

A landscape photograph featuring snow-capped mountains under a cloudy sky. In the foreground, several bright yellow light trails curve across a valley floor. The overall scene is bathed in a warm, golden light, suggesting either sunrise or sunset.

# ESO Operational Transparency Forum

31 August 2022

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

## Introduction | Sli.do code #OTF

Please visit [www.sli.do](http://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](mailto: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

System Events (No system events this week)  
Demand review  
Costs for last week  
Constraints  
Questions from last week

### Focus Areas:

Carbon Intensity deep dive

## Future deep dive/ response topics

### Upcoming soon:

ESO Trading on Interconnectors - 14<sup>th</sup> September.

### Items we have taken away and will come back to this forum on in the future

REMIT obligations on ESO

Feedback welcomed on our proposed deep dive topics

## Demand Flexibility Service

A few weeks ago we hosted an industry webinar sharing our minded to proposals and will share the **recording** and **FAQs** on our website this week

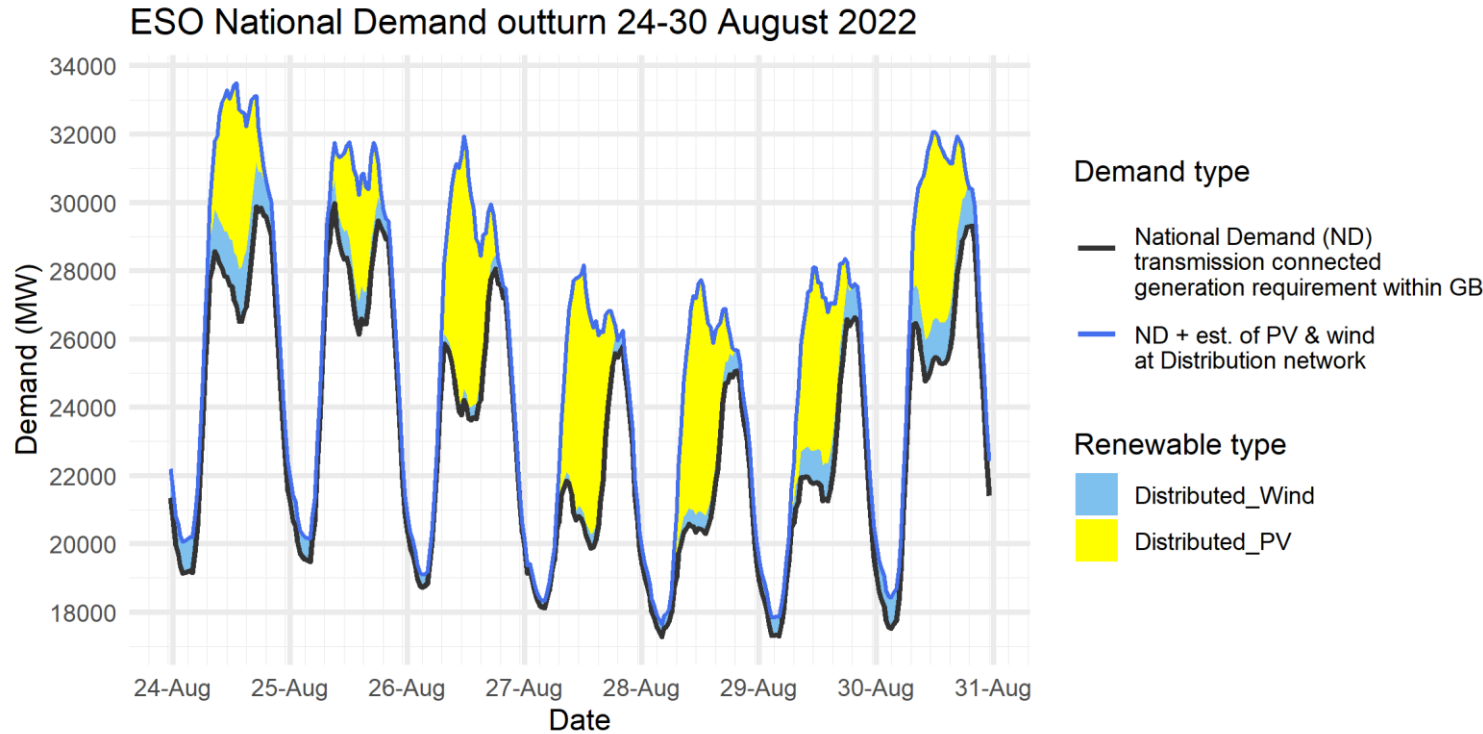
<https://www.nationalgrideso.com/industry-information/balancing-services/demand-flexibility>

We will not be discussing the details of the Demand Flexibility Service in today's call and will take any questions on this topic away.

We will host our next webinar on **Monday 5 September** following the launch of the EBGL consultation of the service terms and welcome you to register your interest by emailing us at:

[box.ESOConsumer@nationalgrideso.com](mailto:box.ESOConsumer@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.

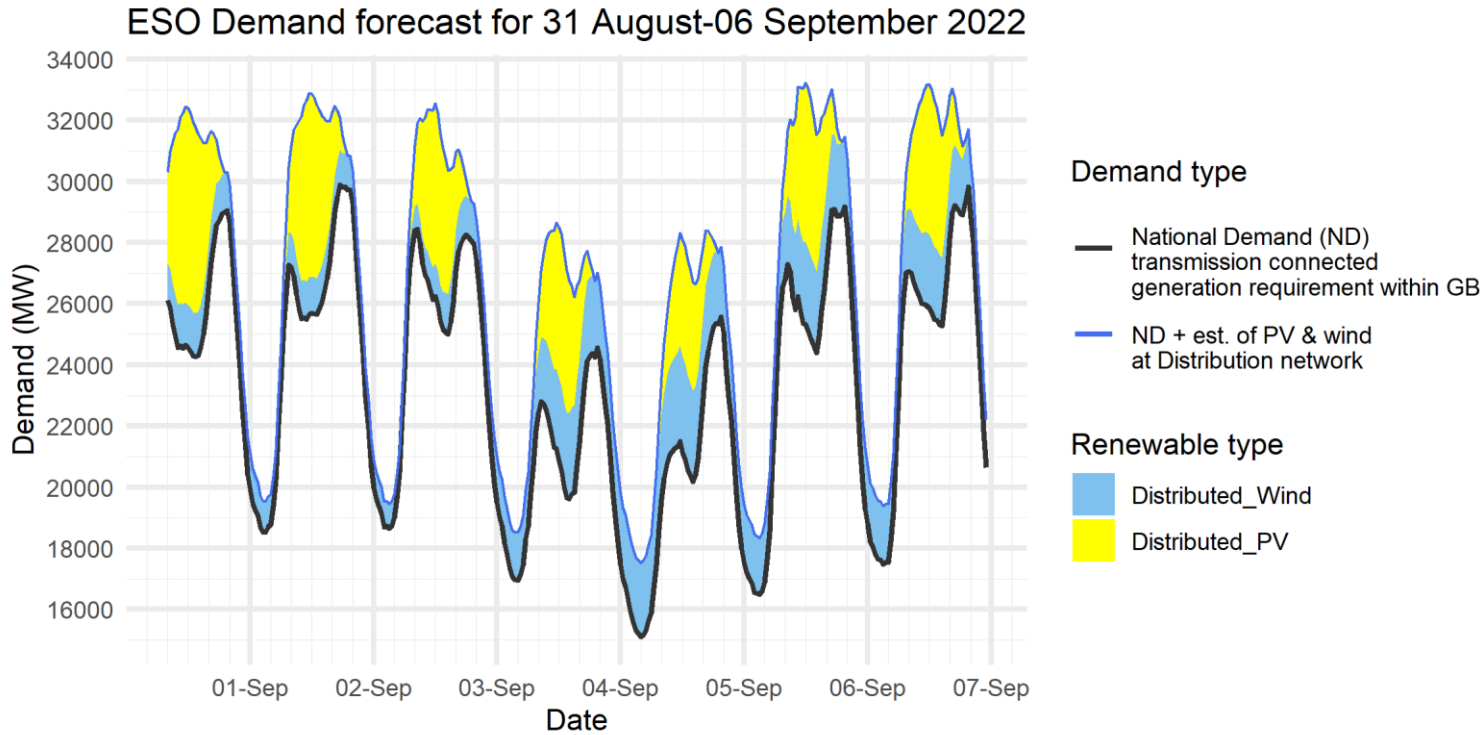
ND values **do not include** export on interconnectors or pumping or station load

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](#)

Date	Forecasting Point	FORECAST (Wed 24 Aug)			OUTTURN		
		National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)
24 Aug	Afternoon Min	26.0	1.6	5.0	26.5	1.5	4.7
25 Aug	Overnight Min	19.5	0.7	0.0	19.5	0.7	0.0
25 Aug	Afternoon Min	25.3	1.0	5.8	26.1	1.0	3.1
26 Aug	Overnight Min	19.4	0.5	0.0	18.7	0.4	0.0
26 Aug	Afternoon Min	24.2	0.6	6.5	23.6	0.4	6.2
27 Aug	Overnight Min	18.7	0.3	0.0	18.1	0.2	0.0
27 Aug	Afternoon Min	19.3	0.4	6.5	19.9	0.4	6.3
28 Aug	Overnight Min	17.6	0.3	0.0	17.3	0.4	0.0
28 Aug	Afternoon Min	18.8	0.5	7.0	20.3	0.5	6.1
29 Aug	Overnight Min	17.6	0.4	0.0	17.3	0.6	0.0
29 Aug	Afternoon Min	19.6	0.5	6.8	21.3	1.1	4.4
30 Aug	Overnight Min	18.1	0.5	0.0	17.5	0.9	0.0
30 Aug	Afternoon Min	26.4	0.7	4.6	25.3	1.2	5.1

# Demand | Week Ahead



		FORECAST (Wed 31 Aug)		
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)	Dist. PV (GW)
31 Aug	Evening Peak	28.9	1.3	0.3
01 Sep	Overnight Min	18.5	1.0	0.0
01 Sep	Evening Peak	29.9	1.1	1.1
02 Sep	Overnight Min	18.6	0.8	0.0
02 Sep	Evening Peak	28.2	1.3	0.5
03 Sep	Overnight Min	17.0	1.6	0.0
03 Sep	Evening Peak	24.4	2.5	0.2
04 Sep	Overnight Min	15.1	2.4	0.0
04 Sep	Evening Peak	25.4	2.4	0.2
05 Sep	Overnight Min	16.5	1.8	0.0
05 Sep	Evening Peak	29.1	2.4	1.0
06 Sep	Overnight Min	17.5	1.9	0.0
06 Sep	Evening Peak	29.2	2.0	1.5

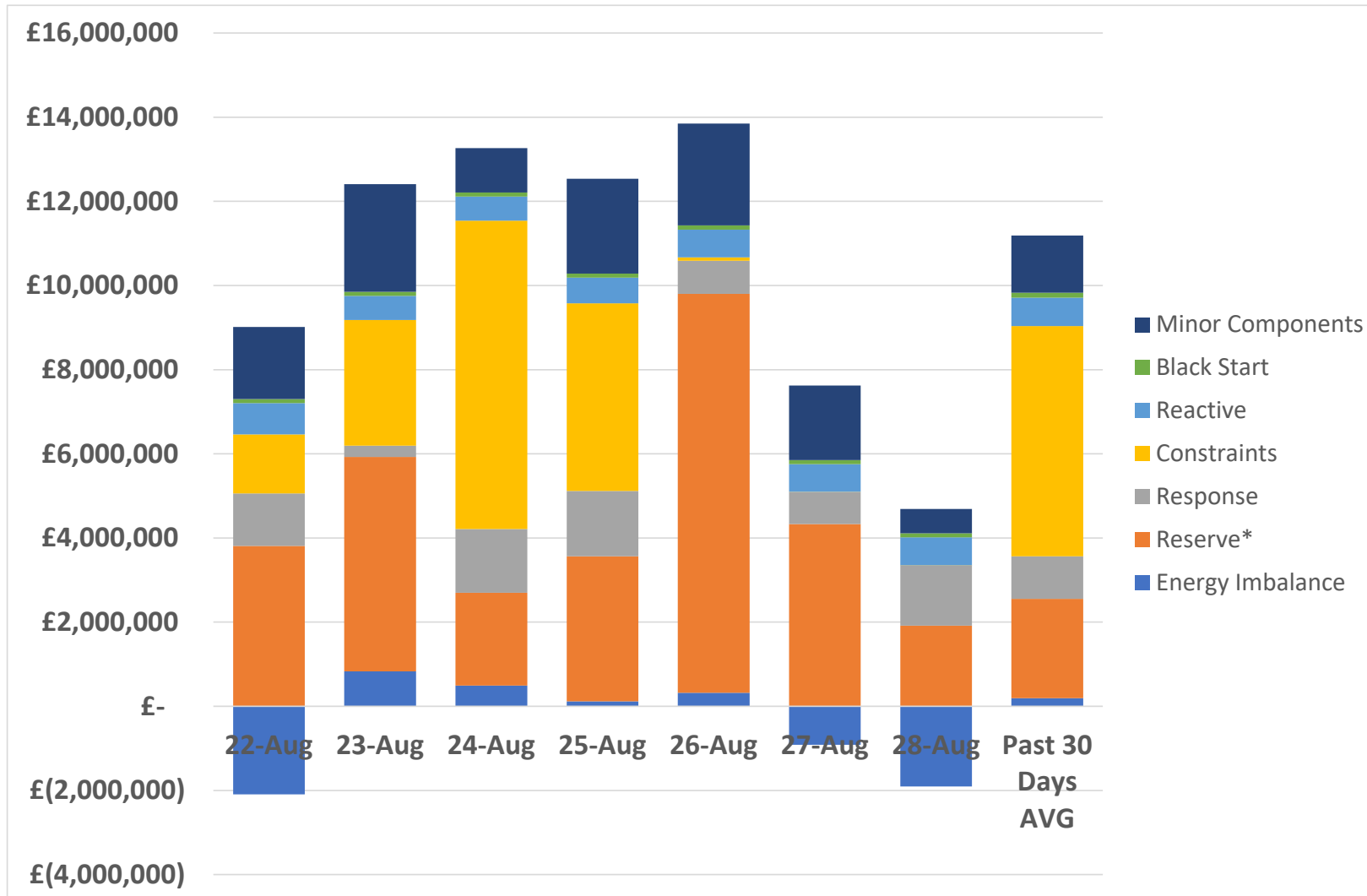
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Blue line serves as a proxy for total GB customer demand. It includes demand supplied by the distributed wind and solar sources, but it **does not include** demand supplied by non-weather driven sources at the distributed network for which ESO has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

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

## ESO Actions | Category costs breakdown for the last week



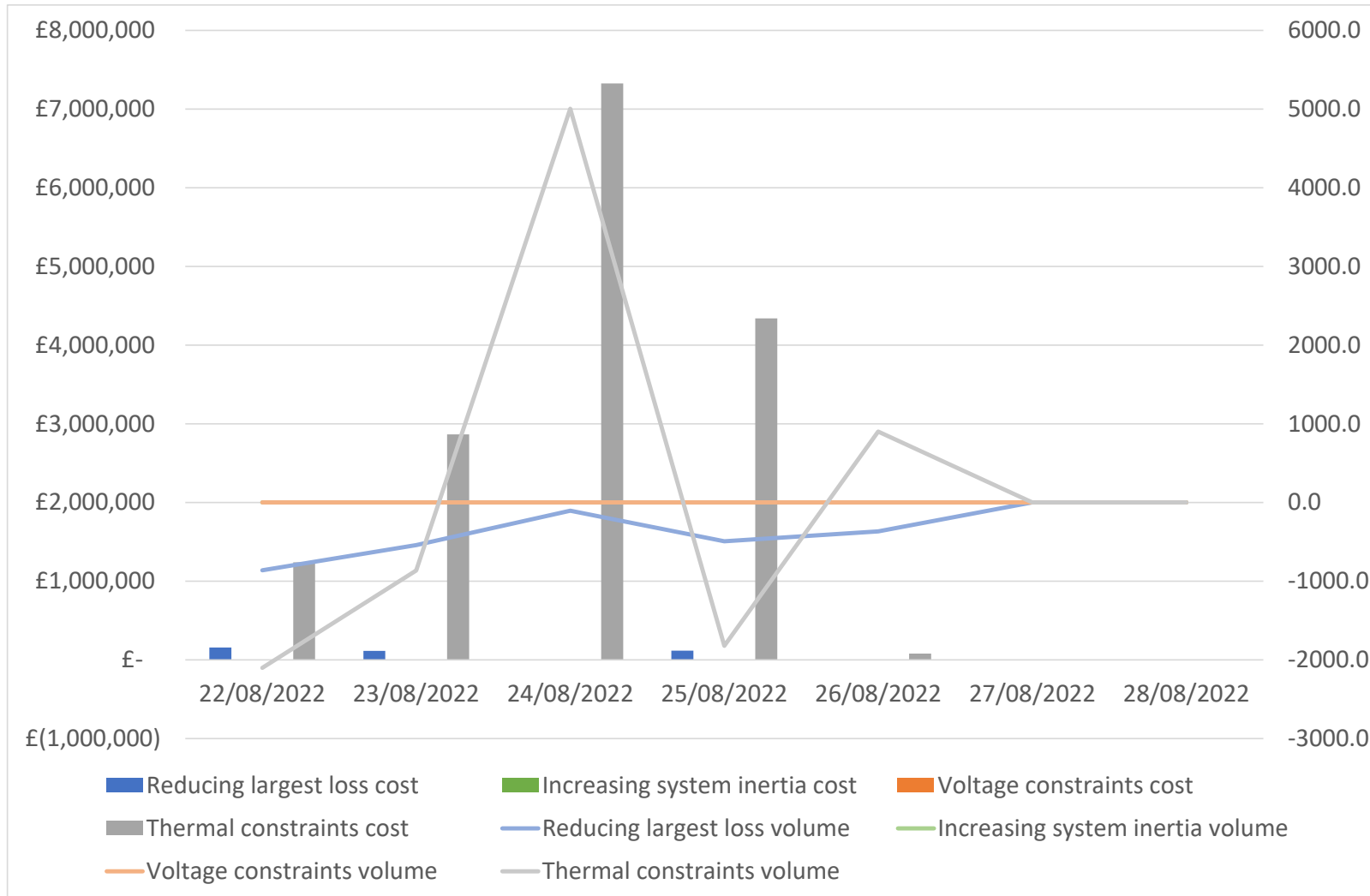
Date	Total (£m)
22/08/2022	6.9
23/08/2022	12.4
24/08/2022	13.3
25/08/2022	12.5
26/08/2022	13.8
27/08/2022	6.7
28/08/2022	2.8
<b>Weekly Total</b>	<b>68.5</b>

Reserve was the key cost component on most days.

The **Minor Components** cost category is a repository of costs of BM actions, which are not easily accounted for in the other reported categories, and other general costs that could include trading option fees, bank charges, sterling adjustments and non-delivery and reconciliation associated costs.

Please note that this category as well as the others are presented and explained in the **MBSS**.

# ESO Actions | Constraint Cost Breakdown



**Thermal – network congestion**  
 Actions required to manage Thermal Constraints all days except Saturday and Sunday.

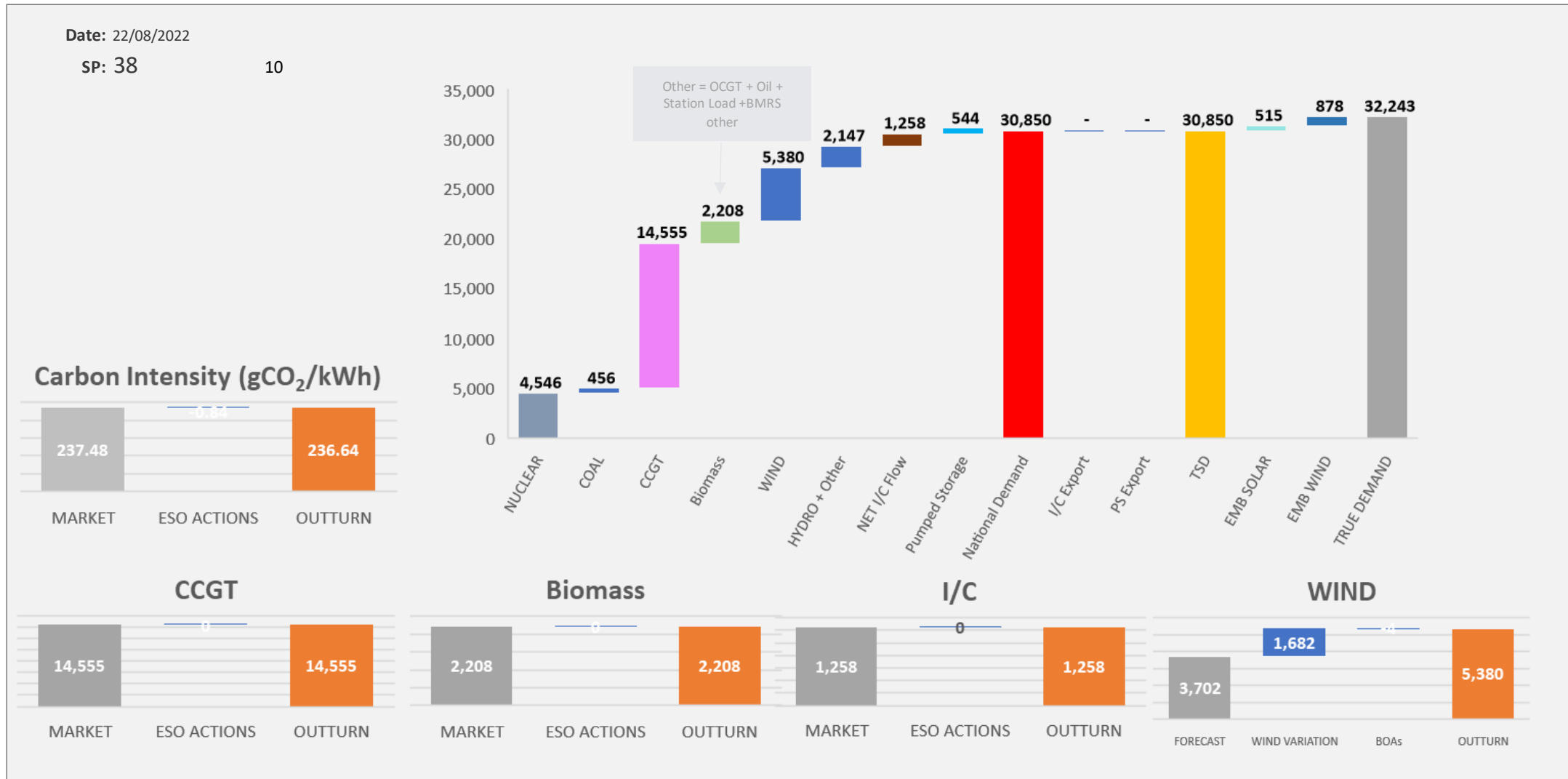
**Voltage**  
 No Intervention to manage the voltage levels.

**Managing largest loss for RoCoF**  
 Intervention required to manage largest loss on Monday, Tuesday and Thursday

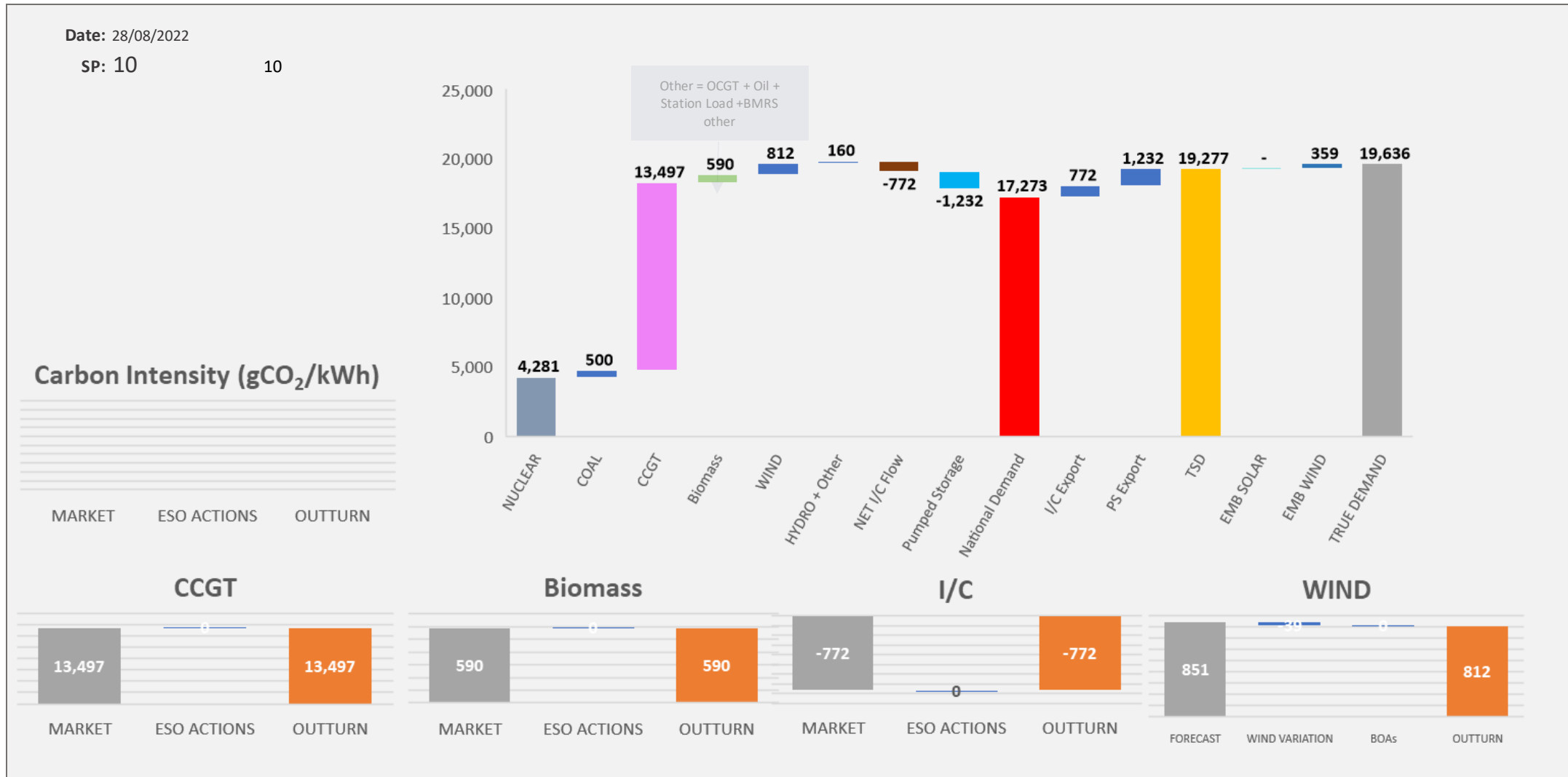
**Increasing inertia**  
 No Intervention required to manage Inertia



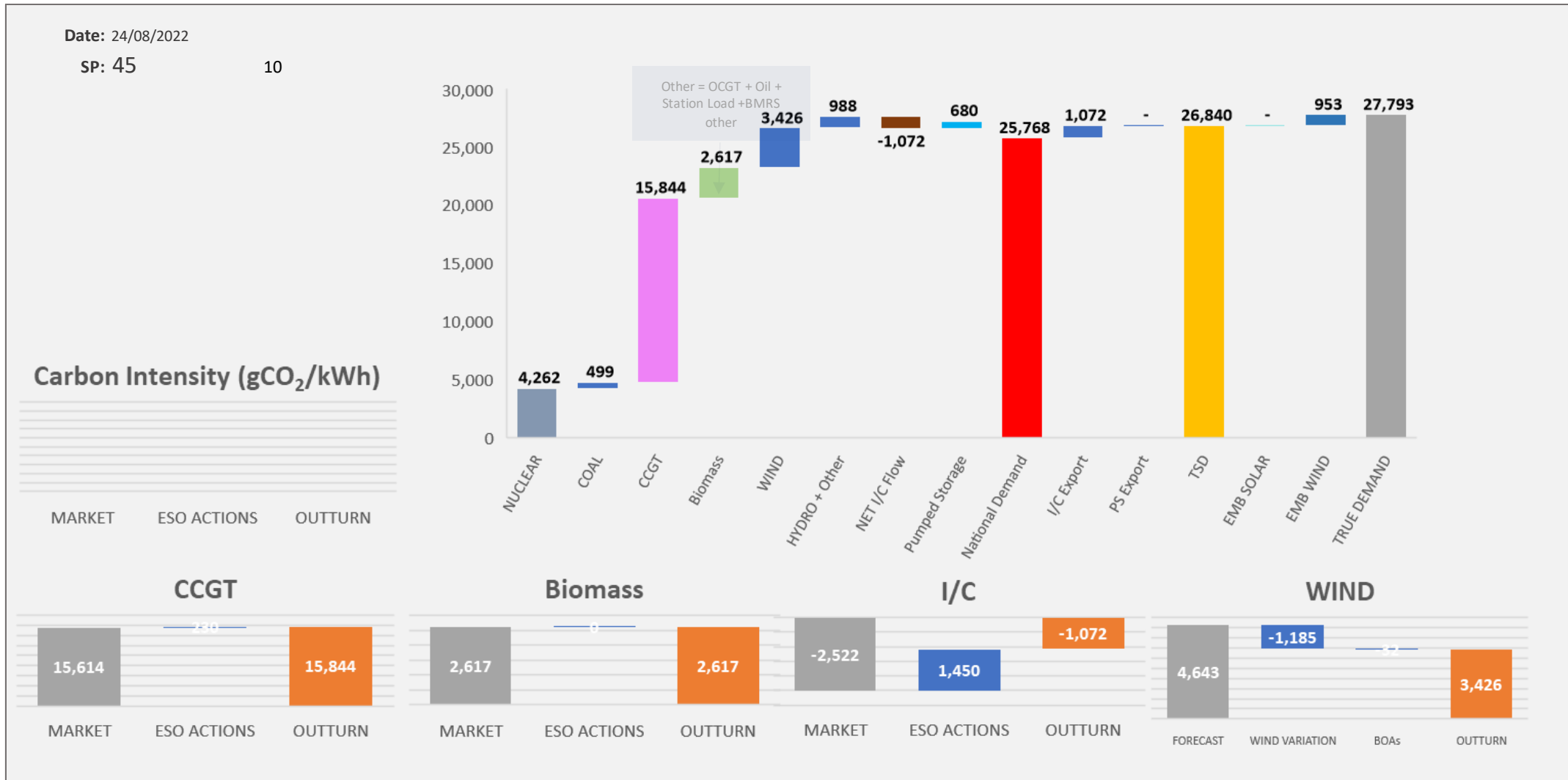
# ESO Actions | Monday 22 August – Peak Demand – SP spend ~£148k



# ESO Actions | Sunday 28 August – Minimum Demand – SP Spend ~ -£18k

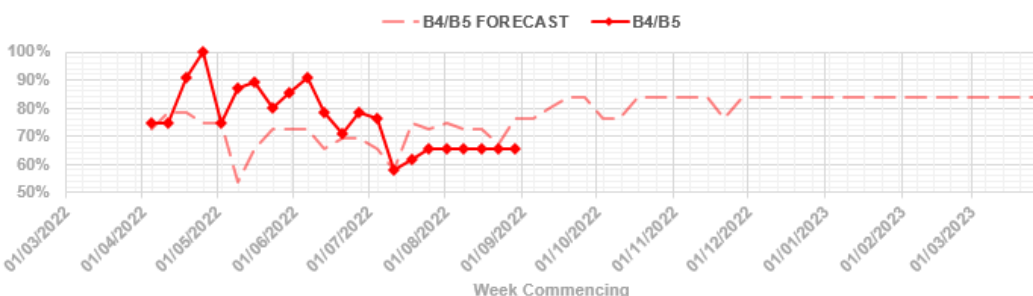


# ESO Actions | Wednesday 24 August – Highest SP Spend ~£820k

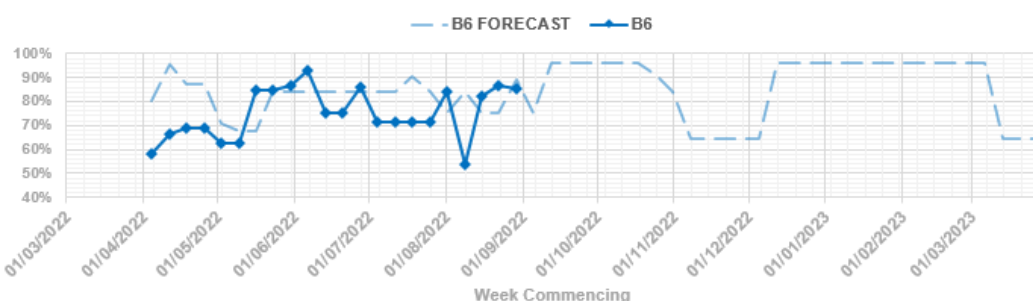


# Transparency | Network Congestion

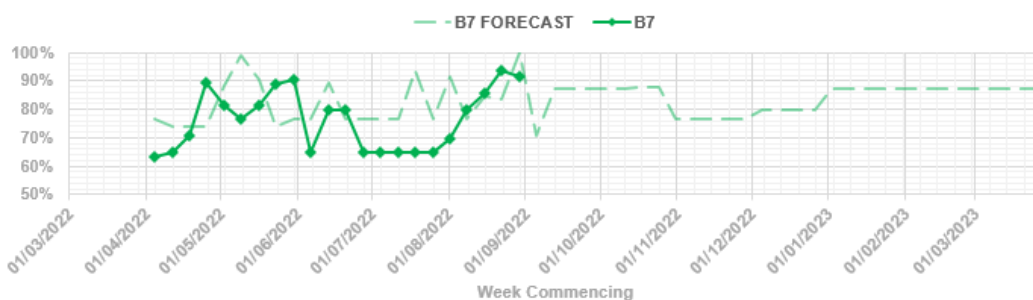
**B4/B5 TRANSFER CAPACITY**



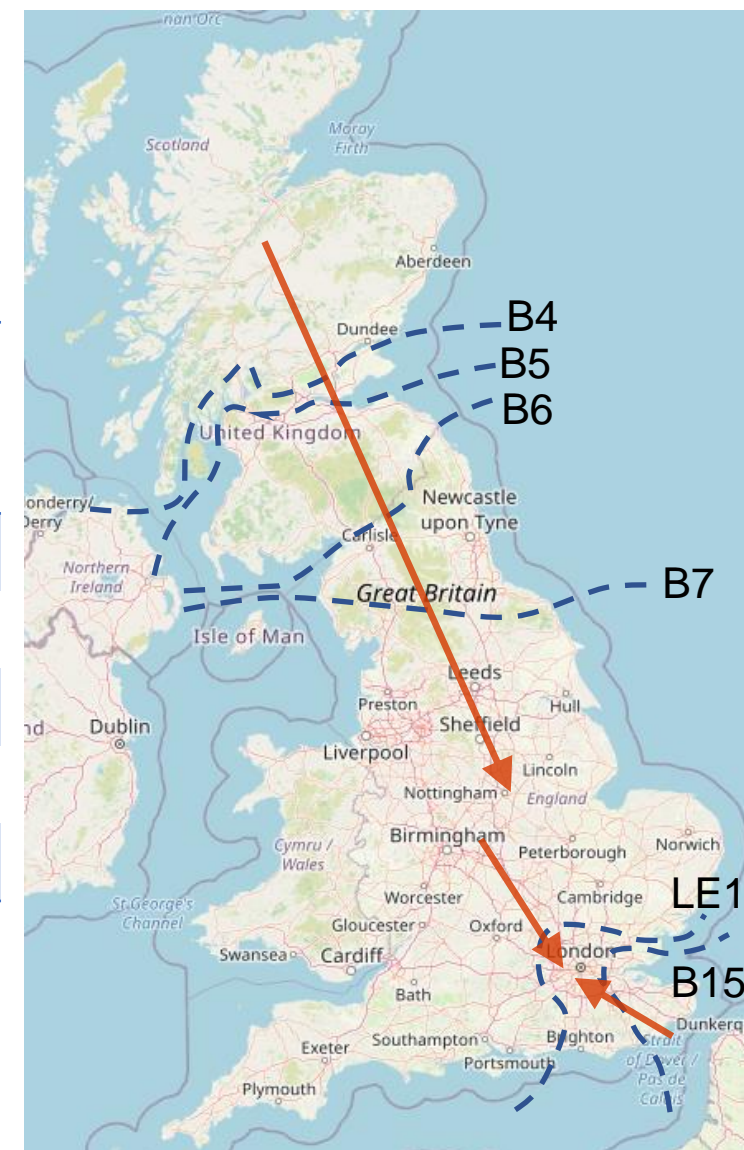
**B6 TRANSFER CAPACITY**



**B7 TRANSFER CAPACITY**



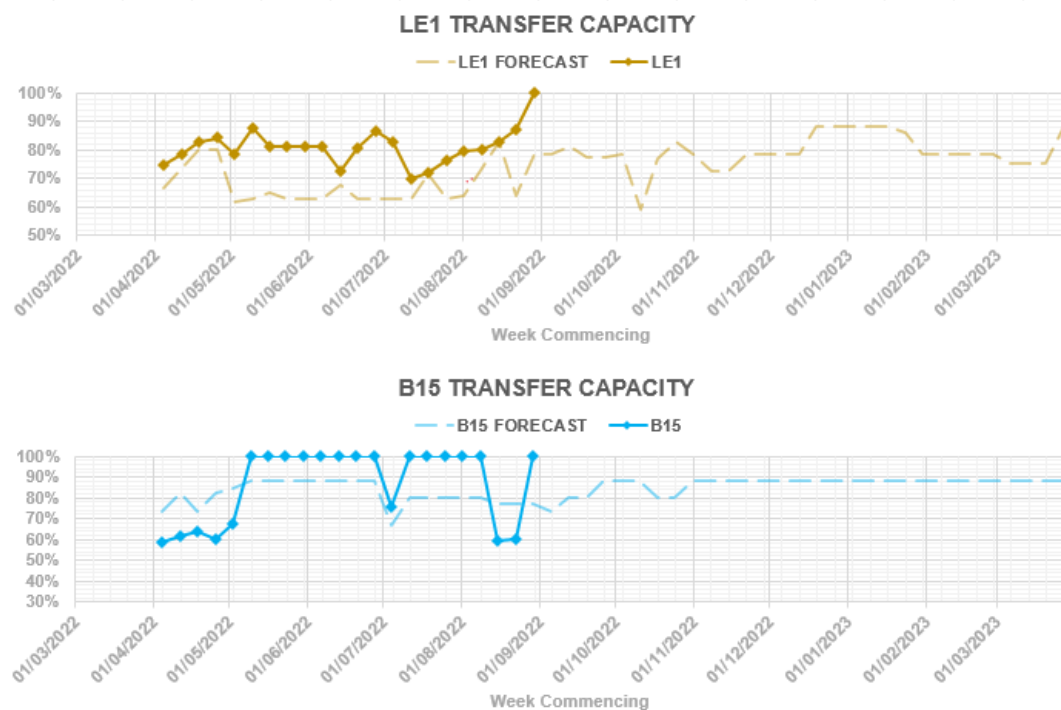
Boundary	Max. Capacity (MW)
B4/B5	2250
B6	4850
B7	7950
LE1	8250
B15	4500



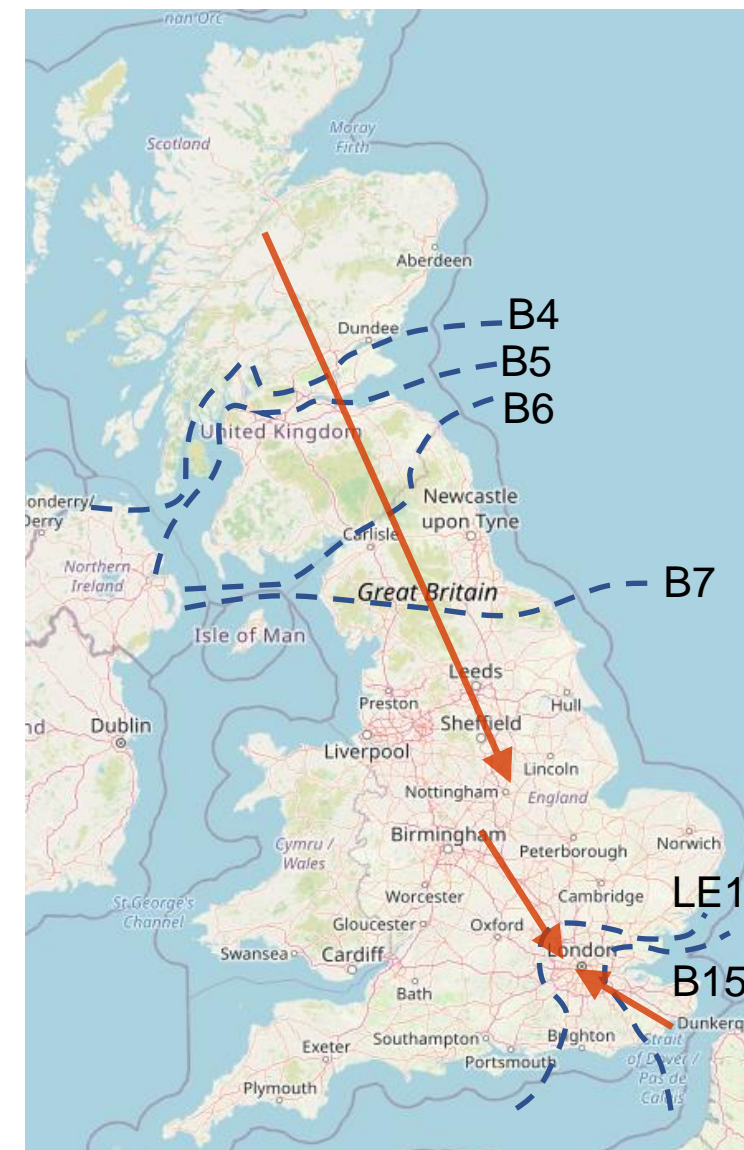
Day ahead flows and limits, and the 24 month constraint limit forecast are published on the ESO Data Portal:

<https://data.nationalgrideso.com/data-groups/constraint-management>

# Transparency | Network Congestion



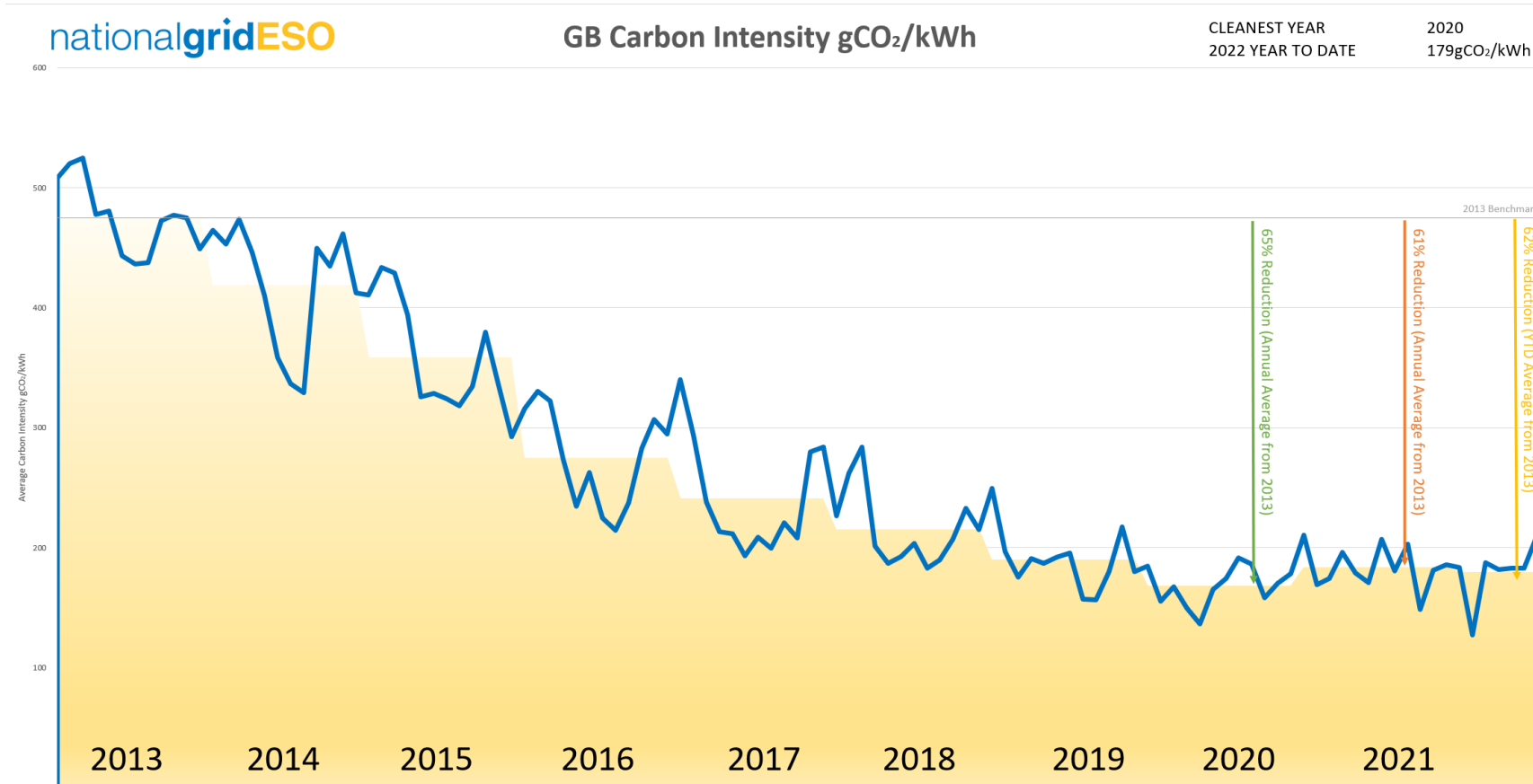
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Day ahead flows and limits, and the 24 month constraint limit forecast are published on the ESO Data Portal: <https://data.nationalgrideso.com/data-groups/constraint-management>

# Carbon Intensity – Our Progress as an Industry since 2013

(monthly and annual averages)



2022 YTD Carbon Intensity is 179 gCO<sub>2</sub>/kWh

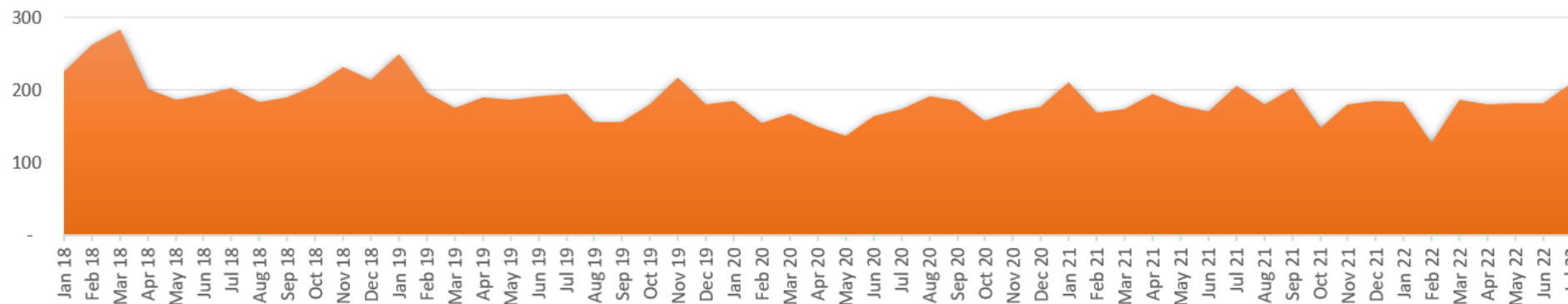
Compared to the 2013 annual average of 529 gCO<sub>2</sub>/kWh – approx. a third of what it was in 2013

However this trend in decarbonisation is flatlining at a time when acceleration is required

July 2022 (summer) is the highest month for Carbon Intensity since Jan 2021 (winter)

# Carbon Intensity – Our Progress as an Industry since 2018

Monthly Avg Carbon Intensity Jan 2018 to Jul 2022



2022 YTD Average\*

179 gCO<sub>2</sub>/kWh

2021 Annual Average

184 gCO<sub>2</sub>/kWh

2020 Annual Average

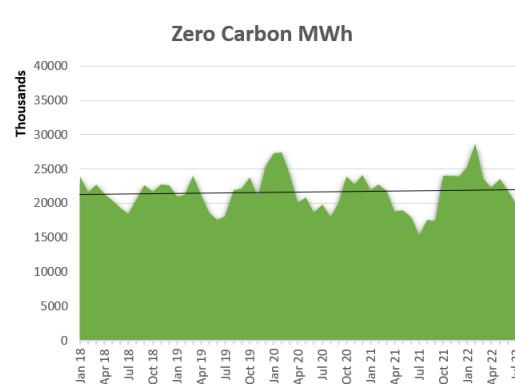
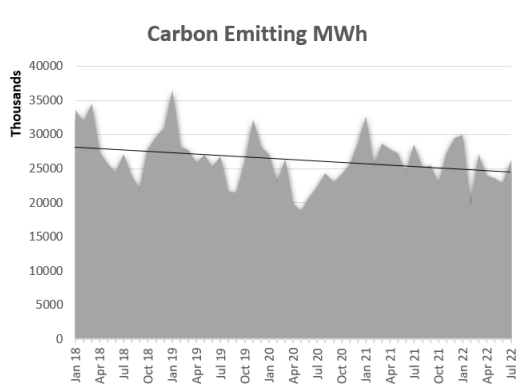
168 gCO<sub>2</sub>/kWh

2019 Annual Average

190 gCO<sub>2</sub>/kWh

2018 Annual Average

215 gCO<sub>2</sub>/kWh

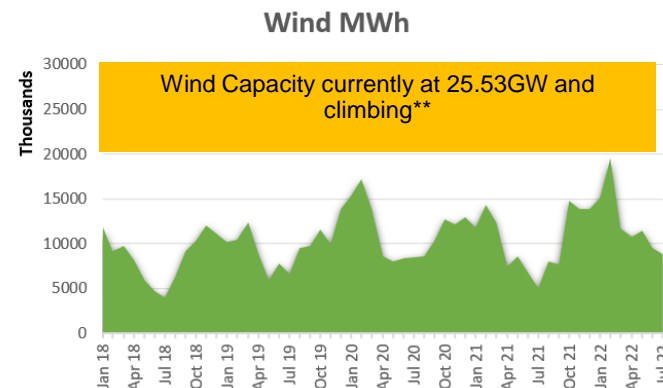
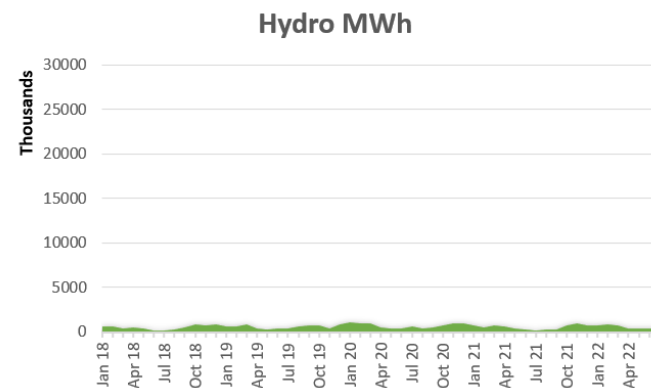
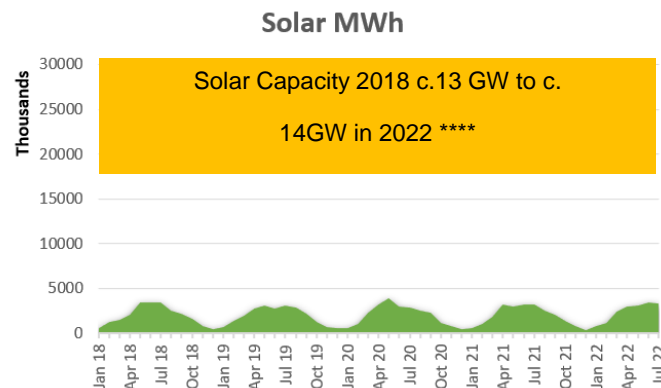
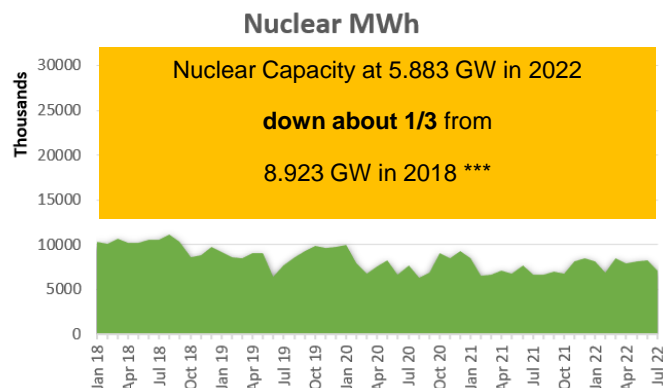


## Key Issues:

- Increased Wind and Solar have met decommissioning of Nuclear during the period
- Very little progress is made to increase the share of zero carbon generation
- Carbon Emitters are declining overall

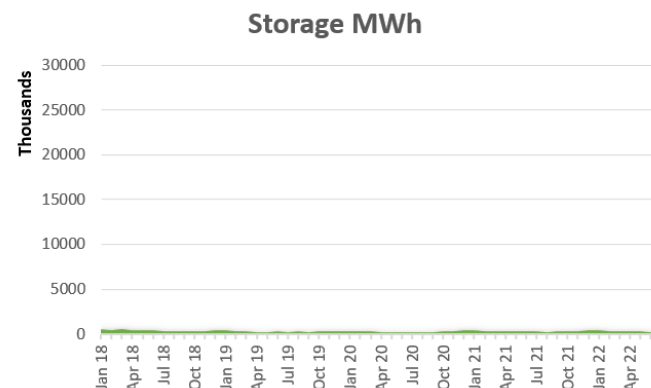
\* YTD excludes winter data – likely to increase carbon intensity as 2022 progresses

# Carbon Intensity – Zero Carbon Generators



Y Axis the same for all to  
 give impression of volumes  
 of energy delivered by each  
 tech type

\*\* RenewableUK \*\*\*world-nuclear.org \*\*\*\*BEIS



2022 YTD Average\*

179 gCO<sub>2</sub>/kWh

2021 Annual Average

184 gCO<sub>2</sub>/kWh

2020 Annual Average

168 gCO<sub>2</sub>/kWh

2019 Annual Average

190 gCO<sub>2</sub>/kWh

2018 Annual Average

215 gCO<sub>2</sub>/kWh

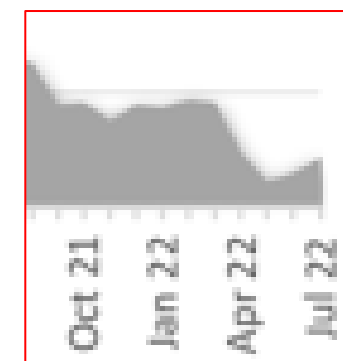
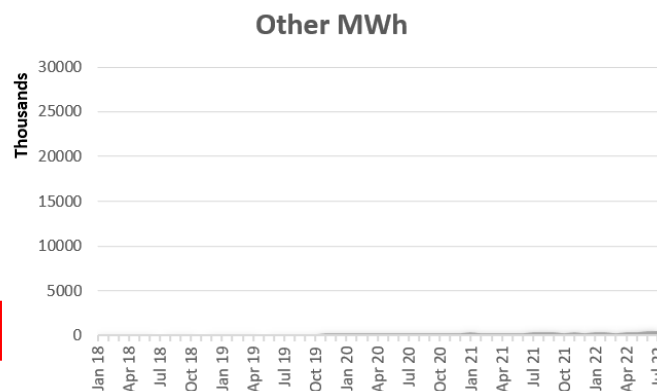
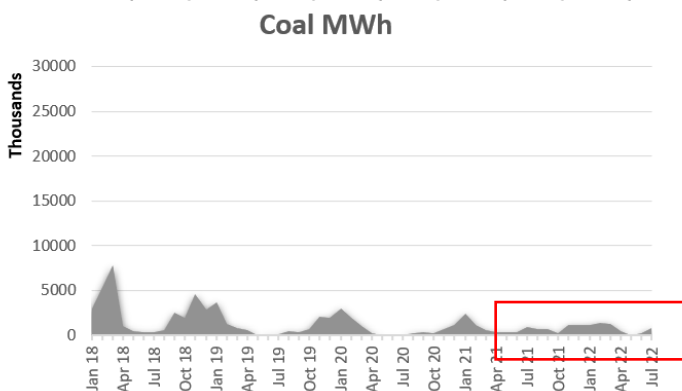
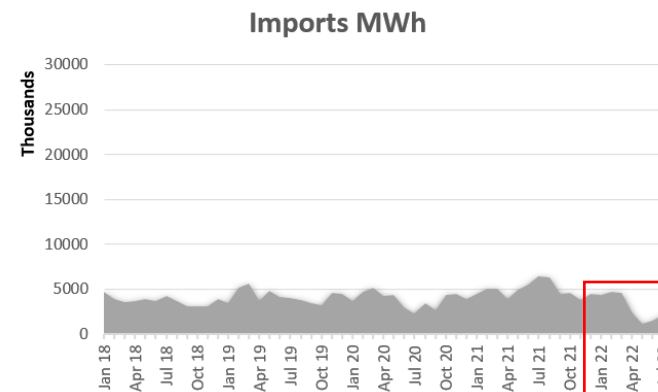
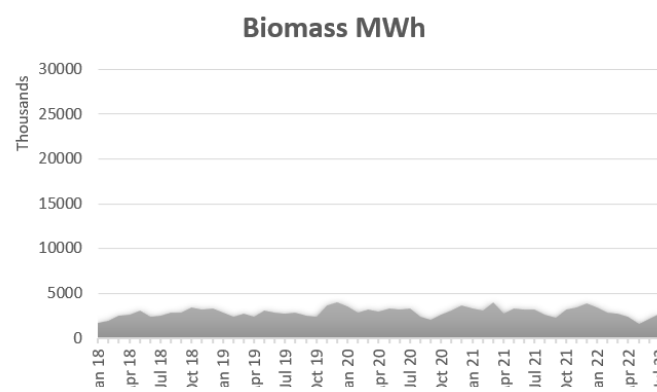
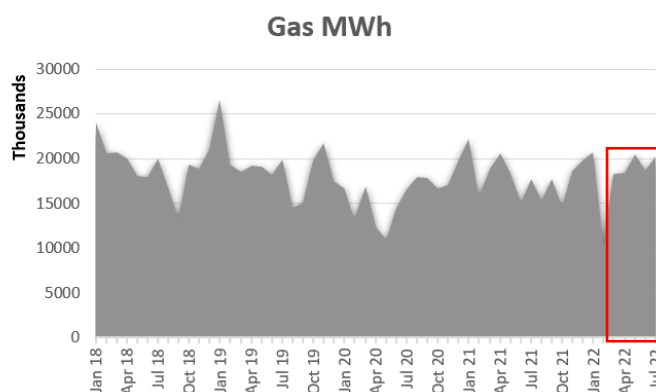
## Key Issues:

- Nuclear has reduced 1/3 since 2018 – gap filled with Wind and Solar increase – minimal "net" zero carbon generator change overall
- Note: Wind & Solar Capacity doesn't equate directly to nuclear capacity given our northern latitude (Yield <=> Installed kWp Capacity for solar) and Wind intermittency is also factored.

\* YTD excludes winter data – likely to increase carbon intensity as 2022 progresses



# Carbon Intensity – Carbon Emitting Generators and Interconnectors



2022 YTD Average\*

179<sub>gCO<sub>2</sub>/kWh</sub>

2021 Annual Average

184<sub>gCO<sub>2</sub>/kWh</sub>

2020 Annual Average

168<sub>gCO<sub>2</sub>/kWh</sub>

2019 Annual Average

190<sub>gCO<sub>2</sub>/kWh</sub>

2018 Annual Average

215<sub>gCO<sub>2</sub>/kWh</sub>

## Key Issues:

- **Interconnector profile as Net GB Importer** has radically changed since Ukraine Conflict
- Coal is still on the system (highly carbon inefficient) – less total in month, but running longer
- Increased Interconnector imports largely supplied with Coal and Gas

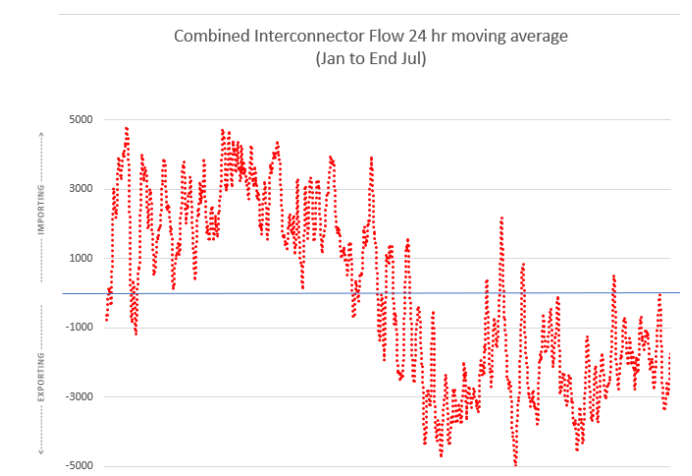
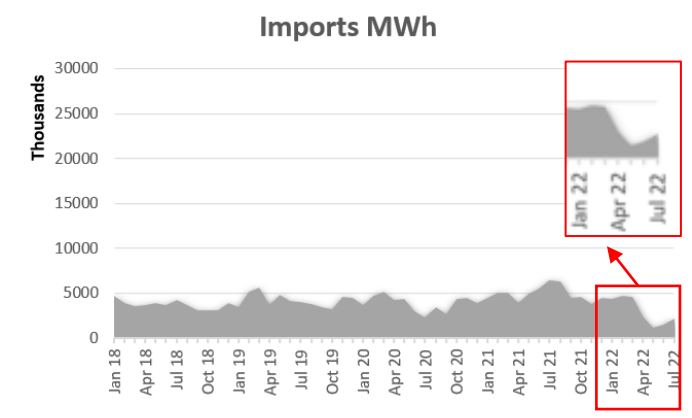
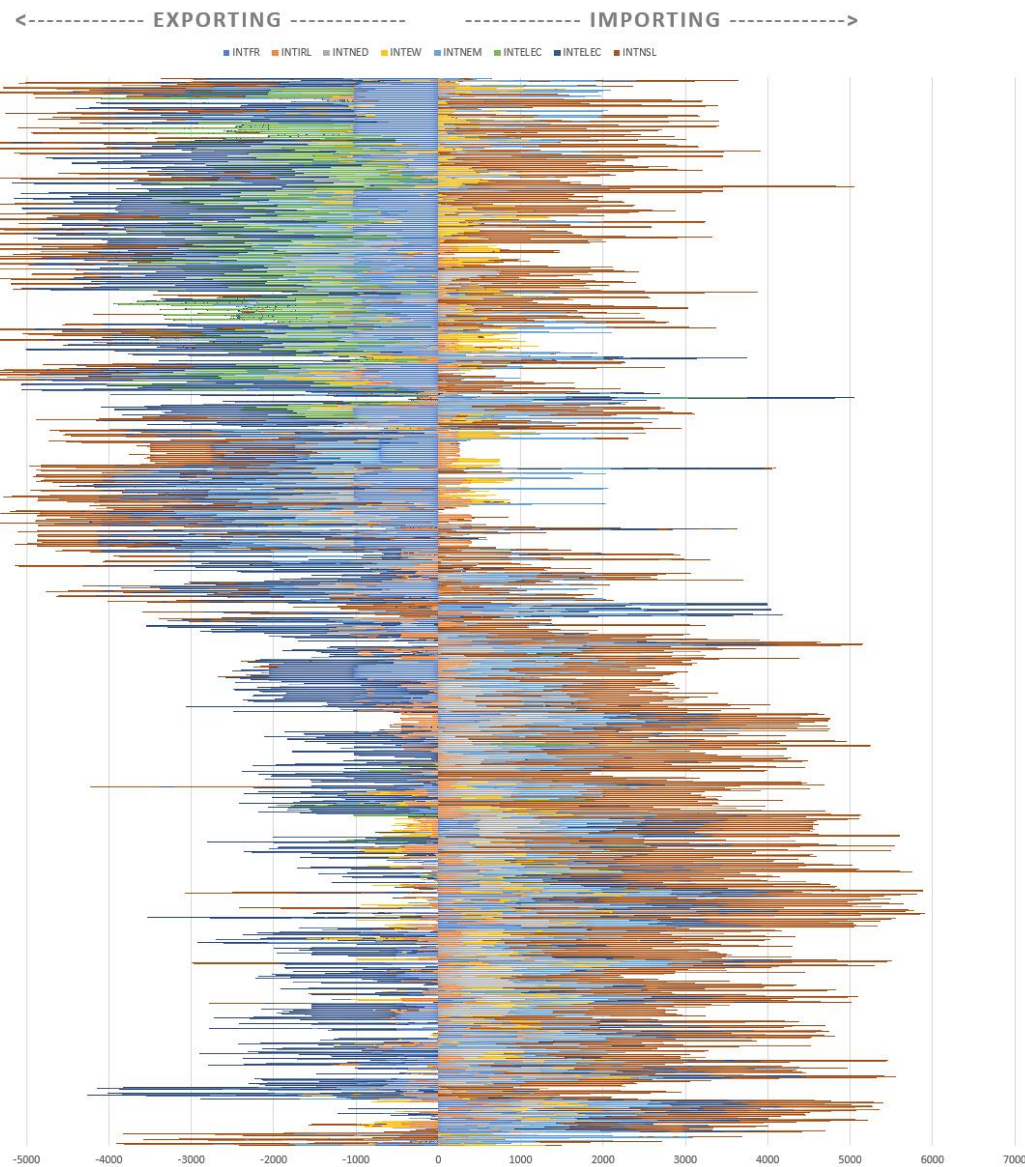
\* YTD excludes winter data – likely to increase carbon intensity as 2022 progresses

# Carbon Intensity – Interconnector significant move to export bias

Invasion of Ukraine

Jul 2022

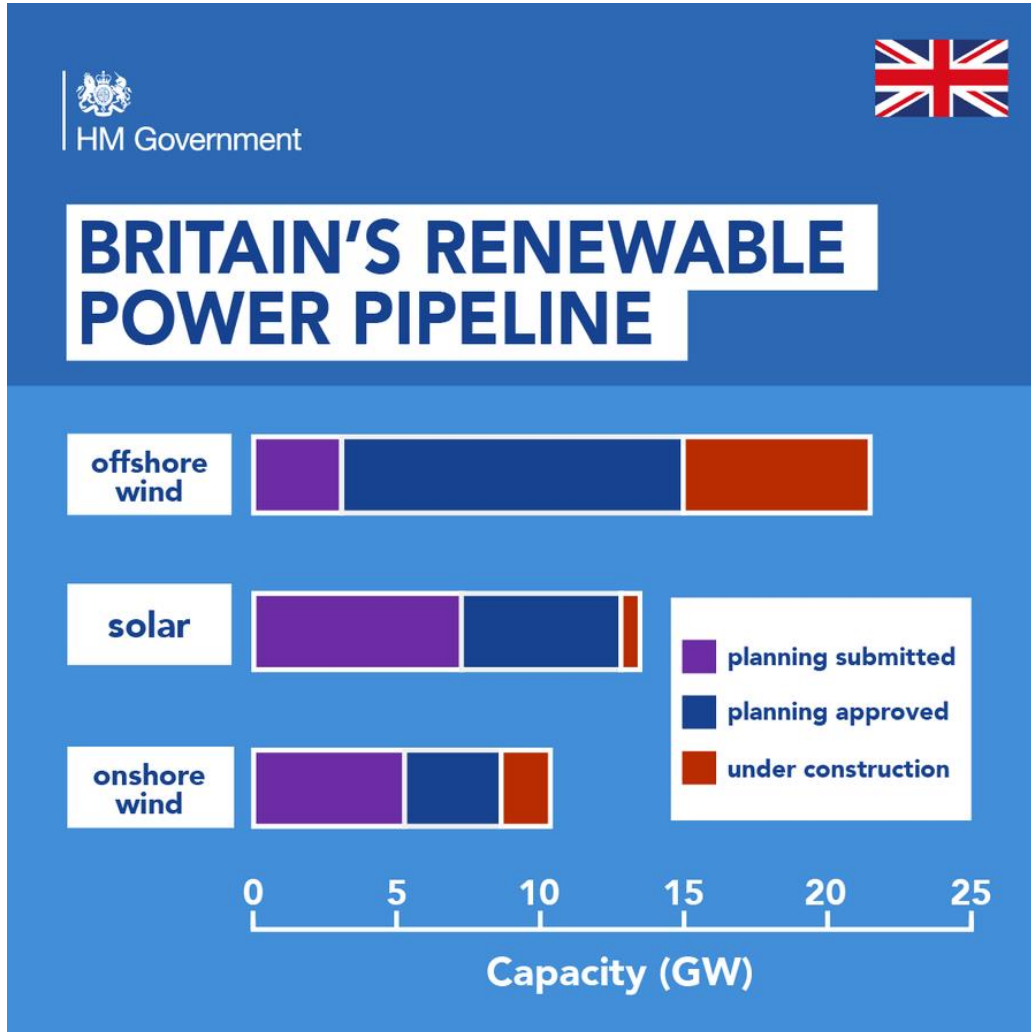
Jan 2022



- 2022 YTD Average\* **179** gCO<sub>2</sub>/kWh
- 2021 Annual Average **184** gCO<sub>2</sub>/kWh
- 2020 Annual Average **168** gCO<sub>2</sub>/kWh
- 2019 Annual Average **190** gCO<sub>2</sub>/kWh
- 2018 Annual Average **215** gCO<sub>2</sub>/kWh

\* YTD excludes winter data – likely to increase carbon intensity as 2022 progresses

# Carbon Intensity – GB's next...



WORLD NUCLEAR ASSOCIATION

Operable Reactors



5,883 MWe

Reactors Under Construction



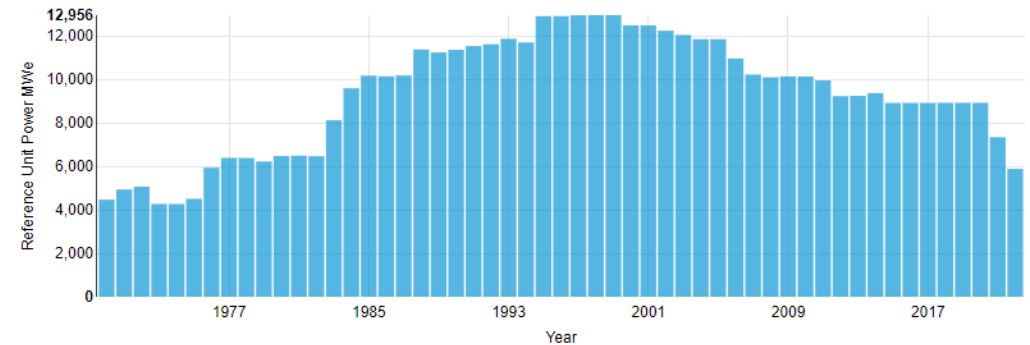
3,260 MWe

Reactors Shutdown



7,755 MWe

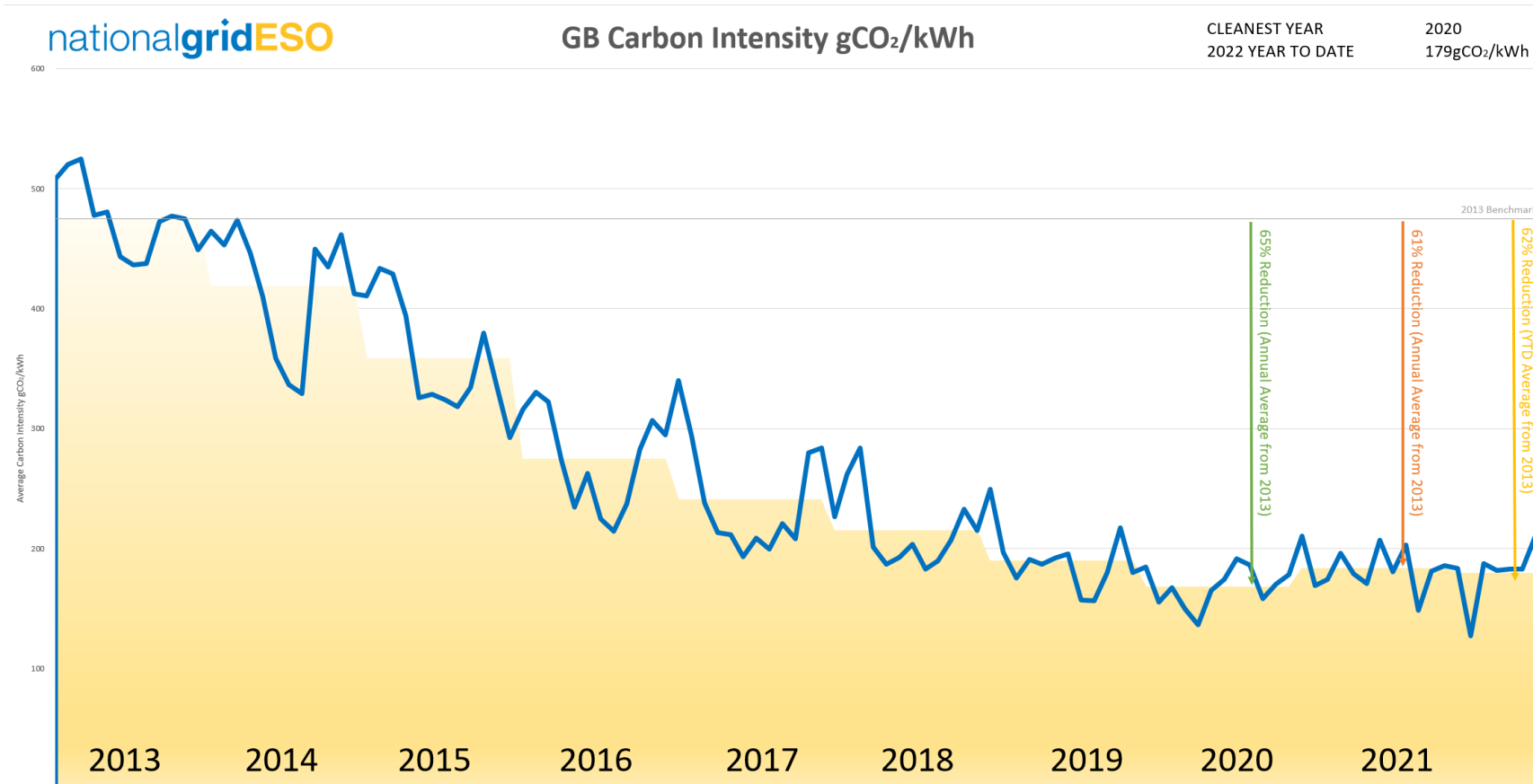
Operable nuclear power capacity



Promise of 24GW of Nuclear by 2050

# Carbon Intensity – Conclusion

(monthly and annual averages)



We are in a period where aging zero carbon nuclear is being replaced by wind and solar.

Interconnector behaviour is changing as Europe struggles with carbon fuel dependence.

The net effect is a carbon intensity holding position, artificially lowering due to covid in 2020.

The energy security, economic and social confluence of recent events promises a carbon watershed.

There will be a pause as infrastructure is built out, but then we will hopefully see another drop akin to the 2010s.

## Questions outstanding from previous weeks

**Q: Is constraint cost going to increase year on year? Looking at few months trends in Summer, Winter? Any views? When constraint management plans from ESO will kick-in to reduce the constraint?**

A: We will shortly publish our view of future constraint costs from the modelling in the Network Options Assessment. In general, constraint costs do continue to rise ahead of transmission reinforcements.

The ESO is taking a broad range of actions to address constraint costs, including work with Ofgem and TOs on accelerating network reinforcements, as foreseen in the British Energy Security Strategy.

**Q: General Query: Are the regular demand and spending reviews still fit-for-purpose? It seems like this could be done as exception reporting, giving further time for deep dives and looking to the future (in q+a). The market, and concerns around it, have changed since OTF created, but OTF hasn't as much**

A: Thanks for the feedback. We held a review session with a number of regular attendees in June and there was some conversation with the people in the room on this. At that time, the suggestion was that the content is kept to ensure that we are focusing on Operational and transparency issues in the near future. We are very happy to keep this under review on an enduring basis.

**Q: Why did NG ESO set a non-zero requirement for DR for delivery on 22nd Aug, but clear 0MW? This has happened before and leaves assets stranded (if optimisers had known requirements were 0MW they would have tendered for DC for example)**

A: Unfortunately, we experienced a technical issue with the process for this delivery day which meant our indicative requirements did not reflect those published on the data portal. We apologise for any impact this had on providers, we have addressed the immediate issue and are undertaking a full process review to mitigate the risk of future issues occurring.

## Questions outstanding from previous weeks

**Q: Re Q54 in the Q+A log about the differences in BM estimates for July 20, is there any reason why the cost of trades is not included in BM spend in the GB System Reports but treated as BM spend in other reports? This could be a bigger problem heading into winter '22.**

A: GB System Report is a control room report created by our control room, pulling in all the actions that have been taken in the BM only. The trades taken by ESO are published on our data portal.

In the daily reports the trade costs are then bundled with BM spend to ensure it is separate to AS costs. We can look at extracting this cost and presenting BM, trades and AS in these daily reports.

**Q: I didn't quite understand those two graphs on inertia costs 21/22 - one showed reducing intervention, one showed increasing costs? Why is largest loss and minimum inertia separate? Are these not ultimately managing the same issue?**

A: Costs depend on the volume of actions required and the price of those actions. In a scenario where the volume of actions remain the same but prices are higher, then costs will be higher. Energy prices have increased over the past 18-24 months, so the same sized intervention in 2022 carries a greater cost than in 2020.

“largest loss” management costs – (i.e. reducing the size of the largest loss risk), is distinct from actions to maintain the level of “minimum inertia”, which involves synchronising machines.

Our Frequency Risk and Control Report assesses the most appropriate cost risk balance and recommends a policy to implement this balance. For more information on this decision please review the report.

## Questions outstanding from previous weeks

**Q: NG ESO has under-procured STOR capacity every day this week with tight margins on the system without increasing the availability price cap - Will the price cap be reviewed?**

A: In response to the fall in procured volume for Short Term Operating Reserve observed last week, the Balancing Services Optimisation team implemented changes to the Buy Order price methodology to align our price structure with prices in alternative markets.

We are continuing to review the pricing methodology such that it is robust to further changes, extreme or otherwise, in wider market dynamics.

**Q: Why do you answer questions in order of votes? Obviously the ones asked earlier in the forum will have the highest votes, as people have longer to look at them and upvote - I think it's a really unhelpful way to choose questions.**

A: Thank you for the feedback. I recognise there is no perfect system for this process but we feel that this is the way of tackling the questions that people most value answers to. If you have questions that are not answered or would like more detail please use the contact email on the first slide to engage with us more directly.

**Q: On BSUoS reform - what is the expected impact of CMP361/362 on the tariff + fund from April?**

A: We intend to publish a draft tariff in September with the best knowledge we have of what the final mod will be at that point, however, we are still waiting on some detail from Ofgem's minded to decision.

## Questions outstanding from previous weeks

**Q: Thanks for issuing a revised BSUoS forecast with winter contingency cost. Could you please confirm, you have taken all the known plant extension costs for this winter in the latest BSUoS forecast? Would you envisage anymore coal plants getting extensions due to anticipated tough winter?**

A: Our update last week set out that we continue in discussions with 1 further generator and this is one of the areas of uncertainty within the cost range we have set out in the updated BSUoS forecast. The cost range does not include the carbon costs that will be incurred if the plant is run over the winter.

We are in no further discussions on extending any plant availability.

**Q: Given the oft stated issues around constraints from Scotland, how helpful is it having a new 1 GW offshore windfarm starting up? Will it have a material impact on balancing service costs?**

A: To decarbonise our energy system, we need to connect new forms of low carbon generation. The government has set an ambition of 50 GW of offshore wind connected by 2030.

Under a government policy decision, generators can connect to the system ahead of wider reinforcements on the system under the Connect and Manage arrangements. This means additional constraint costs ahead of transmission build. Our recent NOA publications have continued to highlight the need for significant transmission reinforcements including from Scotland to England & Wales to reduce constraints costs in future.

**Q: I have just noticed that there is a revised BSUoS forecast including the Winter coal contracts - can this be published in Excel format as well as PDF format please?**

A: There is a corresponding data file in csv format for the forecast that hasn't been updated yet but will be.



## Questions outstanding from previous weeks

**Q: On inertia. Why does equipment need to be installed in specific places, e.g. Scotland? I thought inertia could be provided from wherever and location wasn't important?**

A: The Stability pathfinders are looking at short circuit provision as well as inertia which is currently driving the location requirement. You are correct, we currently look at inertia on a national level, however as the frequency impact does change across the country, we anticipate that we are likely to be looking at regional inertia in the future.

**Q: Inertia daily costs - you have published only one side of procuring it through the BM but you don't publish the cost of making room for providing Inertia (taking wind off and buying on CCGTs). This is not included in your £100m cost so when will this final total cost be published?**

A: We are finalising the analysis, and those data will be published on our data portal soon.

**Q: What is the exact definition of "rocof trigger level"?**

A: The size of the infeed or outfeed loss risk (in MW) that would cause a rate of change of frequency large enough to activate RoCoF loss of mains protection, e.g. at 0.125Hz/s the RoCoF trigger level of 700MW is equivalent to a system inertia of 140 GVA.s.

**Q: Are ESO considering returning the mothballed Calon assets for this winter?**

A: We have only considered non-gas-fired power stations for the winter contingency contracts.

## Questions outstanding we are still working on

Q: The Irish ICs over July (Moyle basically all July, East-West 10th July) generated to a nomination profile completely away from their PNs. This is a semi-regular occurrence since ISEM. After several years why are PNs still not submitted correctly for Irish ICs?

Q: How many sites still need LoM changes? And what is the total MW capacity of these?

Q: Ref Q @ top of slide 25; could someone please explain exactly what “a requirement from ESO” where “such requirement being under ESEC” per footnote 3 of 2022 Direction is? Also, means ESEC has to be activated 1st before requirement for coal applies - otherwise this Direction does not legally apply.

Q: "Ensuring a minimum level of generation" just stated means that you understand that real inertia is needed. So why do you equate it with synthetic inertia in your contracts, Pathfinders, forecasts, plans and other actions?

Q: Is ESO seeing significant ongoing issues with coincident tripping as covered by GC0151: Grid Code Compliance with Fault Ride Through, or is the situation improving?

Q: “Why do some actions in the ‘All BOAs’ dataset flagged as ‘<< Missing NGC ID >>’? Is there additional information available on these actions and if so, where and if not can this be provided?”

**slido**



## **Audience Q&A Session**

① 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](mailto:box.NC.Customer@nationalgrideso.com)

