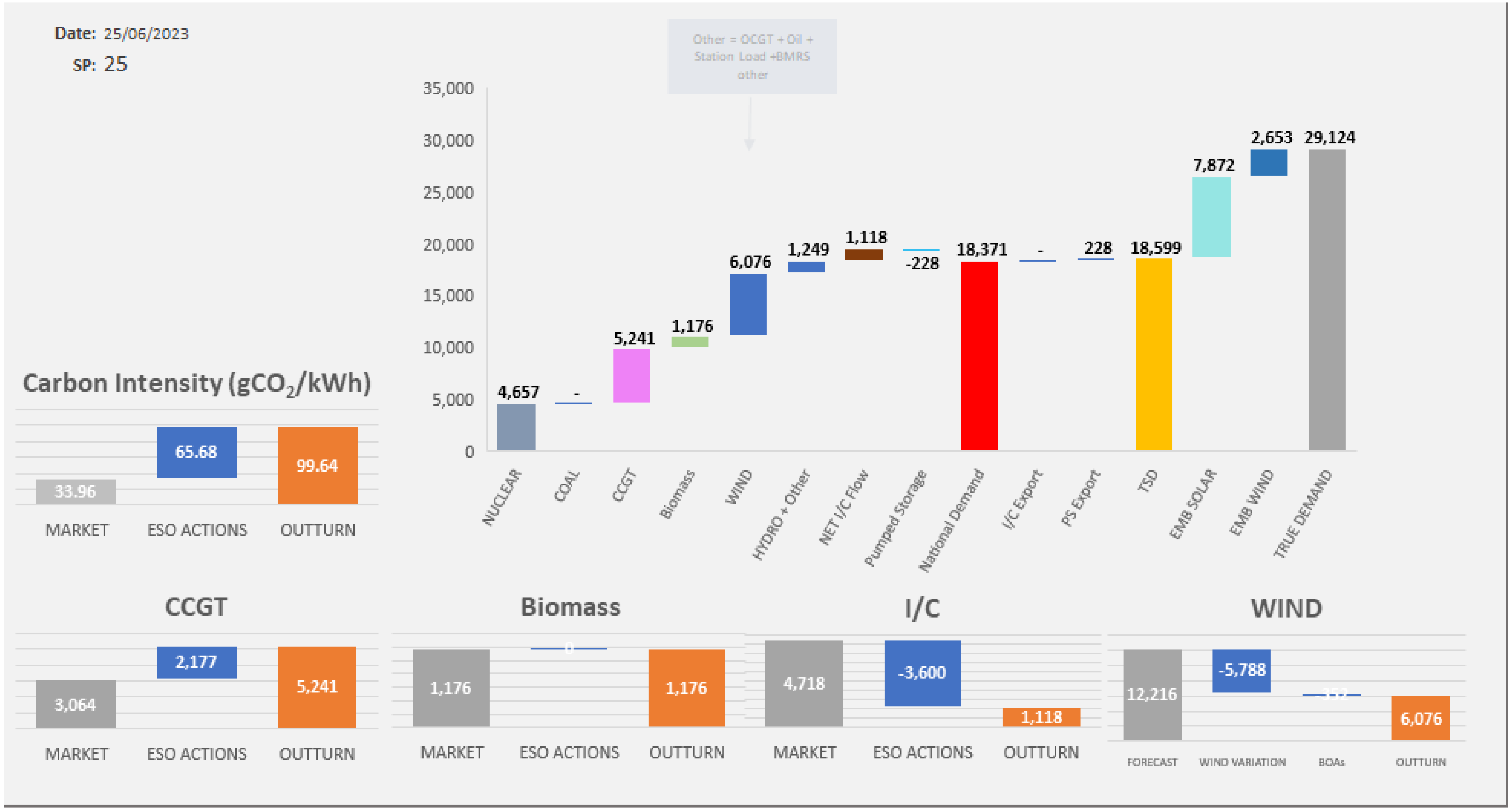
Carbon Intensity data on data portal: https://data.nationalgrideso.com/carbon-intensity1/carbon-intensity-of-balancing-actions

ESO Actions | Sunday 25 June – Minimum Demand – SP Spend ~£455k



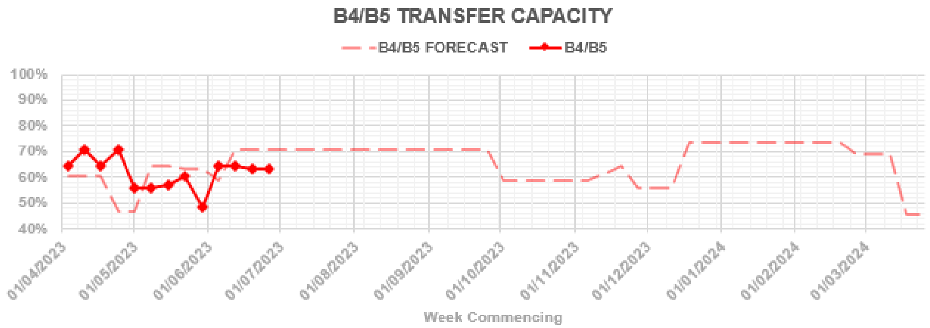
Carbon Intensity data on data portal: https://data.nationalgrideso.com/carbon-intensity1/carbon-intensity-of-balancing-actions

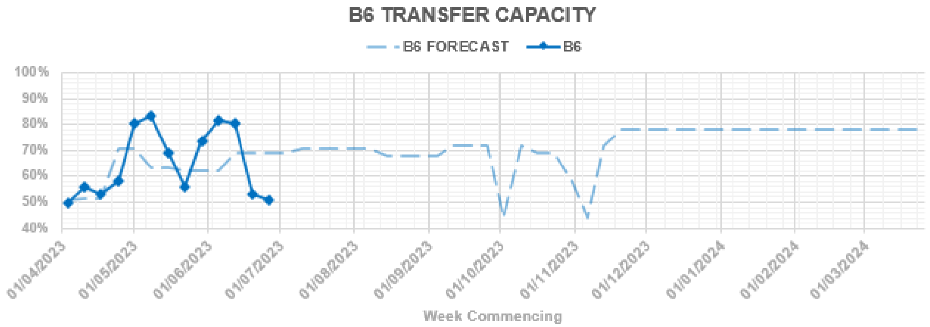
ESO Actions | Sunday 25 June – Highest SP Spend ~£550k

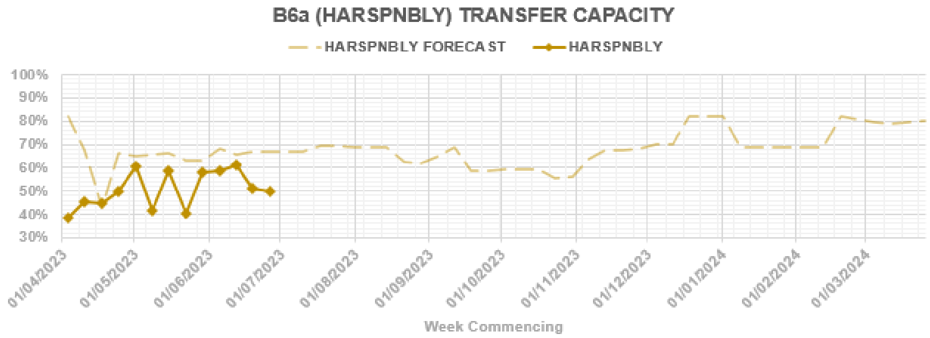


Carbon Intensity data on data portal: https://data.nationalgrideso.com/carbon-intensity1/carbon-intensity-of-balancing-actions

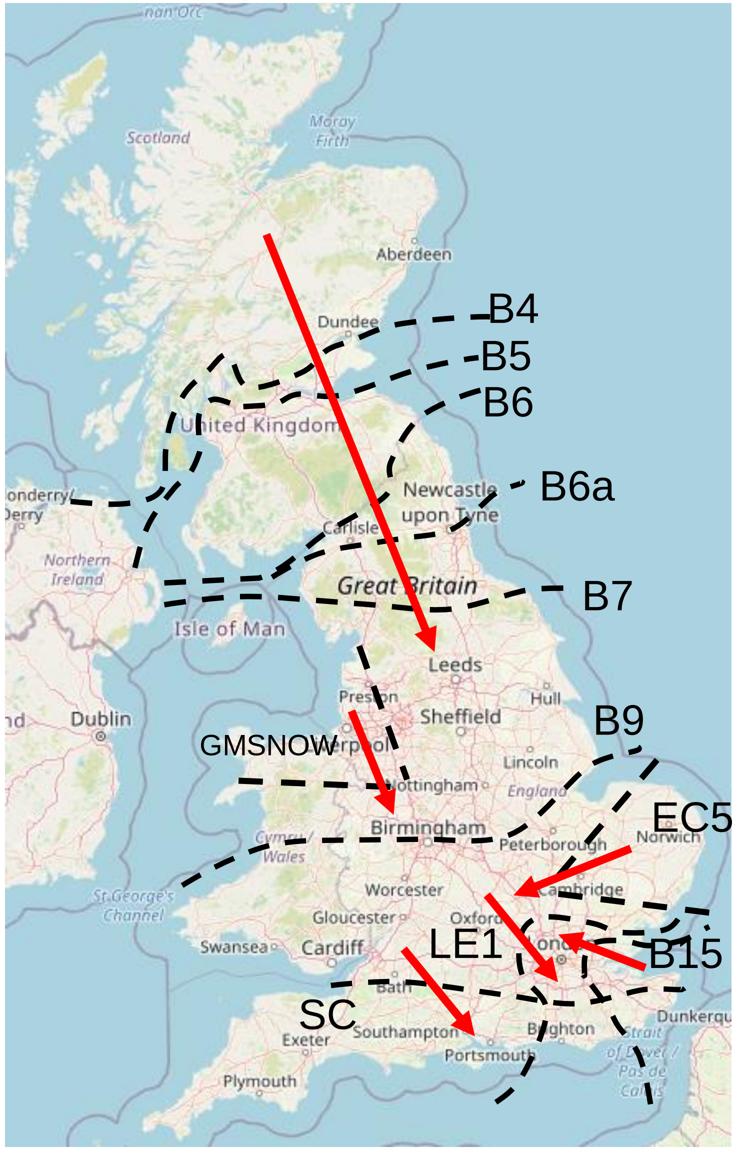
Transparency | Network Congestion







Boundary	Max. Capacity (MW)
B4/B5	3400
B6	6800
B6a	8000
B7	8325
GMSNOW	4700
B9	10600
EC5	5000
LE1	8500
B15	7500
SC	7300



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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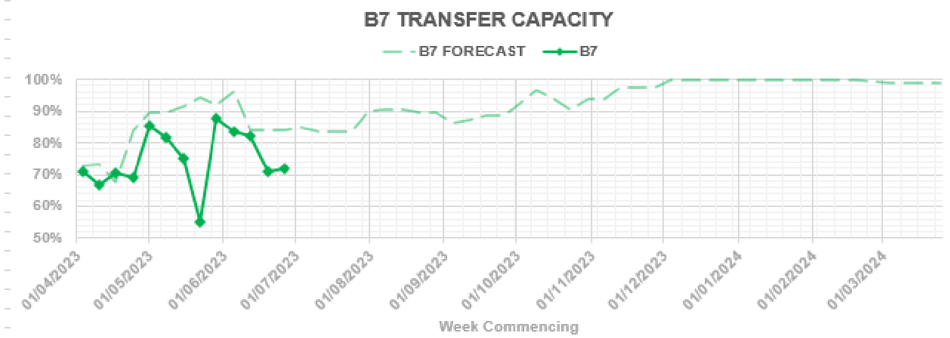

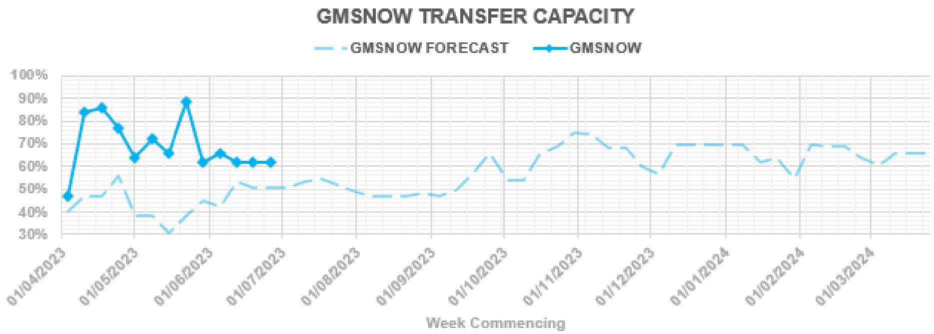

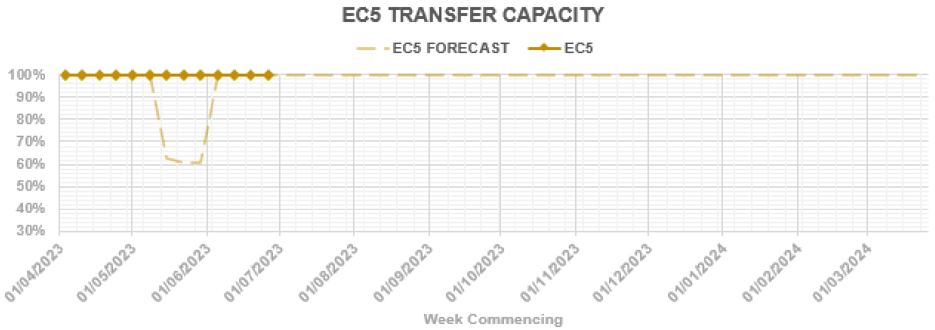

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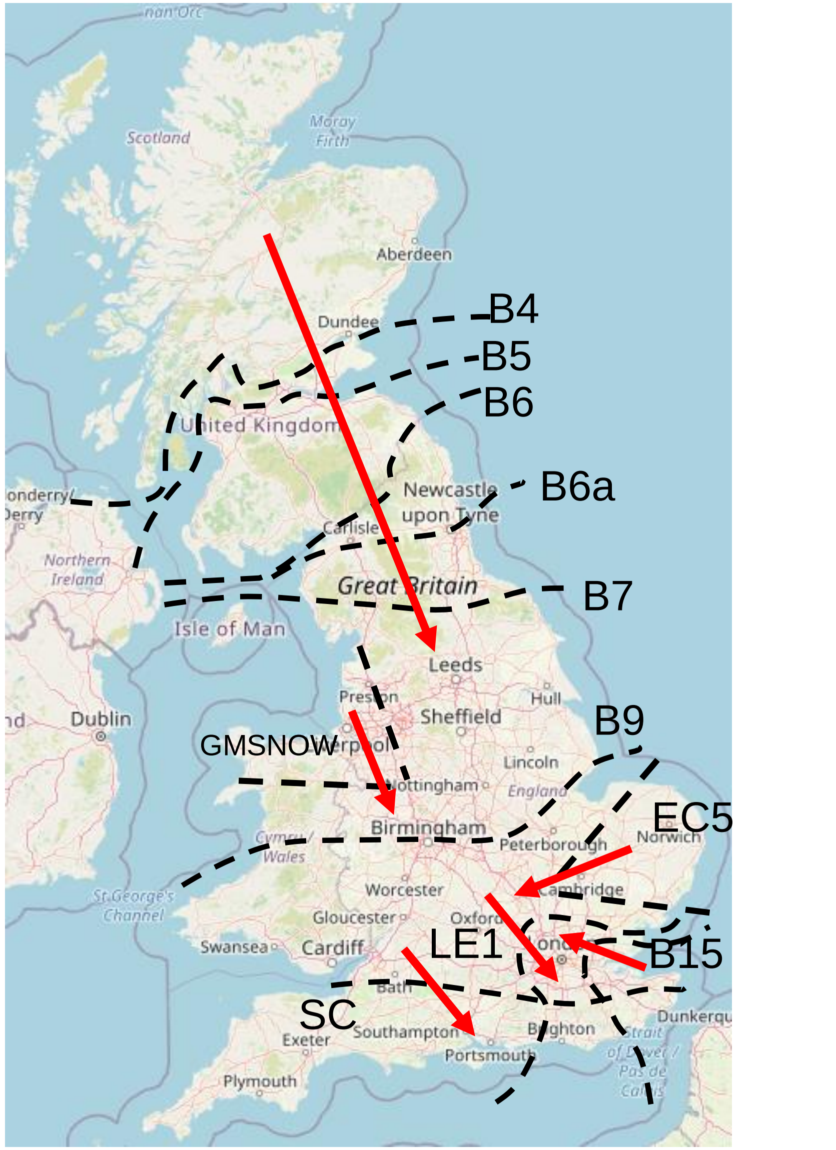

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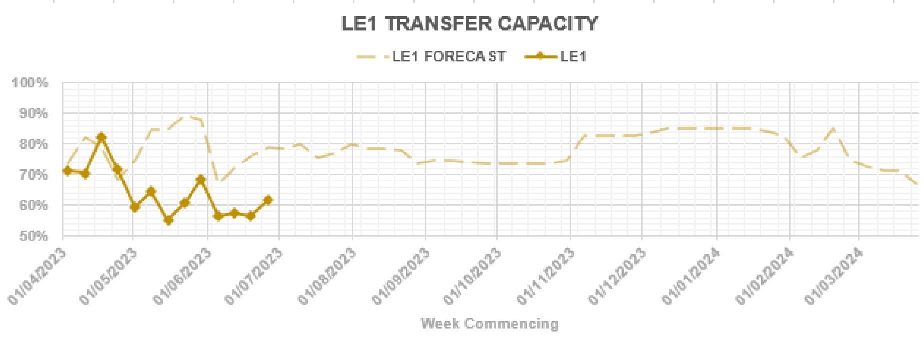

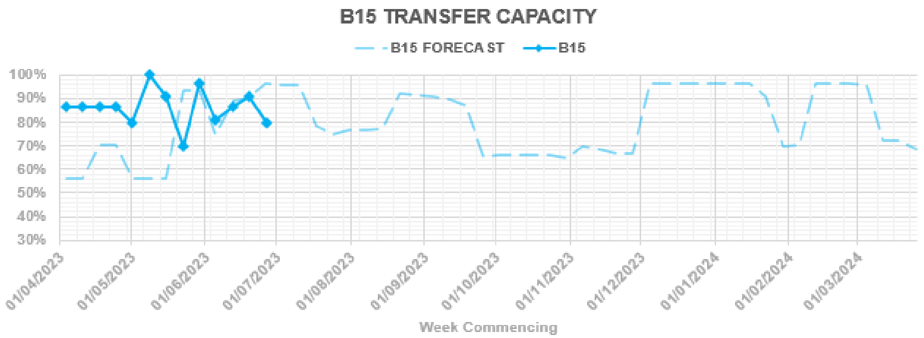

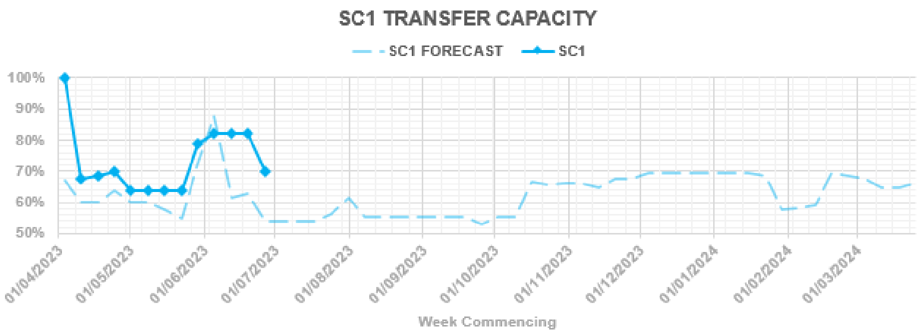

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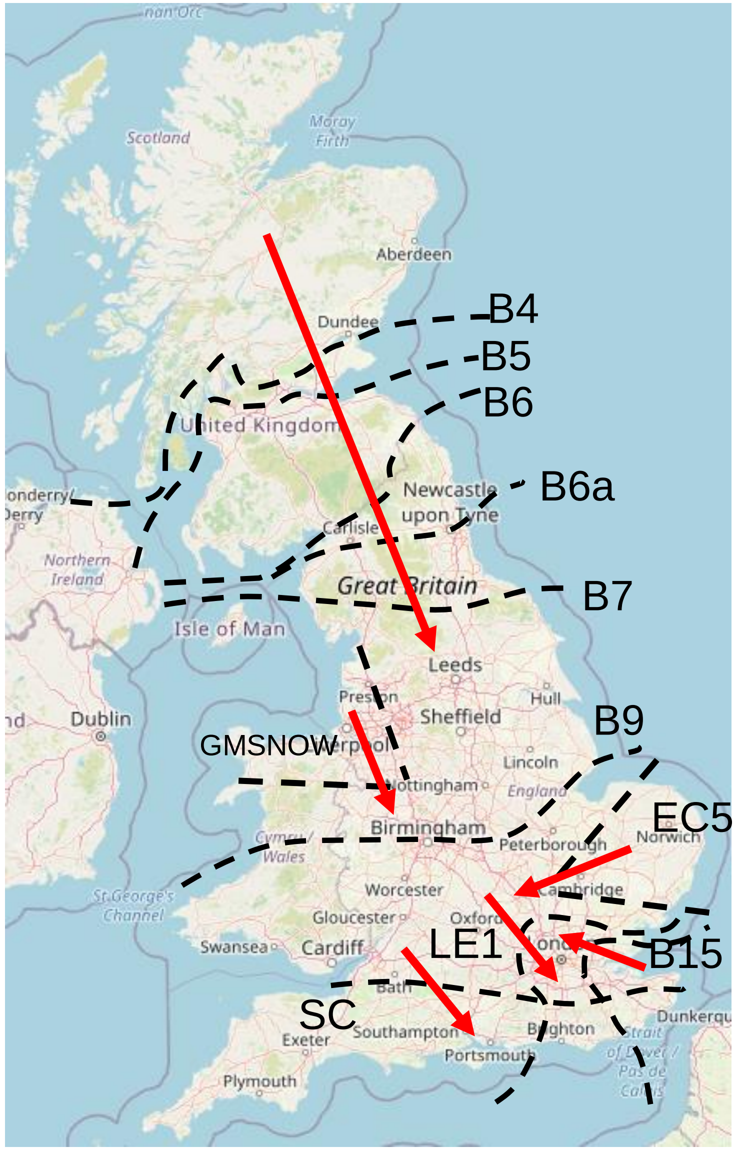

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Questions from last week

Q: Could you confirm at what P level ESO's high scenario BSUoS forecast is at please? (eg P90)

A: The published high scenario corresponds to the p90.

Q: Follow-up to the ANM question. On 7/6/23 we heard that ENCC was using ANM as a tool to manage low demand / high renewables periods. I'm not aware that ENCC has the right to do this. It's a cost to the generators. Can you instruct ENCC that ANM is not a tool for them?

A: The OTF on 07/06 referenced that "…these localised issues are solved by active network management tools and other automated schemes".

To clarify, the ESO does not operate Active Network Management tools and the other automated schemes. These are established by the Distribution Network Operators (DNO) and more information can be found on their websites. For example:

NGED: https://www.nationalgrid.co.uk/our-network/active-network-management-anm

SSE: https://www.ssen.co.uk/our-services/active-network-management/

Northern Power Grid https://www.northernpowergrid.com/your-powergrid/ice-work-plan/article/active-network-management-anm

SP Energy Networks
https://www.spenergynetworks.co.uk/news/pages/our_centralised_anm_platform_is_now_live.aspx#:~:text=Active%20Network%20Management%20is%20a%20distributed%20control%20system,voltages%20to%20key%20points%20within%20the%20controlled%20zone.

Advance Questions

Q: Can ESO please publish the operational metering map. There is a great deal of ambiguity as to what unit is operational metered and thus constitutes the real-time generation data.

A: We're not sure what you mean by an operational metering map as we do not produce one.

There are two existing datasets that may provide the information requested. The first provides the Final Physical Notifications (FPN*) of units and the second is zonal data. You can find these on the Elexon website at:

https://www2.bmreports.com/bmrs/?q=generation/

https://www2.bmreports.com/bmrs/?q=demand/dayanddayaheaddemand

For further information about the data published by Elexon and options for accessing it, please contact Elexon directly.

* FPN = units declared output in order to deliver on their contracted obligations

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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