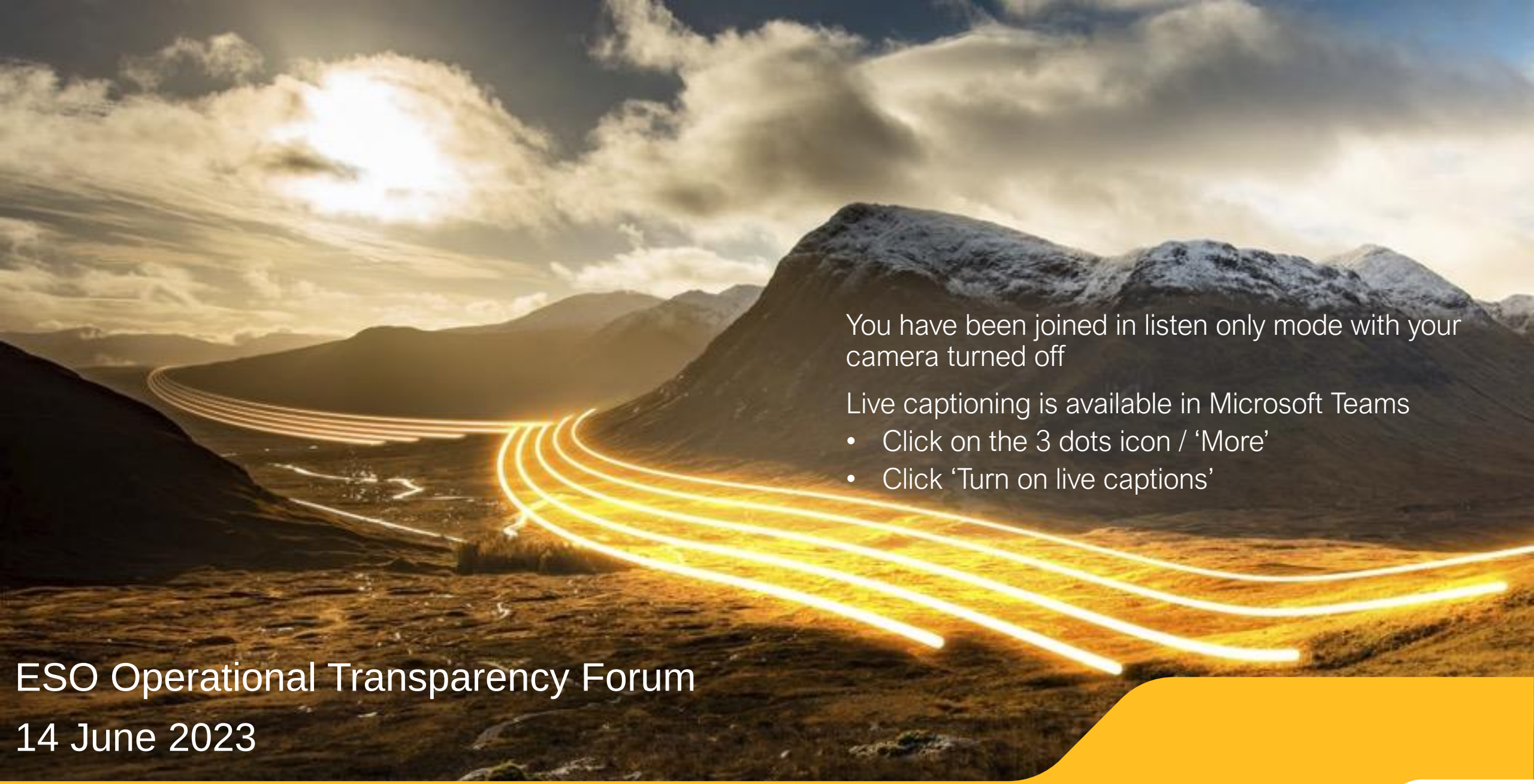

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Live captioning is available in Microsoft Teams

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

ESO Operational Transparency Forum

14 June 2023

ESO

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 - EV charge points & the BM

21 June - Key messages from the Winter 22/23 Review and Early View of Winter 23/24 reports (publication date 15 June)

28 June –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

System Events

Tuesday 6 June 2023 Unplanned Balancing Mechanism (BM) outage - communicated via BMRS

Thursday 8 June 2023 11:39 – An interconnector tripped while importing 1321MW into GB. System frequency reached a maximum deviation of 49.624Hz.

Heavy storm activity over weekend through to Monday 10-12 June 2023 including:

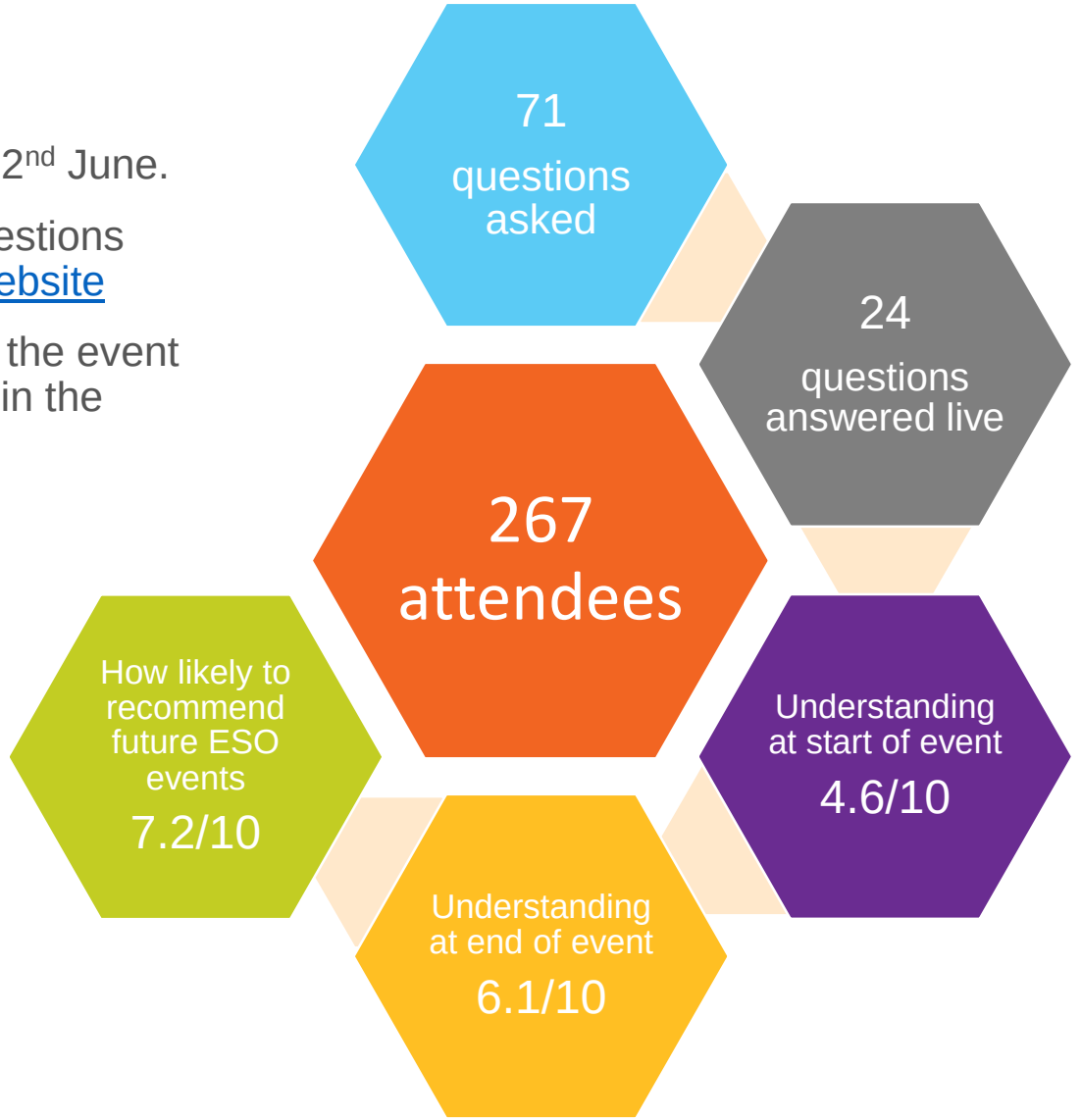
- Circuit tripping due to heavy storm activity. System frequency reached a maximum deviation of 49.684Hz.
- Generator tripped while generating 770MW. System frequency reached a maximum deviation of 49.66Hz.
- Several trips remain under investigation

Dispatch Transparency Event

We hosted an online event about Dispatch Transparency on Friday 2nd June.

The slides, webinar recording and the Q&A document (including questions that we didn't have time to answer live) can be found on the OTF website

Please note for questions which go beyond the immediate scope of the event we have referred participants to the appropriate team or expert within the ESO.



We would appreciate your input to help us understand how the event worked for you; to inform future events; and the ESO approach to Dispatch Transparency.

The post-event survey is available here.

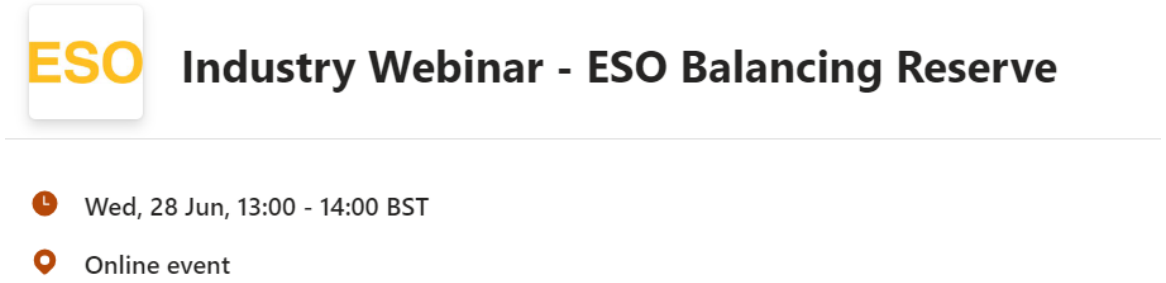
From the in-event poll, we noticed some people felt we assumed too much knowledge. Please use the post-event survey to tell us what type of information you felt was missing and how we could support you and others in a future event.

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.



Link to register

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

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.

Powerloop – Trialling Vehicle-to-Grid technology

ESO

Overview of Powerloop

What

Octopus Energy Group led project looking to demonstrate a feasible model for domestic Vehicle to Grid (V2G)

- Funded by Innovate UK & Office for Low Emission Vehicle
- Ran between 2018 – 2022
- 135 participating households fitted with:
  - Nissan Leaf lease & Bi-directional charger
  - Full G99 export approval
  - Smart meter & consumer app
  - Time-of-use V2G import/export tariff (based on day-ahead wholesale prices)

ESO collaborated on a proof of concept trial:

- Understand the viability of entry into the Balancing Mechanism (BM)
- Demonstrate the capability of V2G enabled EVs

How

2 overnight sessions (17:00 – 05:00):

- Test environment – no settlement or market impacts
- Participating consumer preferences protected at all times

Data/process

- Live data communications to ENCC
- Physical Notifications, Maximum Export/Import Limits used to represent optimised (dis)charge schedules
- **14 instructions** sent from ENCC, altering (dis)charging behaviour of individual vehicles, to match energy imbalance requirements when cost-effective to do so

Sli.do code #OTF

Why did we collaborate?

Growth in Electric Vehicles

- Ban on sale petrol and diesel vehicles
- Could see up to 10 millions battery EV's on road by 2030
- Increased volume of charge points

Figure EC.T.07 - Battery electric cars on the road

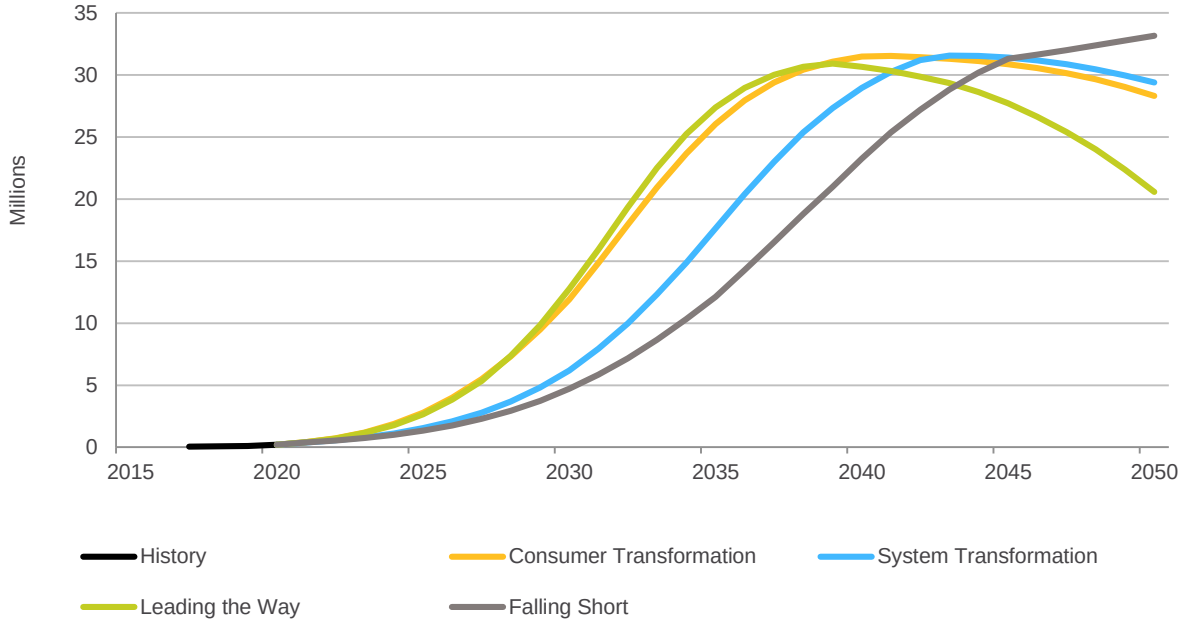
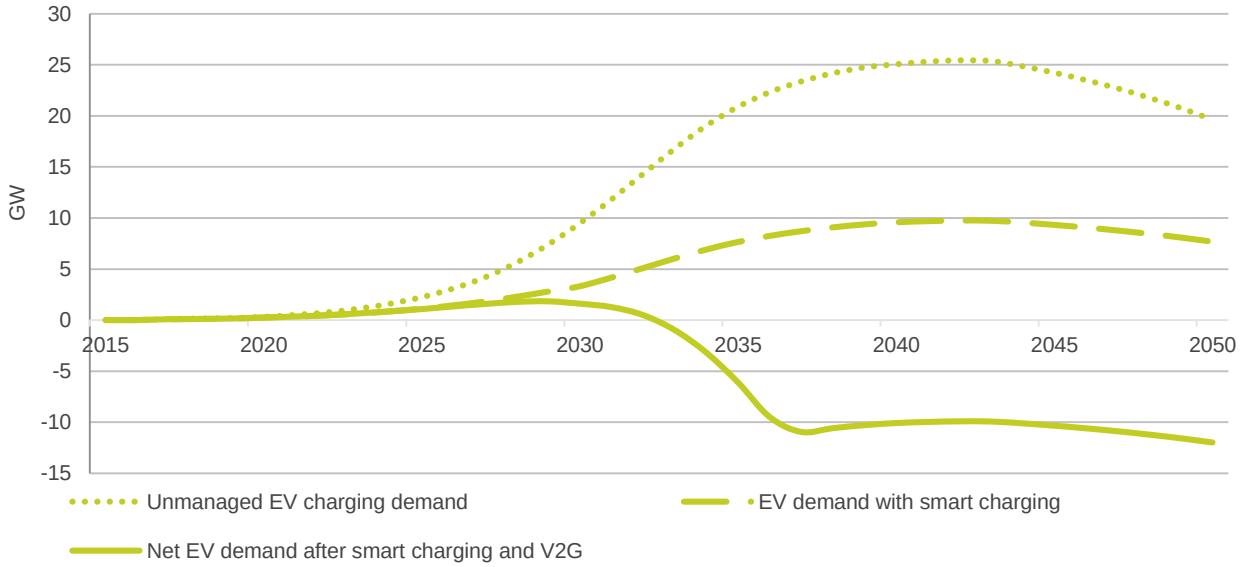


Figure FL.12 - Electric vehicle charging behaviour at average cold spell winter peak system demand – Leading the Way scenario



Implications to system demand

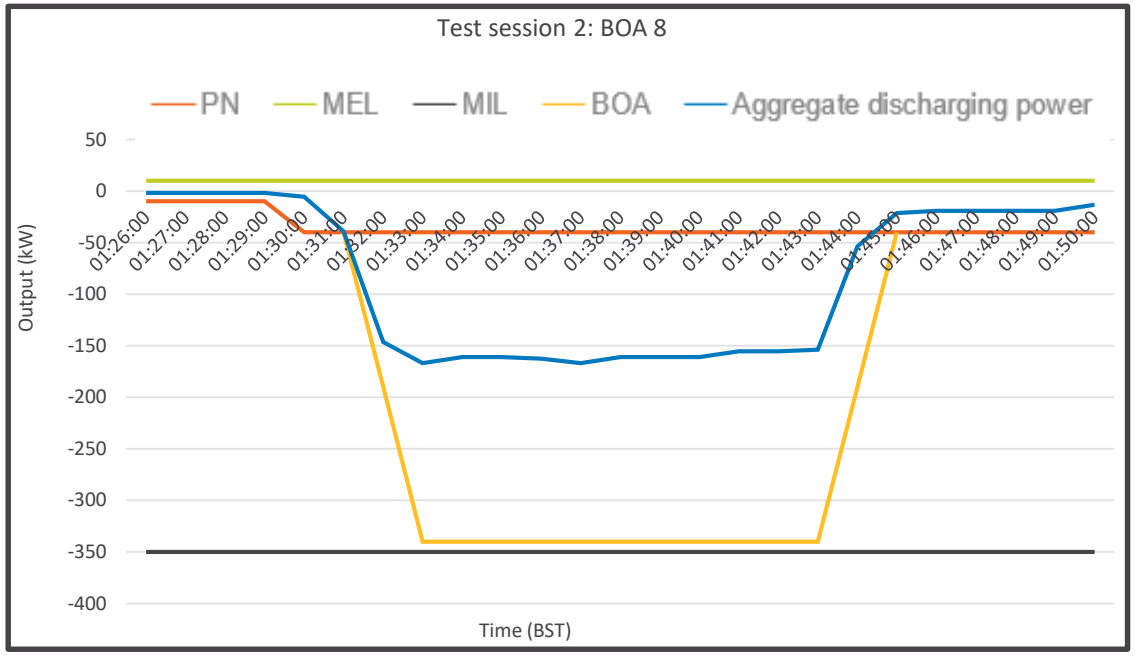
- Smart charging will minimise impacts
- V2G could help reduce peaks by 10GW
- Market currently doesn't incentivise flexibility in consumer demand

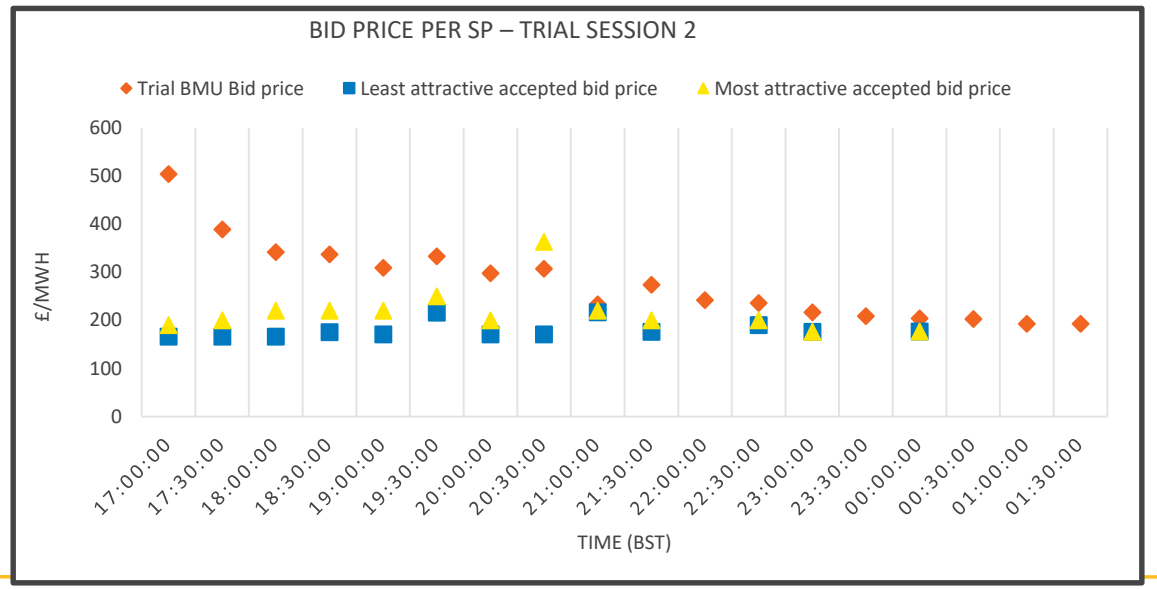
*Graphs taken from our 2022 Future Energy Scenarios – Figures EC.T.07 & Figure FL.12

Findings

Operational

- **Operational parameters**
  Analyse the accuracy of converting household charge schedules into operational parameters (PN, MEL/MIL etc.)
- **Response to instructions**
  Capability of vehicles to alter (dis)charge schedules to meet energy imbalance requirements
- **Time to respond**
  Show fleet was able to respond fully in all cases within 3 minutes, from point of instruction
- **Operational metering (not trialled live)**
  Able to create a second by second metering feed post event based on metering from charge points





Commercial

- **Potential reduced balancing costs**
  Indications that this type of asset could offer cheaper balancing costs than currently available
- **Participating consumer benefit**
  Octopus Energy reported Customers participating in the trial realised a saving of up to **£180/y compared to smart charging on a time-of-use tariff**, or **£840/y compared to unmanaged charging on a flat tariff**, when adjusted to an annual mileage of 10,000 miles.

Finding – Barriers to market entry

Data
- Operational metering feeds – Accuracy, frequency, latency & reliability
- Accuracy of operational parameters

Systems
- Control systems & Network models suitability for domestic assets
- Future system capability with domestic assets

Process
- Ability to dispatch increasing numbers of assets in the BM
- Downstream impacts on modelling, planning & forecasting – due to domestic assets operating in the BM

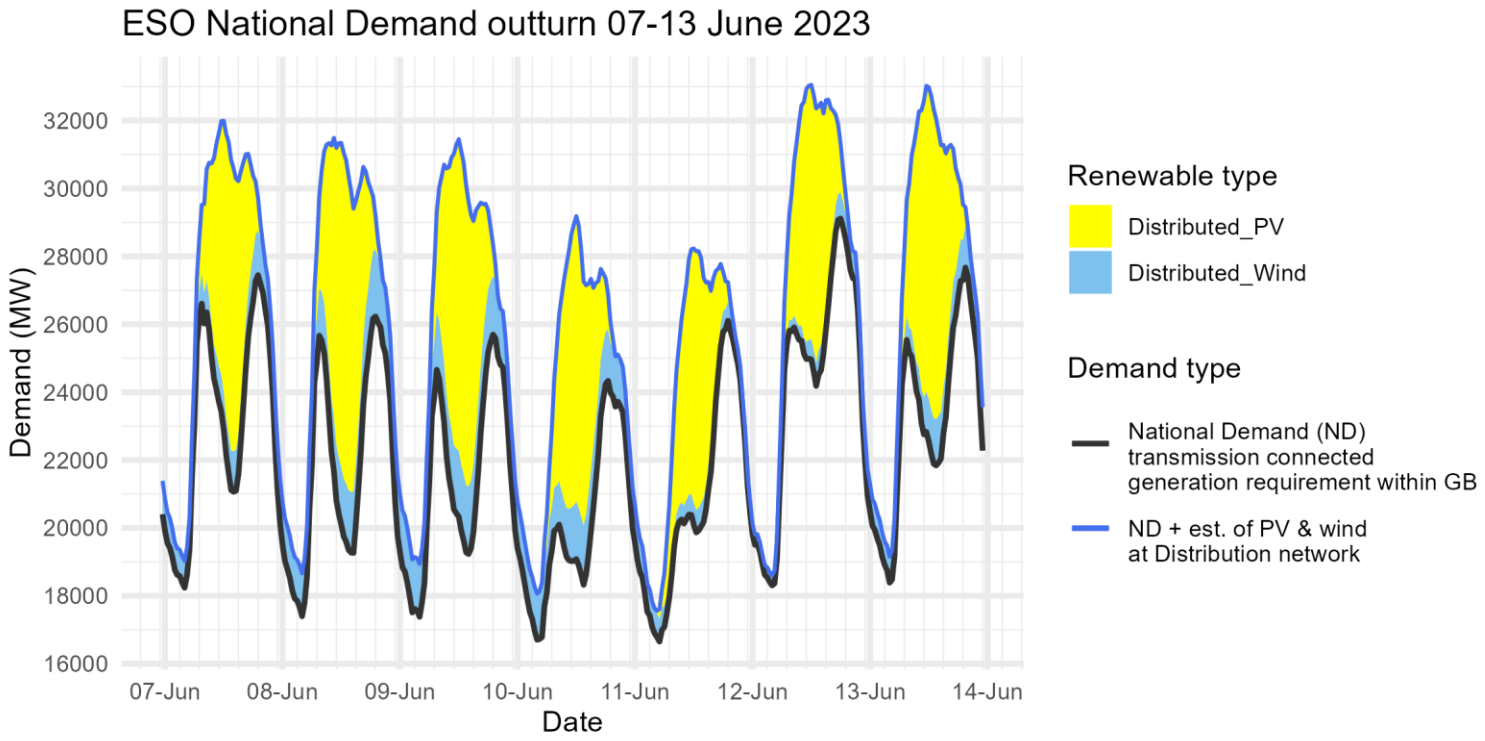
Market framework
- Settlement process
- Minimum thresholds/Aggregation locality
- Whole integer submissions

Next steps

- Final report and animation published on ESO website on 6th June 2023
- **Power Responsive**
  - Working group assessing operational metering barrier
  - Leading conversations with providers in this space
- **CrowdFlex**
  - Exploring trials around incentivising customers to be readily available to offer balancing services

For more information regarding this piece of work (or trials in general), please contact box.balancingprogramme@nationalgrideso.com

Demand | Last week demand out-turn



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

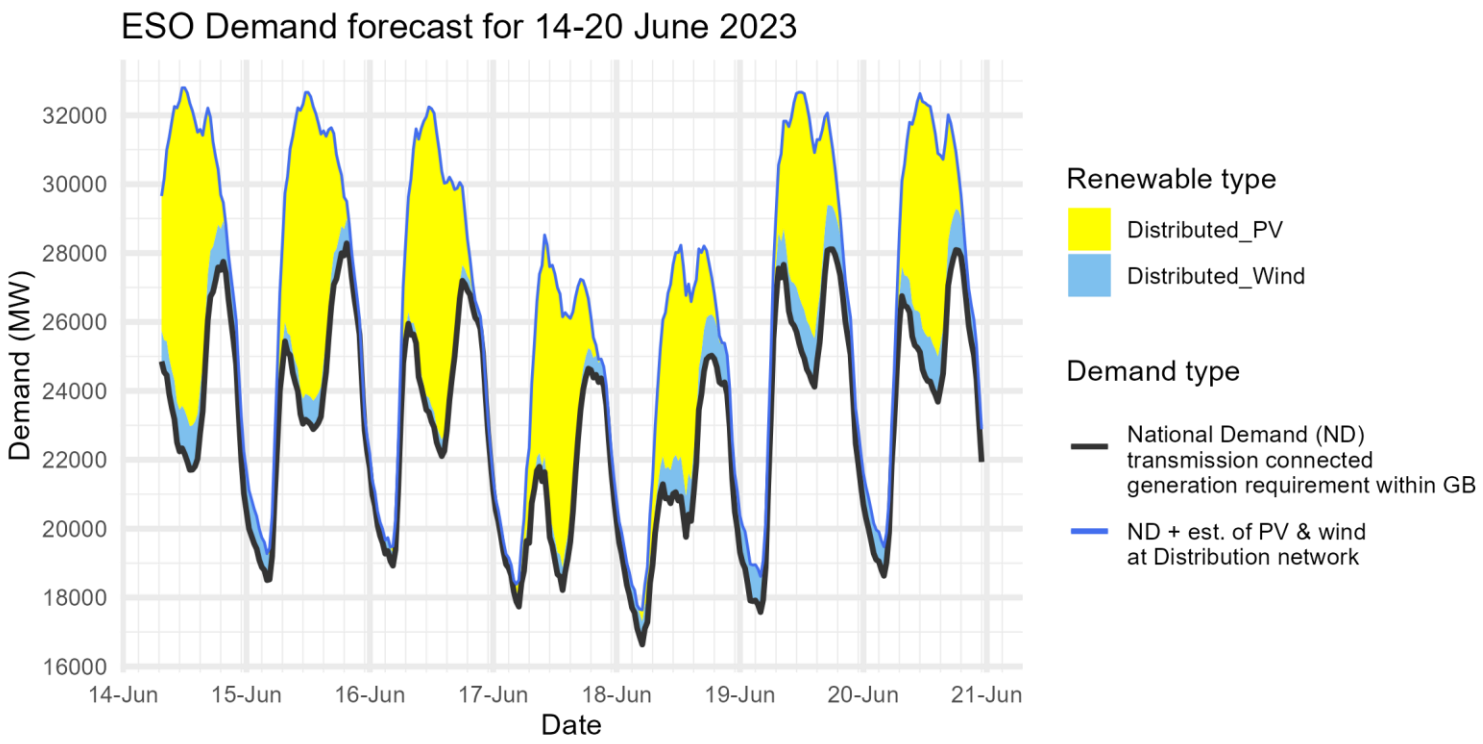
ND values **do not include** export on interconnectors or pumping or station load

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

		FORECAST (Wed 07 Jun)			OUTTURN		
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)
07 Jun	Afternoon Min	21.2	1.3	8.0	21.1	1.2	8.3
08 Jun	Overnight Min	17.7	1.2	0.0	17.4	1.3	0.0
08 Jun	Afternoon Min	20.6	2.0	7.6	19.3	1.8	8.3
09 Jun	Overnight Min	17.0	1.4	0.0	17.4	1.6	0.0
09 Jun	Afternoon Min	19.3	1.9	7.4	19.2	2.0	8.4
10 Jun	Overnight Min	16.5	1.0	0.2	16.7	1.4	0.0
10 Jun	Afternoon Min	17.2	1.3	6.9	18.3	1.8	7.2
11 Jun	Overnight Min	16.3	0.7	0.4	16.7	0.7	0.3
11 Jun	Afternoon Min	18.9	0.9	6.0	19.9	0.7	7.6
12 Jun	Overnight Min	17.8	0.5	0.0	18.3	0.3	0.0
12 Jun	Afternoon Min	22.8	0.7	7.7	24.2	0.7	7.5
13 Jun	Overnight Min	18.8	0.5	0.0	18.4	0.8	0.0
13 Jun	Afternoon Min	23.9	0.7	5.7	21.8	1.4	8.8

Demand | Week Ahead



		FORECAST (Wed 14 Jun)		
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)
14 Jun 2023	Afternoon Min	21.7	1.3	9.4
15 Jun 2023	Overnight Min	18.5	0.8	0.0
15 Jun 2023	Afternoon Min	22.9	0.8	8.5
16 Jun 2023	Overnight Min	18.9	0.4	0.2
16 Jun 2023	Afternoon Min	22.1	0.5	7.8
17 Jun 2023	Overnight Min	17.7	0.3	0.5
17 Jun 2023	Afternoon Min	18.2	0.7	7.3
18 Jun 2023	Overnight Min	16.6	0.7	0.3
18 Jun 2023	Afternoon Min	19.8	1.2	5.8
19 Jun 2023	Overnight Min	17.6	1.0	0.0
19 Jun 2023	Afternoon Min	24.1	1.4	5.4
20 Jun 2023	Overnight Min	18.6	0.8	0.0
20 Jun 2023	Afternoon Min	23.7	1.3	5.9

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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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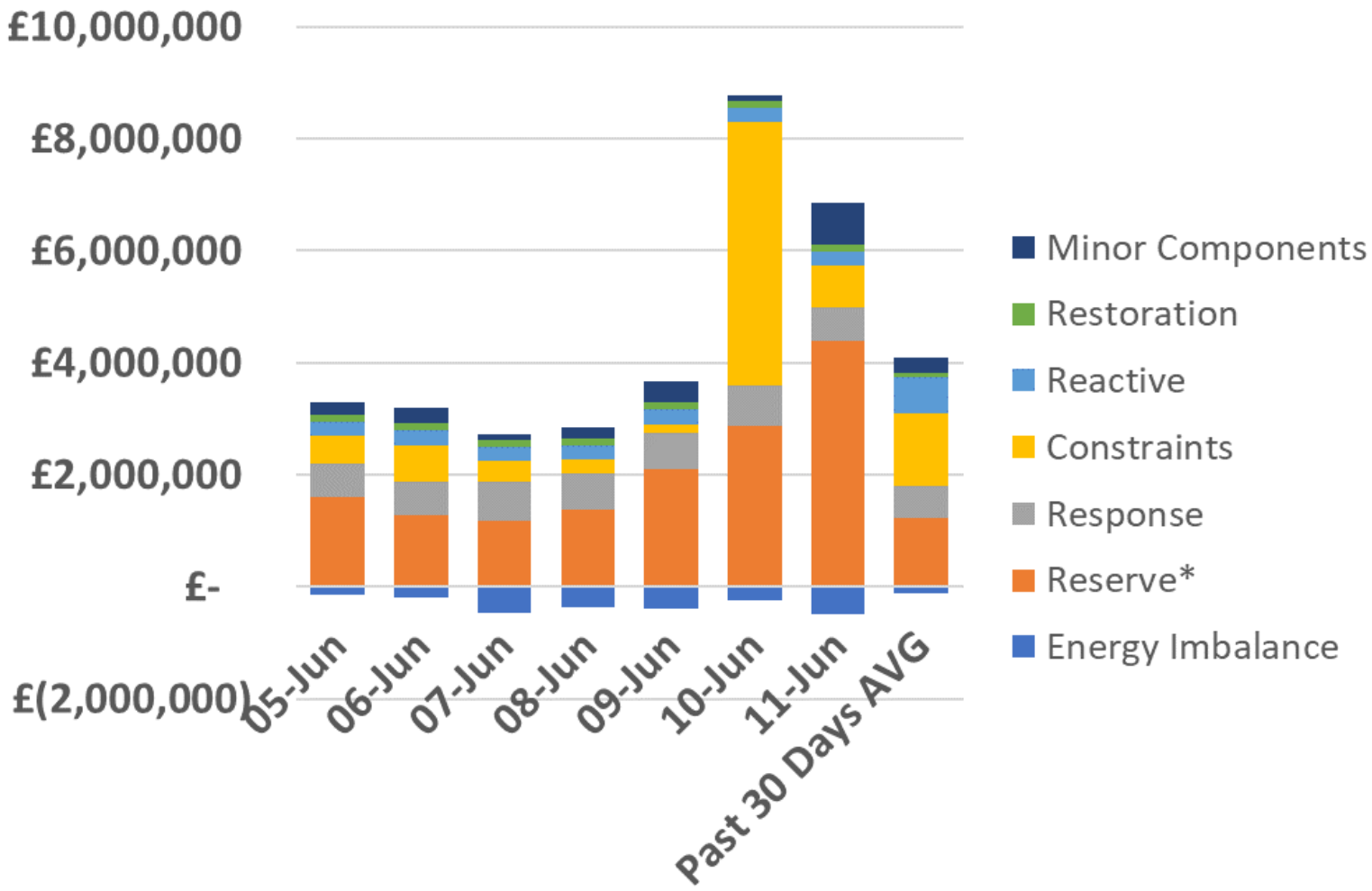
ESO Actions | Category costs breakdown for the last week



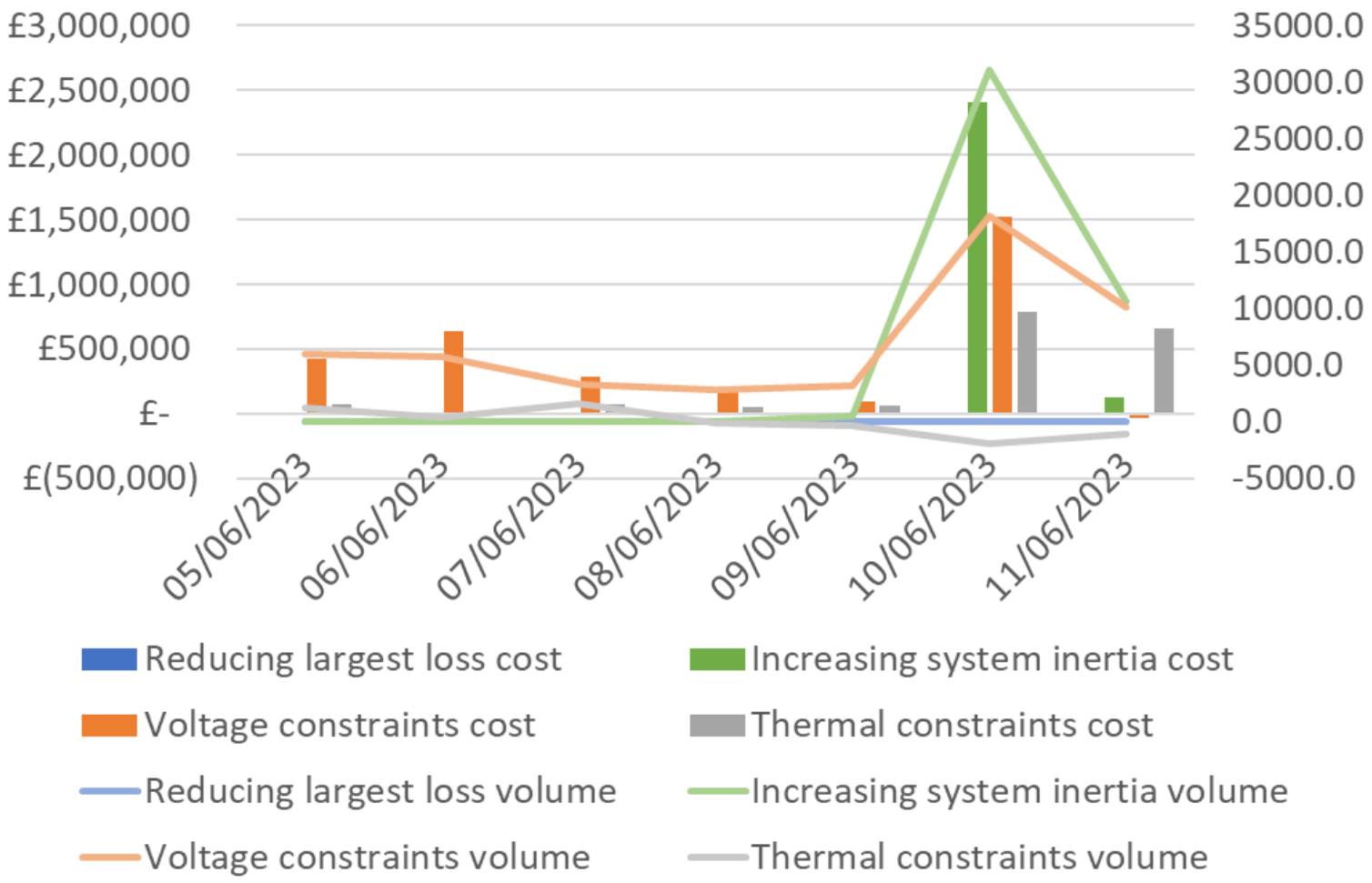
Date	Total (£m)
05/06/2023	3.0
06/06/2023	2.9
07/06/2023	1.8
08/06/2023	2.1
09/06/2023	2.9
10/06/2023	8.8
11/06/2023	6.9
Weekly Total	28.5
Previous Week	40.0

Constraints costs were the key cost component on Saturday, with Reserve for the rest of 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



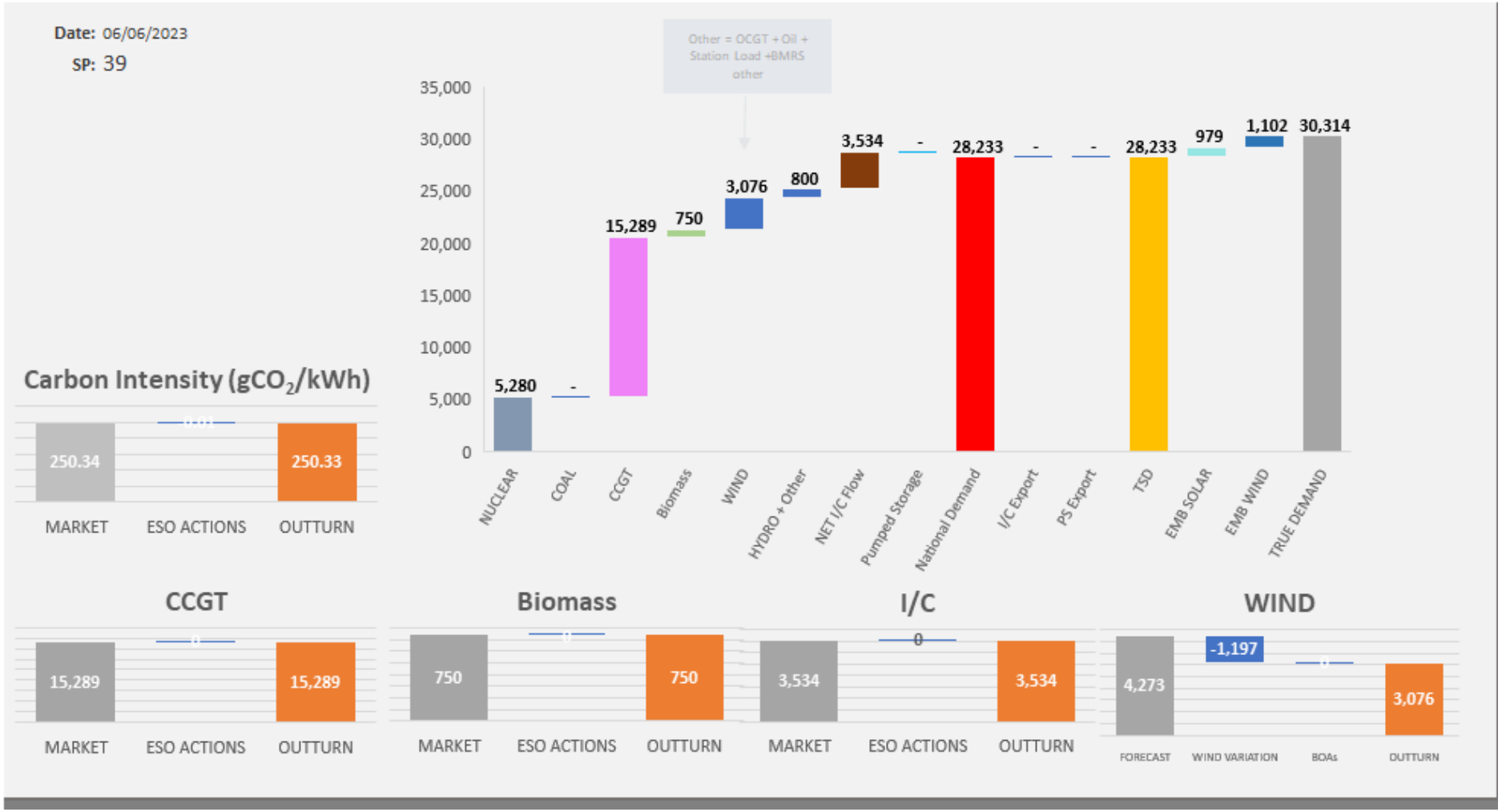
Thermal – network congestion
Intervention was required throughout the week (except Tuesday) to manage thermal constraints.

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

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

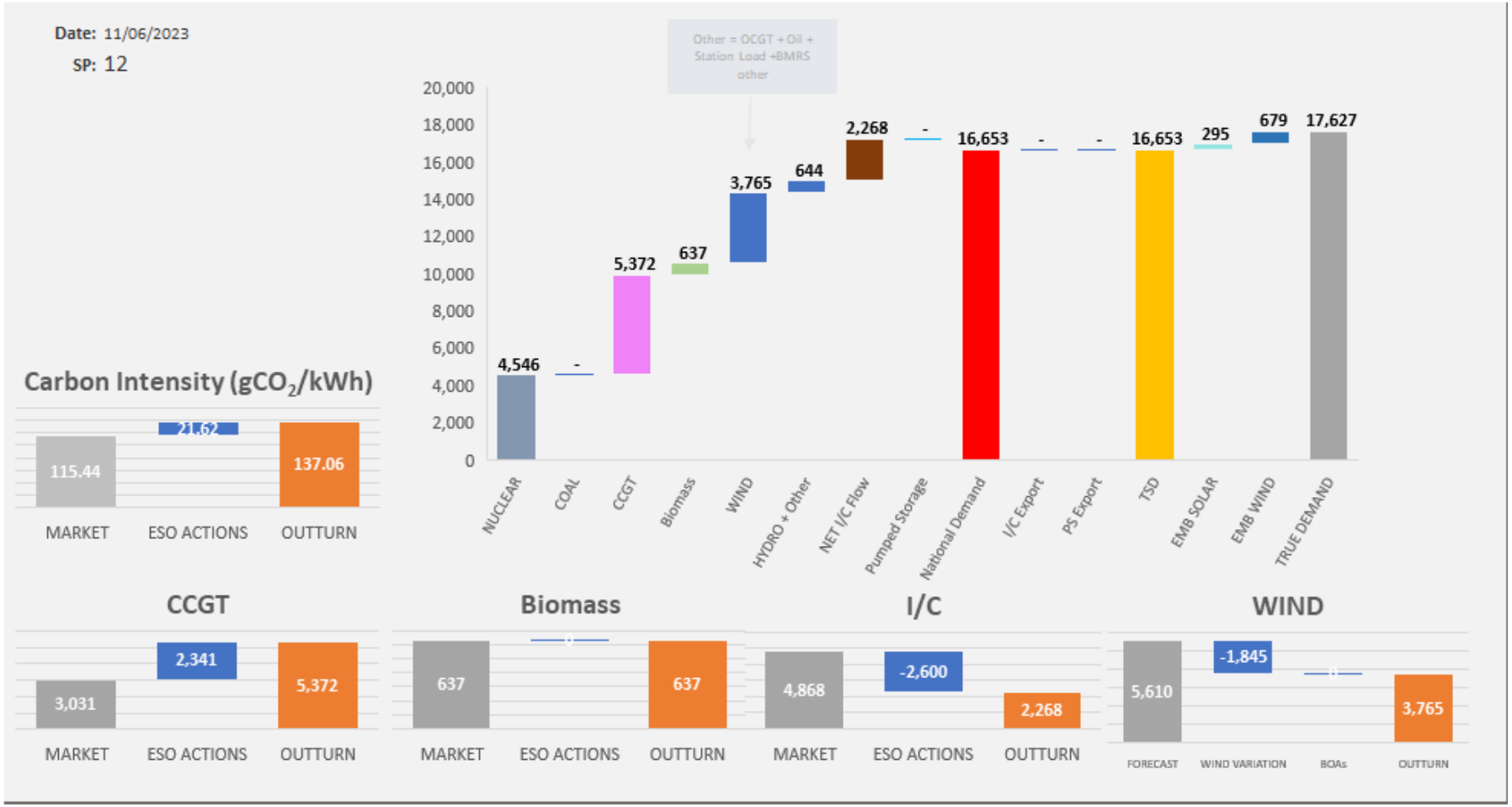
Increasing inertia
Intervention was required to manage system inertia on Saturday and Sunday.

ESO Actions | Tuesday 06 June – Peak Demand – SP spend ~£24k



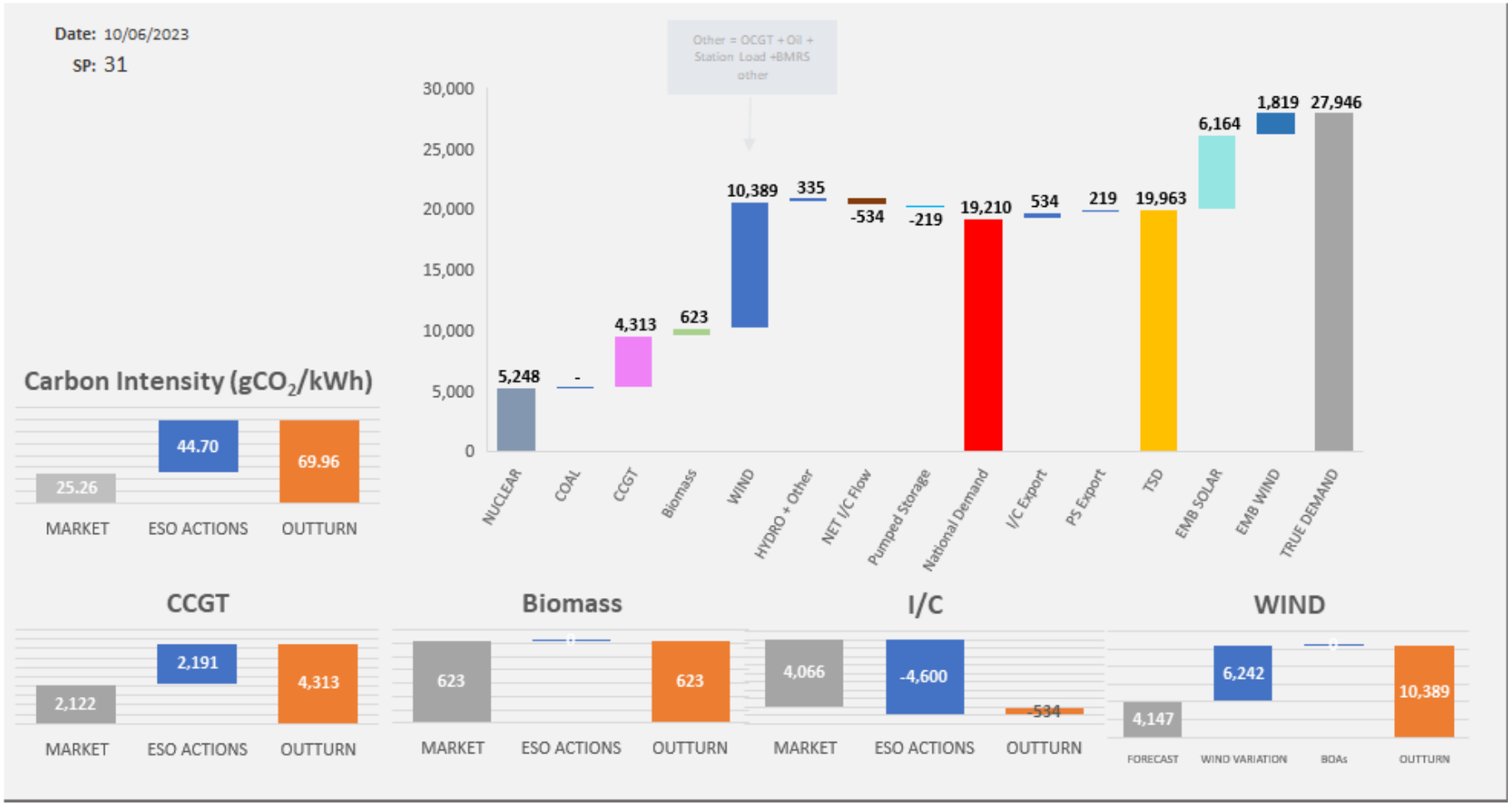
Carbon Intensity data on data portal: https://data.nationalgrideso.com/carbon-intensity1/carbon-intensity-of-balancing-actions

ESO Actions | Sunday 11 June – Minimum Demand – SP Spend ~£177k



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

ESO Actions | Saturday 10 June – Highest SP Spend ~£280k



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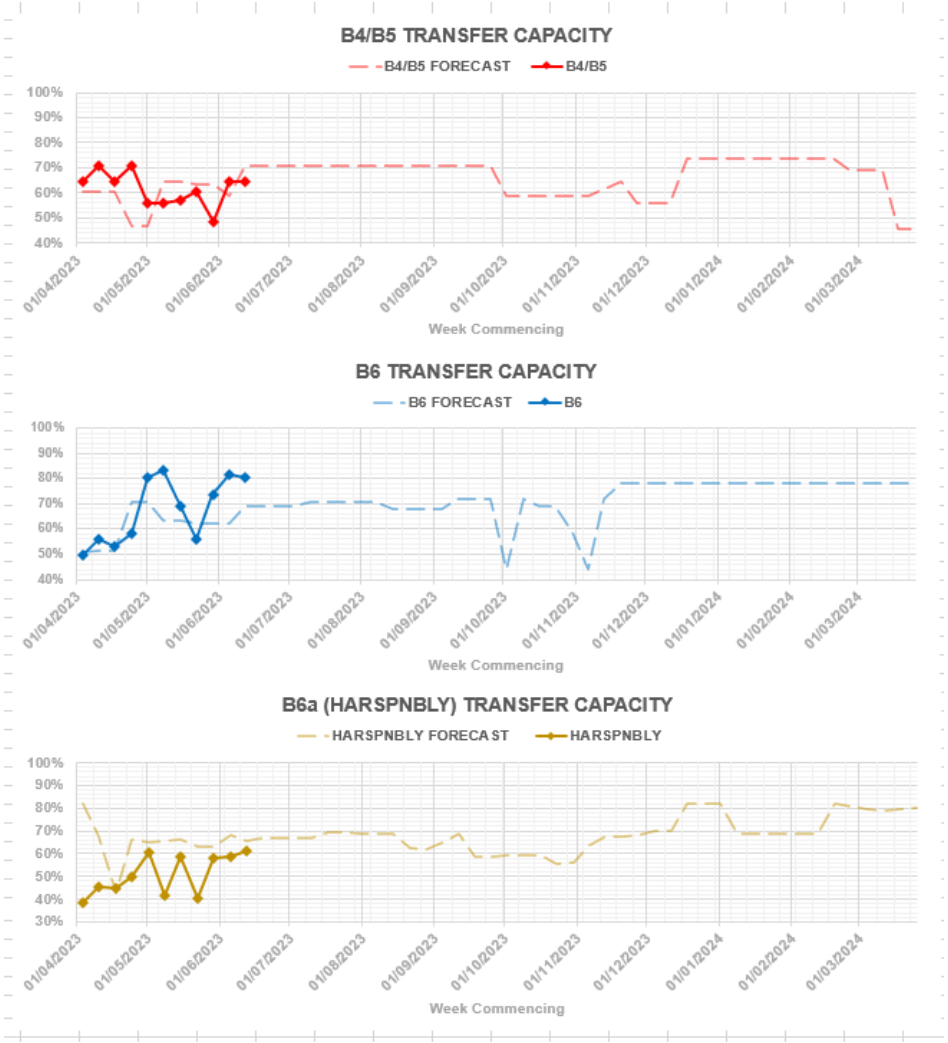
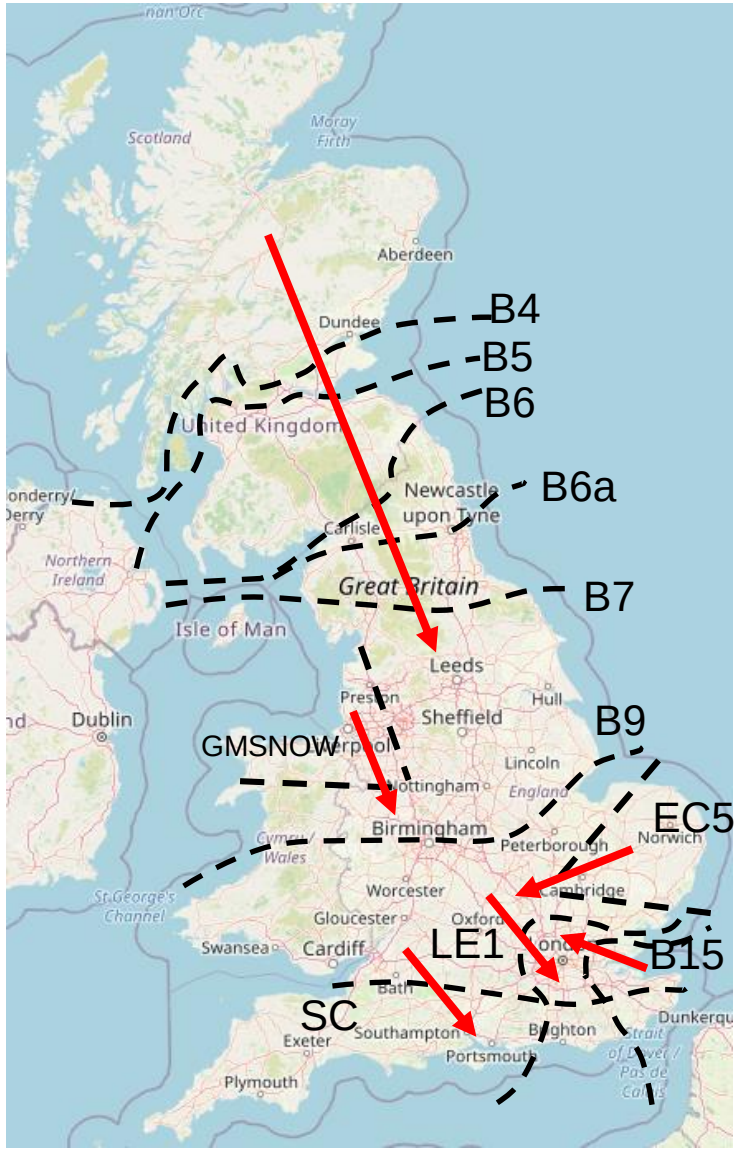
Transparency | Network Congestion

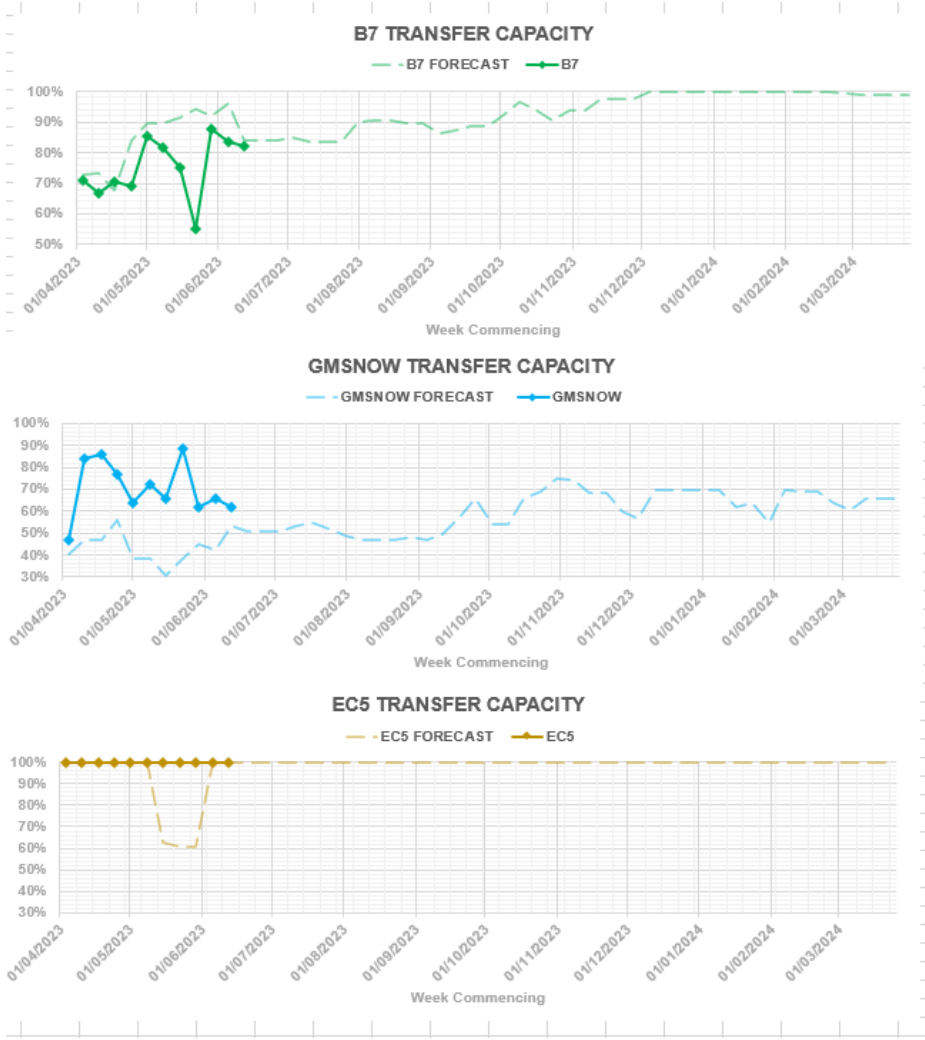


Boundary	Max. Capacity (MW)
B4/B5	3400
B6	6800
B6a	8000
B7	8325
GMSNOW	4700
B9	10600
EC5	5000
LE1	8500
B15	7500
SC	7300



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

Transparency | Network Congestion



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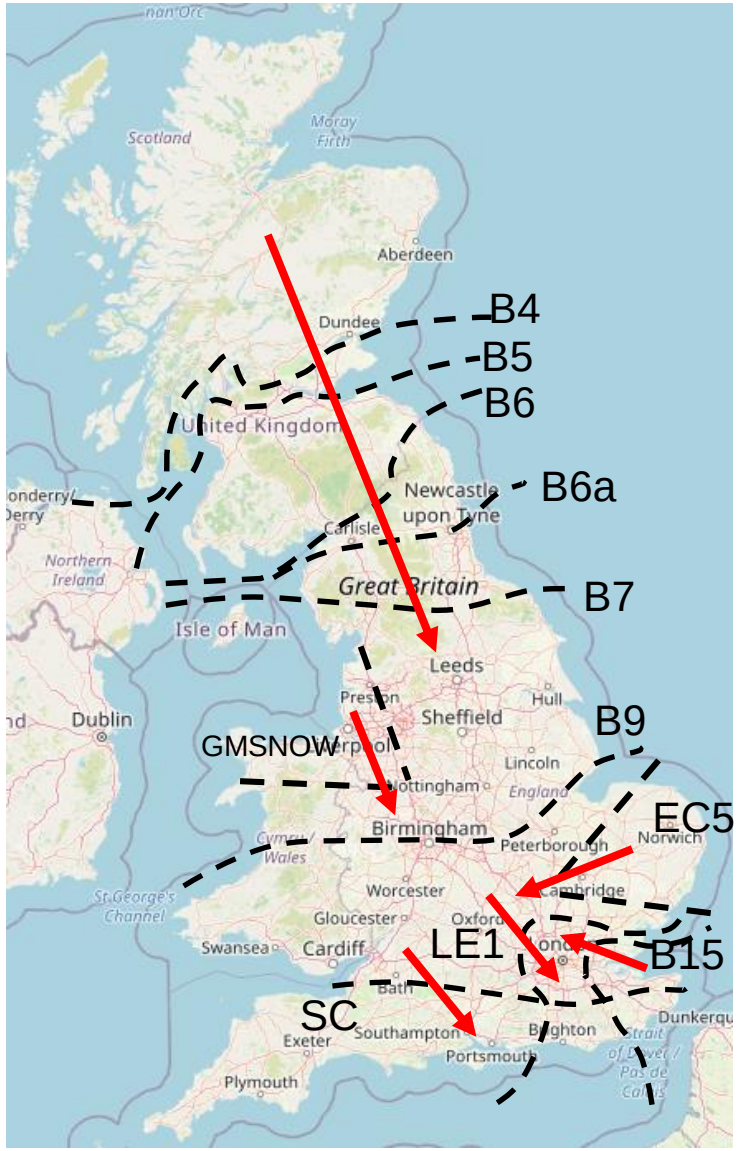

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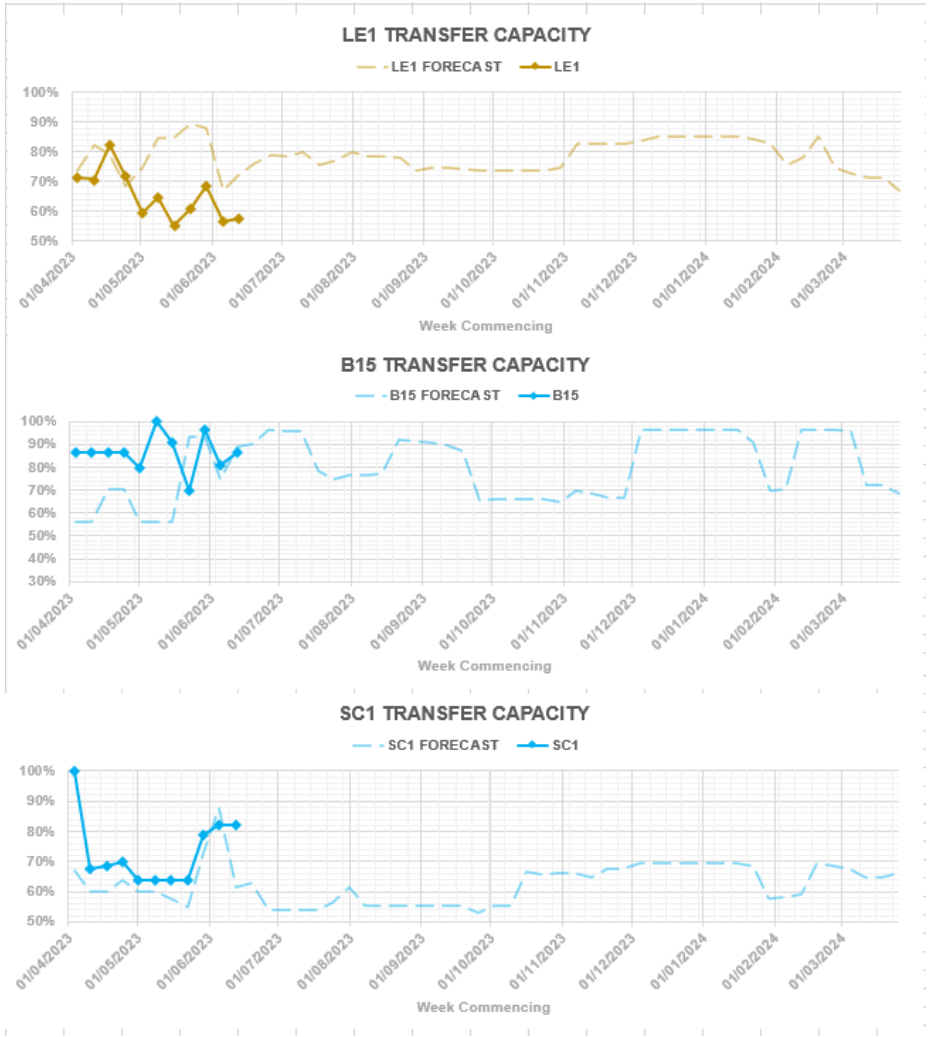
Transparency | Network Congestion



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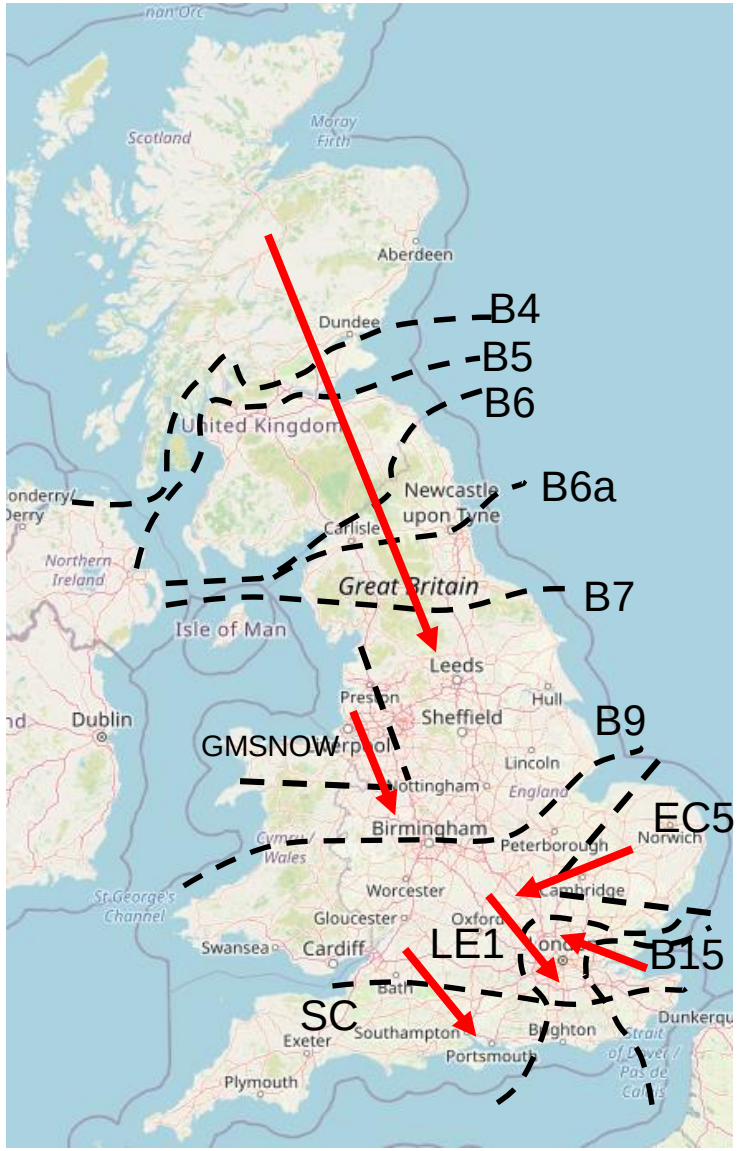

Day ahead flows and limits, and the 24-month constraint limit forecast are published on the ESO Data Portal:
https://data.nationalgrideso.com/data-groups/constraint-management

Questions from last week

Q: On 29th May, during the 12:00-13:00 there were batteries with available capacity to import (over 200MW) priced around -£50 to £5 and not utilised. Why are these assets often overlooked? Are they being held back for worst case, regardless of cost savings and benefits?

A: At any time, the decision to dispatch is not only dependent on price. The level of uncertainty and future requirements has to be considered. It's likely that during this period, the requirements for future downwards actions were being included in the assessment of the bids required at that time. A limitation of the BM is the data about energy available from storage assets, and work is ongoing to address this issue so that the ESO can make even better use of the flexibility from these participants.

Q: My current understanding is that there isn't a way to get prices for reactive power in your data portal, other than from a PDF. Would it be possible to access an API?

A: If you are asking about default payment rates/prices for the obligatory reactive power service (ORPS), these are only published as a pdf. This is updated each month with the new price calculated according to the set methodology. There are currently no plans to provide an API.

For clarity, all balancing costs labelled as Voltage are for the provision of reactive power. These costs are published on our data portal with several of the reports in csv format with API. Because these services are procured through market sources (Balancing Mechanism, Energy Trades and ancillary contracts) we publish the costs incurred rather than the price.

Questions from last week

Q: In the transparency slide for 29 May, it was mentioned that all usable wind bids were exhausted where available. However, from what we see there were over 2 GW of wind bids in the balancing mechanism that was not activated before the more expensive interconnector trades. Was these bids not available and if so for what reason?

A: During the presentation Dan mentioned a couple of things that are relevant to bids to make them 'available' but didn't repeat the context on the bullet points so apologies for that.

1) At all timescales we need to maintain a downward margin reserve which I'd explain as downward volume (I.e. useable bids) obtainable across all timescales to manage unexpected shortfall in demand or unexpected increase in generation during real time (e.g. windfarms over-generating against their forecast or submitted PNs). Our energy teams will require this margin right up until real time so we'd need to leave some of the bid volume for this contingency

2) Constraints, sometimes the available bids may be behind local constraints. This was the case during this example, particularly around the B6 boundary.

Q: For the "Deep dive – Managing low demand / high renewable generation days" presentation given on 7 June, it was stated that Super SEL contracts were enacted on 21 May (slide 8). However, no enactments appear on the Super Stable Export Limit Contract Enactment page on the ESO Data Portal - https://data.nationalgrideso.com/ancillary-services/super-stable-export-limit-contract-enactment. Can you please update the Super SEL enactment data on the data portal please.

A: Thank you for highlighting this omission for us. These have been requested and should be showing on the ESO data portal shortly.

Advance Question

Q: On 29th May (settlement periods 25 to 30) there were many wind plant bids in -150 to -205 GBP range, but they were not accepted but NGESO accepted interconnected trades at very expensive prices (-200s, -300s, -400s, -500s).

In transparency forum it was said that all available wind bmu bids were utilized and remaining wind bids were un-available due to constraints. The answer is incomplete and lacks transparency. Therefore, I would request for deep dive & please answer following questions:

- Which boundary constraint prevented ESO from accepting remaining wind bmu bids? Was it EC5, B15 or any other? A: B5 & B6
- If the constraint boundary was full flow out: why wind bmus bids were not accepted? A: Boundary was flow in. Please see the next answer.
- If the constraint boundary was full flow in: did NGESO consider accepting bids of wind bmus and accepting cheap offers (if required)?

A: The SOP (system operating plans) are produced in strategy timescales and to the best economical solution given system security so yes we would consider such situations.

- All the unaccepted wind bids were from offshore wind plant – Does it has anything to do with that? Does accepting offshore wind plant bids doesn't help?

A: We are fuel and plant type agnostic. Once a safe and secure system has been provided will seek the most economical solution for the consumer.

- Some of the offshore wind plants (T_LARYW, T_RMPNO, T_THNTO) connects to transmission line in the same region as interconnectors (IFA1, BRITNED & NEMO etc). Why were bids of these plants not accepted but power was flown out with expensive interconnector trades?

A: As explained in the deep dive, not all of the bids can be taken in strategy timescales as we need to leave some available in real time for the energy teams as it is too late to trade by delivery timescales so we can't enjoy the full benefit of hindsight in planning time scales. We did however trade to the minimum level of contingency permitted so were operating as cost effectively as possible.

Questions we are still working on

Q: Under what arrangements are DNOs activating ANM schemes to deal with localised NRAPM? Is this an obligation, a transaction, a service or something else?

Q: Thank you for the answer regarding HPC. However at low sync gen levels with HPC as a large P.U loss?

slido

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