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NESO Operational Transparency Forum

5 March 2025

NESO
National Energy System Operator

Introduction | Sli.do code #OTF

To ask questions live & give us post event feedback go to Sli.do 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 below.
- **The OTF is not the place to challenge the actions of individual parties** (other than the NESO), and we will not comment on these challenges. This type of concern can be reported to the Market Monitoring team at: marketreporting@nationalenergyso.com
- **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.
- **Sli.do will remain open until 12:30 this week**, even when the call closes earlier, to provide the maximum opportunity for you to ask questions. After that please use the advance questions or email options below.
- **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@nationalenergyso.com

Stay up to date on our webpage: https://www.neso.energy/what-we-do/systems-operations/operational-transparency-forum (OTF Q&A is published with slide packs)

Note: to access previous OTF webinars from Slido click on the three lines to the left of forum title

NESO National Energy System Operator

Future deep dive / focus topics

Slido code #OTF

Today's Focus Topics/deep dives

Interconnector Special refresh **(extended 90-minute session)**

Future

BM Registration and the Single Markets Platform – 12 March

NESO Market Monitoring activities – 19 March

February Balancing Costs – 26 March

Overview of NESO System Access Planning process – 2 April (postponed from 12 March)

There will be no OTF on 23 April (week after Easter)

If you have questions/suggestions of areas to cover during above presentations or ideas for deep dives or focus topics you would like us to consider, please send them to us at: box.nc.customer@nationalenergyso.com

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NESO Customer & Stakeholder Feedback Survey – March 2025

Slido code #OTF

You may be contacted and asked to participate in this survey

- Email address: surveys@bmgresearch.co.uk
- Phone number: 01213893024
- Scores:
  - Detractor: scores of 1-6 – what did we do wrong?
  - Passive: scores of 7 or 8 – what do we need to do better?
  - Promoter: scores of 9 or 10 – what do we need to keep doing?

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Frequency Risk and Control Report (FRCR) 2025 Consultation: 3rd – 31st March 2025

Slido code #OTF

- In line with SQSS requirement, NESO is obliged to produce an annual FRCR report and consult with industry on the assessment and policy recommendation presented in the report on how we manage frequency risks.
- **We will be consulting on the 2025 version of FRCR between the 3rd and 31st March 2025.**
- The associated documents is published on **FRCR webpage**, where you can find:
  - **FRCR 2025, the Main report**
  - **FRCR Methodology v3**
  - **FRCR Data Handbook**
  - **FRCR 2025 Consultation Response Proforma**
- We are holding a webinar on **Wednesday 19th March 13:00-14:00**, mid-way through the consultation period to provide further insight into the proposal and take any initial feedback on the proposals ahead of the consultation period closing.

Please send your response proforma to box.FRCR@nationalenergyso.com or complete the online Response Form by 5pm on Monday 31st March 2025

Please register your interest for the webinar using this link

Quick Reserve update

- A reminder that the Quick Reserve Phase 2 EBR Article 18 consultation closes on **14 March 2025**
- Please be aware that the consultation has design changes that impact **all Quick Reserve providers** and is not just to enable access to the service for non-BM providers. The main proposed change, applicable from go live of Phase 2, which affects all providers (BM and non-BM) is the requirement to submit (via API) Performance Metering data to NESO for post-event performance monitoring.
- Please refer to the Performance Metering Data Specification published on our website.
- We encourage all Quick Reserve providers (new and existing) to review the EBR Article 18 consultation pack. The summary document outlines all proposed changes from the live Quick Reserve service.

Slido code #OTF

Future Event Summary

Event	Date & Time	Link
Pre-Fault Frequency Control Modelling Webinar	~~5th March 2025 (14:00-15:30)~~ **12th March 2025 (13:30-15:00)**	Register here
Short Term Operating Reserve to Slow Reserve transition feedback survey	5th March 2025 (Deadline)	Click here for feedback survey
Balancing Programme March 2025 Webinar	6th March 2025 (14:00-15:30)	Register here
Quick Reserve Phase 2 – Launch of EBR Article 18 consultation	14th March 2025	Provide your response here
Frequency Risk and Control Report (FRCR) 2025 Consultation Webinar	19th March 2025 (13:00-14:00)	Register here
Quick Reserve Phase 2 – IT integration drop in sessions covering OBP, Settlement and Operational Metering	Weekly from 20 March till 10 April (10:30 – 11:30)	Register here

Public

Interconnector Operations Deep Dive

How does NESO manage ICs as part of the system?

5th March 2025

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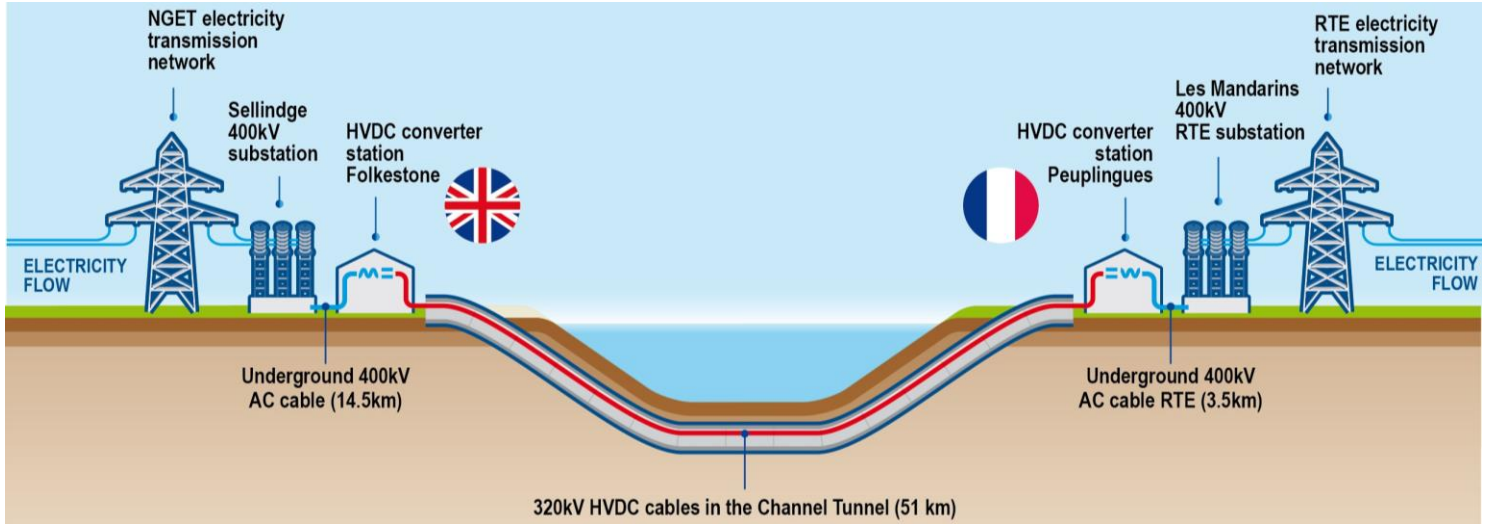
National Energy System Operator

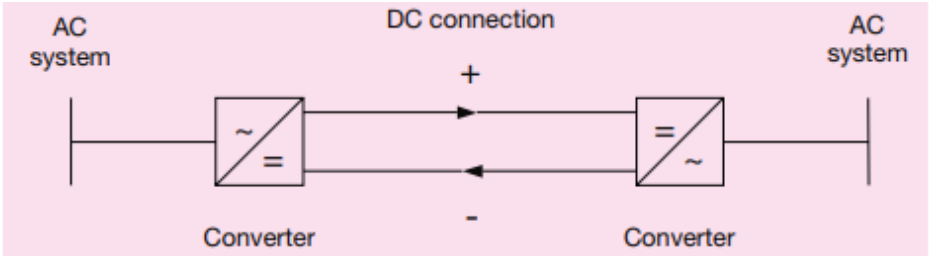
Agenda

1. Interconnectors Overview
2. Interconnector activities at NESO
3. Operational Actions
4. Case Study

What is an Interconnector?

- Connects the electricity systems of two countries via high voltage direct current (HVDC) subsea cables.
- Allows the trading and sharing of electricity, with flows generally going from the country with the lowest price to the country with the highest price.
- Converter stations at each end of the cable convert DC back to AC, then connects to the onshore transmission network.

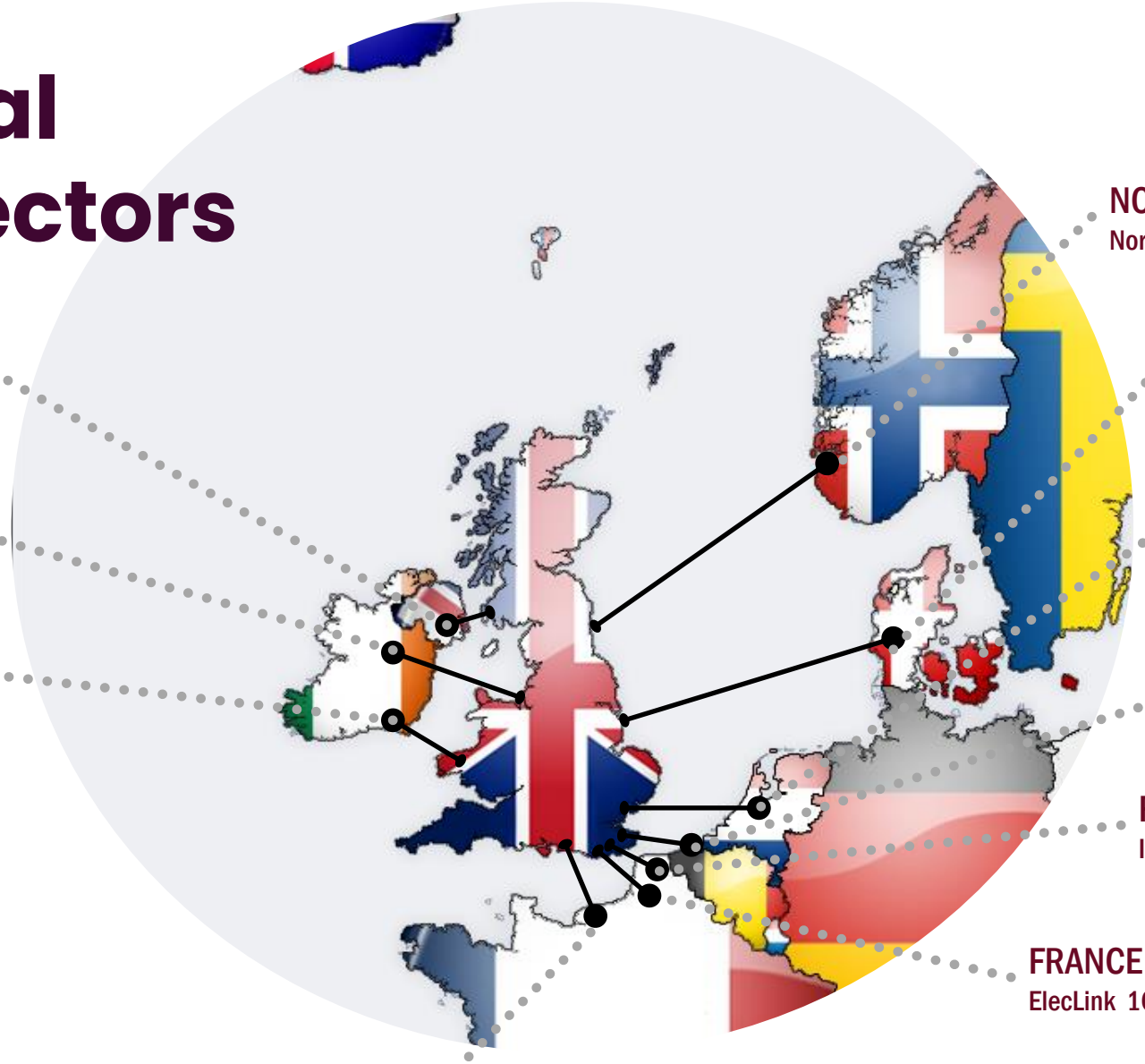




GB Interconnectors

Interconnector	Capacity	Connected Country - System Operator	Go-live	Owned By	Operated By
IFA	2GW	France - RTE	1986	NGV (NGIC) & RTE	NGV (NGIC) & RTE
Moyle	0.5GW	Northern Ireland - SONI	2001	Mutual Energy	EirGrid/SONI
BritNed	1GW	Netherlands - TenneT NL	2011	BritNed Development Ltd	BritNed Development Ltd
EWIC	0.5GW	Ireland - EirGrid	2012	EirGrid Interconnector DAC	EirGrid/SONI
Nemo	1GW	Belgium - Elia	2019	Nemo Link Ltd	Nemo Link Ltd
IFA2	1GW	France - RTE	2020	NGV (NGIFA2) & RTE	NGV (NGIFA2) & RTE
NSL	1.4GW	Norway - Statnett	2021	NGV (NGNSL) & Statnett	NGV (NGNSL) & Statnett
Eleclink	1GW	France - RTE	2022	GetLink (ElecLink Ltd)	ElecLink Ltd
Viking	1.4GW	Denmark - Energinet	2023	NGV (NGVLL) & Energinet	NGV (NGVLL) & Energinet
Greenlink	0.5GW	Ireland - EirGrid	2025	Greenlink Interconnector Ltd	EirGrid
NeuConnect	*1.4GW*	*Germany - TenneT DE*	*Expected 2028*	*NeuConnect Britain Ltd*	*NeuConnect Britain Ltd*

Operational Interconnectors



N IRELAND
Moyle 500MW

ROI
EWIC 500MW

ROI
Greenlink 500MW

FRANCE
IFA2 1GW

NORWAY
North Sea Link 1.4GW

DENMARK
Viking Link 1.4GW

NETHERLANDS
BritNed 1GW

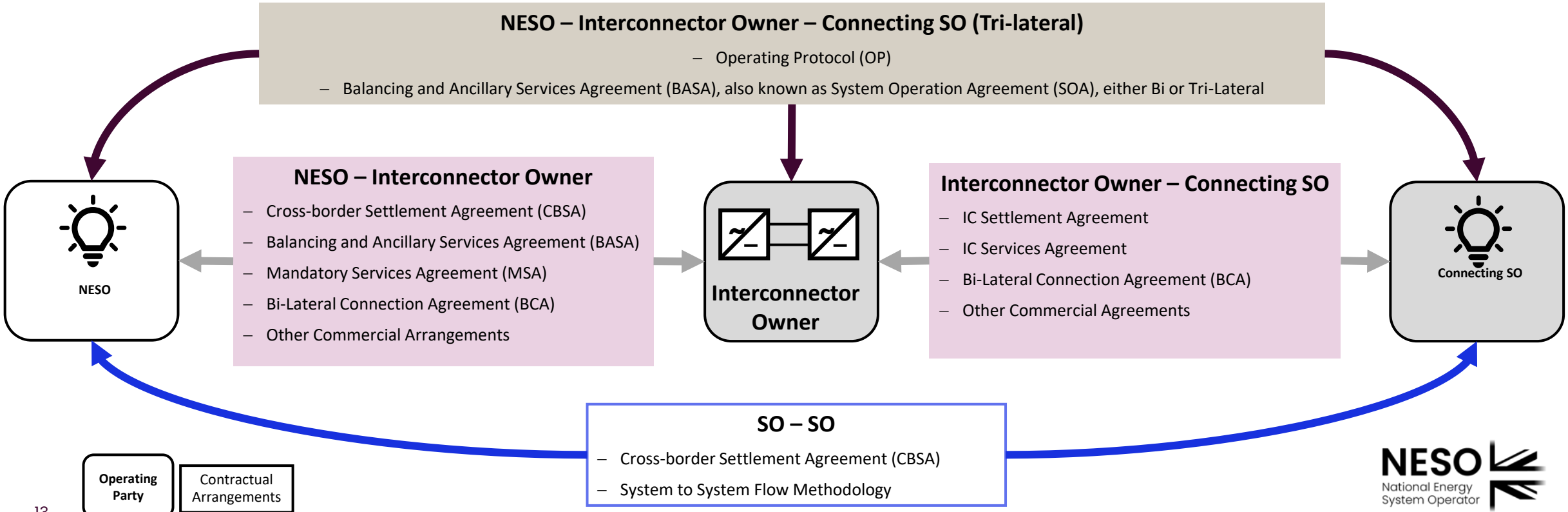
BELGIUM
NemoLink 1GW

FRANCE
IFA 2GW

FRANCE
ElecLink 1GW

Interconnector Stakeholders & Agreements

- Interconnectors (ICs) have a number of contractual arrangements & operational protocols, which allow them to provide services to GB's power system.
- These are required in order to allow the ICs to facilitate markets and transport electricity between the connecting countries and to set out and govern the operations the operators and connected SOs must abide by, as well as the methods in which payments are made to the various parties.



What determines Interconnector Flows? (1)

Interconnector flows are market driven = They are set by Market Participants

They are not set by System Operators (e.g. NESO) or the Interconnector Owner(s)

- Interconnector flows are set according to market prices on either side of the interconnector;
- In general, the ***spread/difference*** between the two market prices drive the interconnector flow;
    - Power will flow from the lower price market to the higher price market.
- How this spread translates into a flow depends on the individual interconnector's **capacity mechanism…**

Implicit

- Capacity is allocated 'implicitly' as a result of wholesale energy trades;
- Usually determined by 'coupled' energy auctions;

Explicit

- Capacity must be bought 'explicitly' (as a specific product) by a market participant;
- Capacity can then be nominated by the market participant, as required;
- The corresponding energy must also be bought/sold *separately* within the national markets.

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What determines Interconnector Flows? (2)

Interconnector flows are market driven = They are set by Market Participants

GB interconnectors utilise a variety of capacity allocation mechanisms:

- Each mechanism usually covers a specified timeframe;
- Therefore, the *actual* or *forecast* **spread** (i.e. price difference between markets) is what is captured at that time.

Implicit Capacity Mechanisms	
Day-ahead:	Intraday:
NSL	EWIC, Moyle, Greenlink

Explicit Capacity Mechanisms		
Long Term:	Day-ahead:	Intraday:
IFA, IFA2, ElecLink, BritNed, NEMO, Viking Link	IFA, IFA2, ElecLink, BritNed, NEMO, Viking Link	IFA, IFA2, ElecLink, BritNed, NEMO, Viking Link

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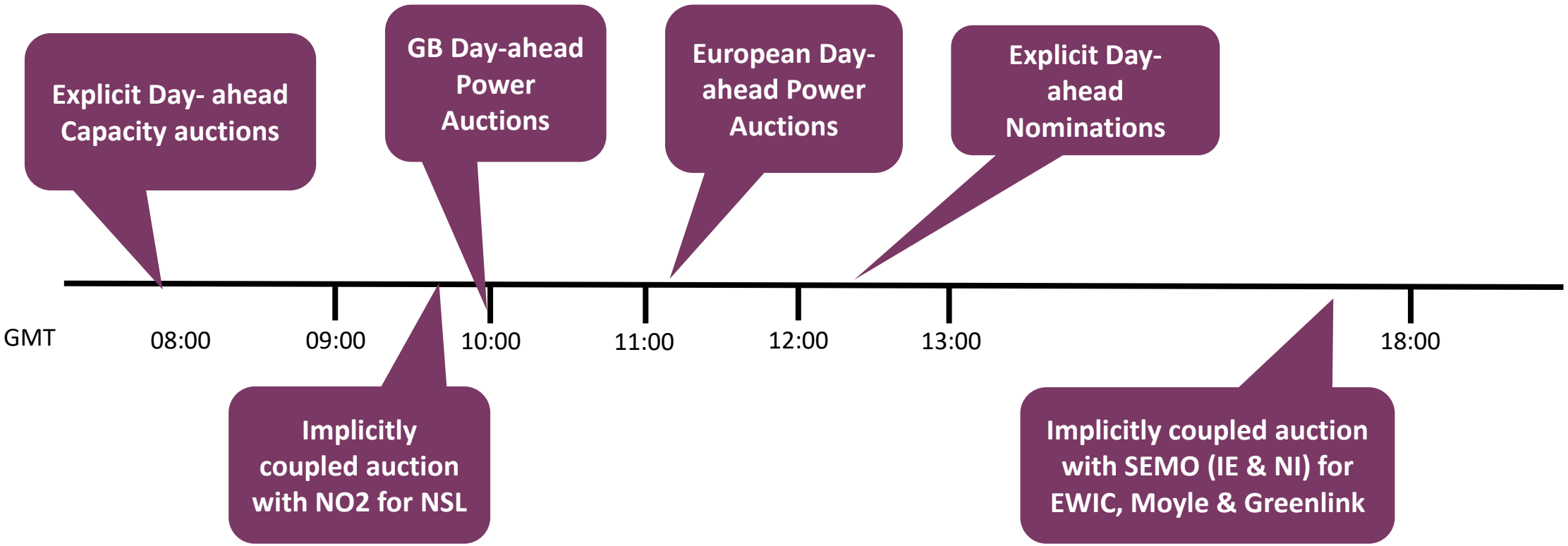
Interconnector Timings– Day-ahead (DA)



For detailed timings of capacity and implicitly coupled auctions see the relevant provider's website

https://support.nordpoolgroup.com/support/solutions/articles/8000088463-about-the-n2ex-day-ahead-auction

https://www.epexspot.com/en/tradingproducts

https://www.semopx.com/markets/intraday-market/

Interconnector Timings – Intraday (ID)

Time (GMT)	23:00	23:30	00:00	00:30	01:00	01:30	02:00	02:30	03:00	03:30	04:00	04:30	05:00	05:30	06:00	06:30	07:00	07:30	08:00	08:30	09:00	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30	15:00	15:30	16:00	16:30	17:00	17:30	18:00	18:30	19:00	19:30	20:00	20:30	21:00	21:30	22:00	22:30
SP	47	48	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
IFA	ID1 - 18:15 - 18:45																ID2 - 04:15 - 04:45																ID3 - 12:15 - 12:45								ID4 - 16:15 - 16:45							
BrtiNed	ID1 - 18:30 - 19:00																ID2 - 04:50 - 05:20								ID3 - 08:50 - 09:20								ID4 - 12:50 - 13:20															
NemoLink	ID1 - 20:45 - 21:10												ID2 - 02:30 - 02:55												ID3 - 08:30 - 08:55												ID4 - 14:30 - 14:55											
IFA2	ID1 - 18:15 - 18:45																								ID2 - 08:15 - 08:45								ID3 - 12:15 - 12:45								ID4 - 16:15 - 16:45							
ElecLink	ID1 - 18:30 - 19:00																												ID2 - 08:20 - 08:50																					
Viking Link	ID1 - 17:00 - 17:30																ID2 - 04:00 - 04:430																ID3 - 12:00 - 12:30								ID4 - 16:00- 16:30							

For detailed timings of capacity auctions see the relevant provider's website

IFA & IFA2: https://ifa1interconnector.com/auctions

BritNed: https://www.britned.com/market-dashboard/

NEMO: https://www.nemolink.co.uk/trade-with-us/

ElecLink: https://www.eleclink.co.uk/customers-auctions.php

Viking Link: https://www.viking-link.com/trade-with-us/auction

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Interconnector activities at NESO

Area	Timeframe	Short Description
Cross-Border Strategy	*Long Term/ Regulatory*	Ensuring interconnectors and cross-border market and operational arrangements remain viable, appropriate and efficient under all future GB and connected market and planning scenarios.
Offshore Hybrid Assets (OHA)		Working with DESNZ and Ofgem to deliver an operationally and commercially viable OHA regime.
Connections		Responsible for Bilateral Connection Agreements.
Strategic Energy Planning		Long-term network planning regime to identify future network development opportunities.
European Frameworks		Supports the implementation of changes to GB frameworks related to cross-border activities. Providing expertise and guidance to internal teams, ensuring compliance with regulatory requirements.
Contracts		Development and review of contracts and agreements between NESO, interconnector owners and connected TSOs to enable operation of the interconnector.
Grid Code Compliance		Ensures relevant parties are compliant with the GB Gride Code.
Control Technology	*Delivery/ Operations*	Development and review of contracts and agreements between NESO, interconnector owners and connected TSOs to enable operation of the interconnector, and development and delivery of operational control systems, procedures and training.
Energy Trading		Trading to adjust flows on the interconnectors for system requirements.
Electricity National Control Centre (ENCC) & ENCC Support Teams		Control Room real-time operations.
Post-event analysis	*Post-event*	Investigations into events on the electricity system.
Settlements		Calculate and produce invoices for balancing activity undertaken on interconnectors and use the volume and price data to support provision of BSAD.

Operational Actions

Operational Actions on Interconnectors

- NESO will always aim to secure required flows via Day-ahead (DA) or Intraday (ID) trading, if more economical, to ensure as much certainty ahead of real-time as possible.
- **Pre-(final) Gate Closure** – ID Trading - *where possible, namely:*
  - *Interconnectors with explicit capacity mechanisms*
  - *Sufficient spare capacity is available*
- **Post-(final) gate closure / within gate** – Options available to the Electricity National Control Centre (ENCC) at near-to/in real-time, in order of preference:

  Note 1: *Interconnectors are not active Balancing Mechanism Units and therefore NESO cannot use Bid-Offer Acceptance instructions (BOAs)*

  Note 2: *NESO does not have to use one before the other but will always try to use services in the order below if possible*

  - SO-SO Trades – *if trilaterally agreed & available*
  - Net Transfer Capacity (NTC) / Intraday Trading Limits (ITL) – *only to be used if EA or EI will be required*
  - Emergency Assistance (EA) – *if agreed & available*
  - Emergency Instruction (EI)

Order of Actions – Everyday Actions

Everyday Actions	Order	Comments
Reconfigure Transmission Network to reduce network congestion: Change substation running arrangements, Tap Quad Boosters, and make use of enhanced ratings	Normal operating practice – no cost	Changing daily operating conditions can result in different network configurations to reduce congestion.
Review and refine reserve requirement within day dependent on system conditions	Normal operating practice – no cost	Changing system conditions can relieve requirements for reserve or increase requirements. This can change at any time as the conditions change.
All deliverable Offer action on all available BM participants	#1 based on Cost	Scheduled from Day Ahead, action taken in real time – some offers may not be available due to network congestion.
Issue warming instructions to cold BM participants	#1 based on Cost	Scheduled from Day Ahead, action taken in real time.
Buy/Sell energy from continental Europe	#1 based on Cost	Scheduled from Day Ahead, action taken from Day Ahead to ~2hrs ahead of time by NESO Traders.
Reconfigure CCGTs to increase available energy (e.g.sync additional GTs)	#1 based on Cost	Scheduled from Day Ahead, managed within the control timescales within day.
SO-SO trade in cost order	#1 based on Cost	SO to SO trade with other SO in Europe/ Ireland.
Instruct Demand Flexibility product	#1 based on Cost	For predominantly peak periods (16:00 to 19:00) activated within day.

NESO Interconnector (Market) Trading

Balancing Mechanism actions are not possible on Interconnectors.

Instead, Over-The-Counter (OTC) trading is used to adjust the flow where necessary.

- NESO's Trading team works with the Control Room to identify opportunities or required trades;
- Interconnector trades are arranged through competitive, ad-hoc auctions with *Qualified Counterparties* ;
- Trades are conducted during the '*Intraday*' timeframe, up to ~2 hours ahead of real-time delivery;
- Trades can take place on interconnectors which operate explicit capacity mechanisms;
    - IFA,
    - IFA2,
    - ElecLink,
    - BritNed,
    - NEMO,
    - Viking Link

Qualified Counterparties *– companies who are registered interconnector users, and who have a signed GTMA with NESO, sufficient credit posted and completed the necessary testing with NESO's trading process.*

NESO Interconnector (Market) Trading

Transparency of NESO trading actions

- NESO Interconnector Trade Requirements are published in real time,
- Then, once an auction completes, it is updated with results, in real time
  https://www.neso.energy/data-portal/interconnector-requirement-and-auction-summary-data
- Upcoming NESO trades (interconnector & other BMU) are published on individual basis:
  https://www.neso.energy/data-portal/upcoming-trades-0
- All historic NESO trades are published after delivery:
  https://www.neso.energy/data-portal/historic-gtma-grid-trade-master-agreement-trades-data
- During delivery, NESO trades are also displayed in DISBSAD:
  https://bmrs.elexon.co.uk/adjustment-actions-disbsad

Qualified Counterparties *– companies who are registered interconnector users, and who have a signed GTMA with NESO, sufficient credit posted and completed the necessary testing with NESO's trading process.*

SO-SO Trading

System Operator to System Operator (SO-SO) Trades are trades between NESO and the connected System Operator (SO).

Either SO can request a volume of energy from the connected SO.

If the connected SO can fulfil the request, the volume and change of flow timings are agreed, and the resulting energy is exchanged via the relevant interconnector.

SO-SO trades :

- Can be requested by either SO;
- Can be requested for any reason, i.e. tagged as system or energy;
- Does not require the Requesting SO to be in a particular System State;
- Can only be requested for periods where nominations are firm, i.e. within gate;
- Requires minimum 40 minutes notice prior to delivery;
- Assisting SO can reject for any reason.

SO-SO Trade Prices

- If agreed and set ahead of real-time, prices are published on BMRS (e.g. CBB and Excess Energy Prices)
- If a firm price is agreed between SOs during requesting stage, the price is published post-real time via BSAD reporting.
- If only an indicative price is agreed during the requesting stage, this will be published initially, where possible, and updated with the final price once available.

Indicative prices are given by the supporting SO and are:

- Either, a calculated estimate of the **average** cost of rebalancing actions required in their grid system;
- Or, a calculated estimate of the **highest** cost of rebalancing actions required in their grid system;

in order to provide support to GB.

SO-SO trade prices will be compared to available Balancing Mechanism costs and internal actions when making decisions.

SO-SO trade costs feed into Cashout and recovered through BSUoS. Further information and Monthly Balancing Services Summaries (MBSS) can be found here.

SO-SO Trading Tools

NESO only has SO-SO Trading services with:

Connected SO	Country	Interconnector	Service Name	Used by NESO?
RTE	France	IFA & IFA2	Excess Energy	No, since the introduction of hourly gates due to required notice period
Elia	Belgium	NEMO	Redispatch & Countertrading (RDCT)	
EirGrid	Republic of Ireland	EWIC & Greenlink	Cross Border Balancing (CBB) & Coordinated Third Party Trading (CTPT)	CBB – yes CTPT – no, EirGrid use trades via a 3rd party
SONI	Northern Ireland	Moyle	Cross Border Balancing (CBB) & Coordinated Third Party Trading (CTPT)	
Energinet	Denmark	Viking	Emergency SO-SO Trading (ESOT)	Yes

Order of Actions – Enhanced & Emergency Actions

Enhanced Actions (if everyday actions are insufficient)	Order	Comments
Recall TO assets from outage to increase network availability and available capacity	#2	Anytime through to control room timescales, depending on ERTS (Emergency Return to Service) time.
Net Transfer Capacity (NTC) restrictions	#3	Required to ensure interconnectors flows remain within operation security limits. Used as a last resort after all commercial actions and system optimisations have been taken. Can be use for margin extremes when an interconnector flow can result in an EMN or HRDR being issued (this is detailed further in the internal and external NTC policies).
Use of Emergency Assistance (EA) from other SO	#4	Enacted close to real-time. Only applicable if capacity is available on interconnectors. EA can be withdrawn at any time.
Emergency Actions (if enhanced actions are insufficient)	**Order**	**Comments**
Emergency Instruction (EI) to other SO	#5	Only applicable if this does not cause demand control in the interconnected countries.
Use of MaxGen	#5	This should be used at the same time as EI to other SO. This service will be initiated by the issuing of an Emergency Instruction.
OC6.5.3 Fast Demand Control instructions to DNOs	#6	This could be via voltage control or demand control of fast disconnection blocks up to 20%, protecting critical sites.
OC6.5.4. Demand Control Rotation Protocol	#7	In-day rota'd demand control disconnections up to 40%, protecting critical sites. NESO has emergency powers to do this, when approved by Gold CMT.

NTC & ITL

Net Transfer Capacity & Intraday Trading Limit

System Operator (SO) tools to manage the maximum securable import and export interconnector flow which can be facilitated on the SO's Grid System without risking a breach of system security.

- Submitted by ENCC operators
- Submitted individually for each interconnector
- Submitted per interconnector Market Time Unit (e.g. 60mins)
- Submitted separately for each flow direction

Net Transfer Capacity (NTC)

- Restricts the capacity which can be released to the specific interconnector market at DA or ID timescales.
- Ensures the interconnector's maximum import and/or export flow does not risk a breach of system security. This can be for:
  - **Network Constraints** – Transmission & Energy (localised Voltage, Thermal & Stability and national Inertia)
  - **Largest System Loss** - relating to Frequency Management (Largest System Loss, both Generation and Demand, Rate of Change of Frequency and Response)
  - **Margin Extremes** - risk of System Warnings related to GB system margin issues.

- Can be reduced to a flow lower that the Already Allocated Capacity (capacity already sold to the market).
- When restricted by NESO, the interconnector is compensated if they are signed up to the "Methodology for GB Commercial Arrangements relating to Interconnector Capacity Calculation".
  - Settlement for this on a monthly basis in arrears e.g. capacity provided in March '25 will be settled at the end of April '25

NTC is the only method by which an SO can guarantee an interconnector's flow will not risk a breach of Grid System Security.

NTC data is published on the data portal here.

Intraday Trading Limit (ITL)

ITLs assist SOs in managing system security risks resulting from interconnector imports and exports.

- Similar to NTC but flow cannot be reduced below the Already Allocated Capacity.
- Can only be used intraday.
- No compensation related to ITL.

ITL data is published on the data portal here.

Emergency Assistance (EA) [1]

Grid Code requirement BC2.9.6

Provides a method of near to real-time support between connected SOs. Either SO can request an increase or decrease in energy flow from the connected SO over a specific interconnector.

- EA can be partially withdrawn by some SOs across some interconnectors in real-time.
- If the connected SO can assist, the EA flow profile (MWs & timings) is agreed after which, the interconnector owner enacts the EA flow profile.
- Note – EA is similar to SO-SO Trading but with Alert/Emergency status highlighting a risk or breach of system security triggering the request.

Emergency Assistance (EA):

- Can be requested by either SO;
- Can be requested for any system reason, i.e. tagged as system;
- Requires the Requesting SO to be in at least an Alert State, to avoid entering an Emergency, or already in an Emergency State;
  - ***Note**: EA can be agreed prior to the Requesting SO changing it's declared system state via EAS. Priority is to secure the system*
- Can only be requested for periods where nominations are firm, i.e. within gate;
- Requires minimum 15 minutes notice prior to commencing delivery;
- Assisting SO can only reject a request if it will cause their system to enter Emergency State.

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Emergency Assistance (EA) [2]

EA is available on the following interconnectors.

If an EA is accepted, NESO will publish a message to BMRS System Warnings (link).

Note: *the BMRS message states the Requesting SO, resulting flow & start/end times. It does not contain the interconnector name or price information.*

Connected SO	Country	Interconnector
RTE	France	IFA
RTE	France	IFA2
Elia	Belgium	NEMO
Energinet	Denmark	Viking Link
Statnett	Norway	NSL
SONI	Northern Ireland	Moyle
EirGrid	Republic of Ireland	EWIC
EirGrid	Republic of Ireland	Greenlink

Emergency Assistance vs. SO-SO Trading

Emergency Assistance	SO-SO Trading
Can be requested by either SO	Can be requested by either SO
Can be requested for any system reason i.e. tagged as system or energy	Can be requested for any reason, i.e. tagged as system or energy
Requires the Requesting SO to be in at least Alert State, to avoid entering Emergency, or already in Emergency State ***Note:*** *EA can be agreed prior to the Requesting SO changing it's declared system state. Priority is to secure the system*	Does not require the Requesting SO to be in a particular System State
Can only be requested for periods where nominations are firm, i.e. within gate	Can only be requested for periods where nominations are firm i.e. within gate
Requires minimum 15 minutes notice prior to commencing delivery	Requires minimum 40 minutes notice prior to delivery
Assisting SO can only reject a request if it will cause their system to enter Emergency State. Service can be temporarily withdrawn by either TSO.	Assisting SO can reject for any reason

Emergency Instruction (EI)

- An emergency and almost immediate method of securing breaches of system security;
- An emergency action once all other available actions have been exhausted, regardless of cost
- Available on all GB units including interconnectors:
  - Grid Code requirement BC2.6.4 & BC2.9
- Instructing SO gives verbal instruction to Interconnector Operator via telephone to reduce flow to a specified level. The Interconnector Operator enacts the instruction immediately and without delay.
- Emergency Instruction (EI):
  - Can be instructed by either SO
  - Can only reduce the flow towards 0MW & cannot change the direction of flow
  - Can be instructed for any system reason, i.e. tagged as system

    ***Note**: EI can be instructed prior to the Instructing SO changing it's declared system state via EAS. Priority is to secure the system.*
  - Requires the Requesting SO to be in an Emergency State;
  - EI instructions are open-ended. The flow can only be change when agreed by the Instructing SO or as a result of a subsequent EI from either SO
  - No minimum notice
  - Can only be rejected by the Interconnector Owner if it will endanger personnel or equipment safety
- If the Assisting SO has declared an Emergency State via the European Awareness System (EAS) , the Instructing SO will contact the Assisting SO to discuss their ability to manage their system resulting from an EI
  - The Assisting SO may have declared an Emergency State for a reason which may not be impacted by the Instructing SO's EI
- If both SOs are in an Emergency State, coordination will take place to agree a volume which would share the impact across both SOs, in line with the relevant interconnector governance documents.
- NESO does not publish/report EIs in real-time, only through BSAD
  - Priority is to secure the system rather than to publish. Publishing post-event is of no benefit as the situation will have already been resolved.

EA & EI Pricing

- Interconnector Owners are always kept whole in both countries markets. This is achieved either by the Requesting SO:
  - moving the resulting imbalance to its own account; or,
  - paying the Interconnector Owner the value of any imbalance penalty

- **EA** pricing between connected SOs is negotiated and included in Bilateral Settlement Agreements to reflect the regulatory obligations of both SOs

- **EI** is a mandatory, non-commercial service:
  - When carrying out an EI the Instructing SO's priority is secure the system as soon as possible and will likely be restricted in what actions can be taken

EA & EI Settlement

- Costs & volumes are included in & reported via the final Balancing Services Adjustment Data (BSAD) submission the following day (D+1):
  - This may be adjusted if required post-event;
  - BSAD is published on the data portal (here) & provided to Elexon for Cashout calculations.

- System tagged actions do not feed into Cashout,
  - ***Note for EA*** - *if the cost is less than an Energy tagged action, Elexon will remove the EA's System tag meaning the cost will feed into Cashout*

- Any outstanding costs to NESO are recovered through Balancing Services Use of System (BSUoS) Recovery Daily costs
  - Achieved by allocating the Weighted Average Volume Allocation to each settlement period

Case Study

European Awareness System (EAS)

- The EAS platform is hosted and maintained by ENTSO-E. It allows System Operators (SOs) to exchange operational information in real-time.
- EAS gives SOs the ability of declaring their System State to other SOs. There are five levels of System State:

Normal

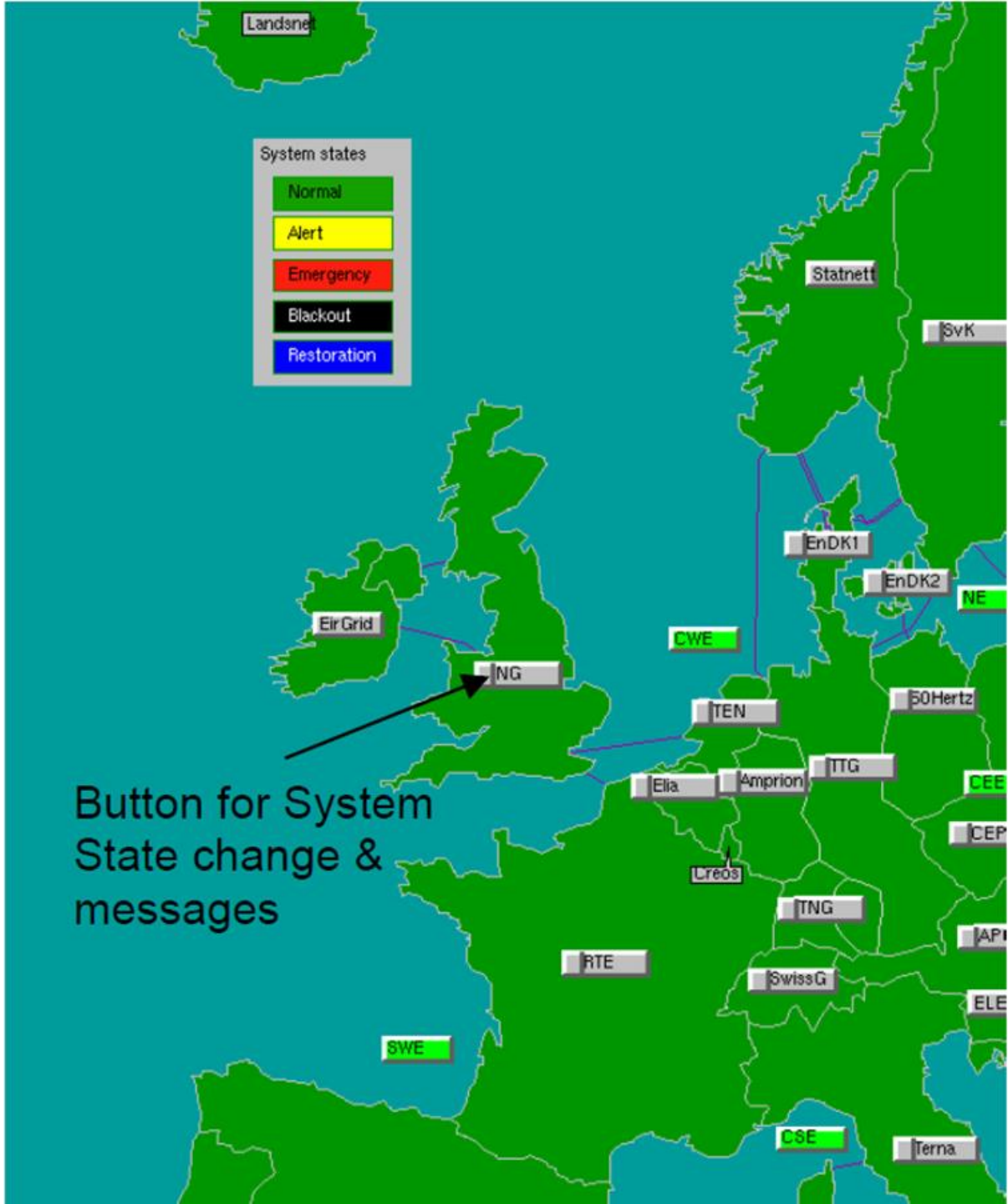
Alert

Emergency

Black-out

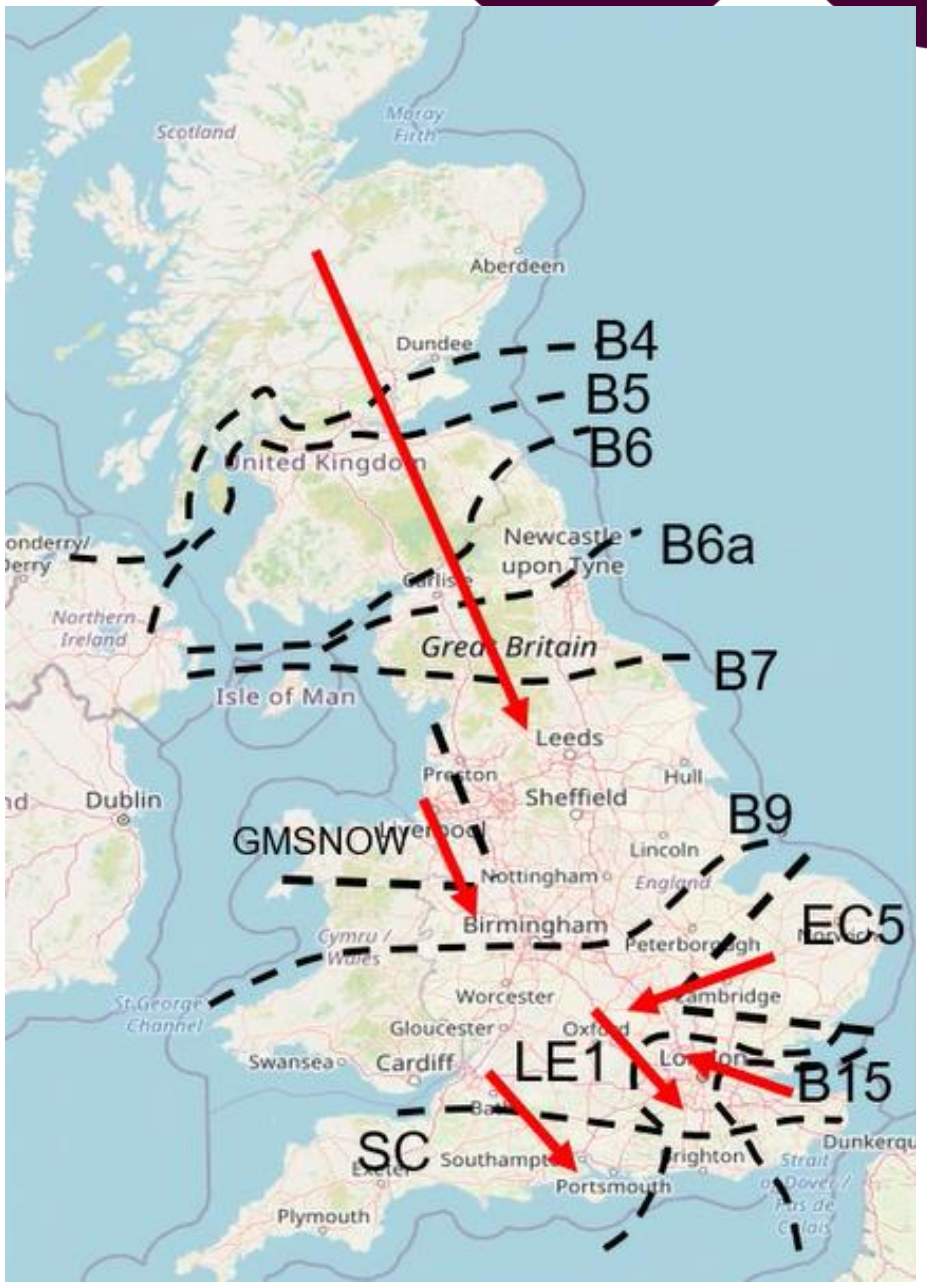
Restoration

The European Network of Transmission System Operators for Electricity (ENTSO-E) is an association representing electricity transmission system operators from countries across Europe.



Case Study 11/06/2024 [1]

- Active export transmission constraint on the system B15 (ESTEX) due to a combination of outages.
- B15 (ESTEX) limits flows from generation sources in the Thames Estuary region to the rest of GB, requiring a reduction of generation levels within the B15 (ESTEX) boundary.
- The constraint is managed by a combination of restrictions to wind and thermal plant and by market trading actions on the European interconnectors within the B15 (ESTEX) boundary.
- Due to issues with NESO trading systems, trades were unable to be secured between 1300–1400hrs. Due to low wind and limited options on thermal plant, there were no market-based options available to manage the B15 (ESTEX) constraint during this period.
- In order to secure the constraint, NESO had no alternative but to use enhanced/emergency actions.



Case Study 11/06/2024 [2]

- The GB system state was set to ‘Alert’ on the ENTSO-E Awareness System (EAS) at 1200hrs.
- An Emergency Assistance request to reduce import to GB by 800MW was agreed with RTE for the operational period 1300-1400hrs.
  - This was agreed with RTE due to France being a larger grid system & more likely to have sufficient volume available.
- A message was posted on the Elexon BMRS website System Warnings page at 12:50hrs (BST).

Warning date	Warning type	Message text
11/06/24, 11:48	Other	A request for Emergency Assistance has been agreed on a GB connected Interconnector. The requesting party was NGESO. GB net flow will decrease by 800 MW between 13:00 11/06/2024 to 14:00 11/06/2024. Issued by Gavin Brown at 12:50 on 11/06/2024

Your input appreciated….

Please email .box.NC.Customer@nationalenergyso.com with feedback or further questions.

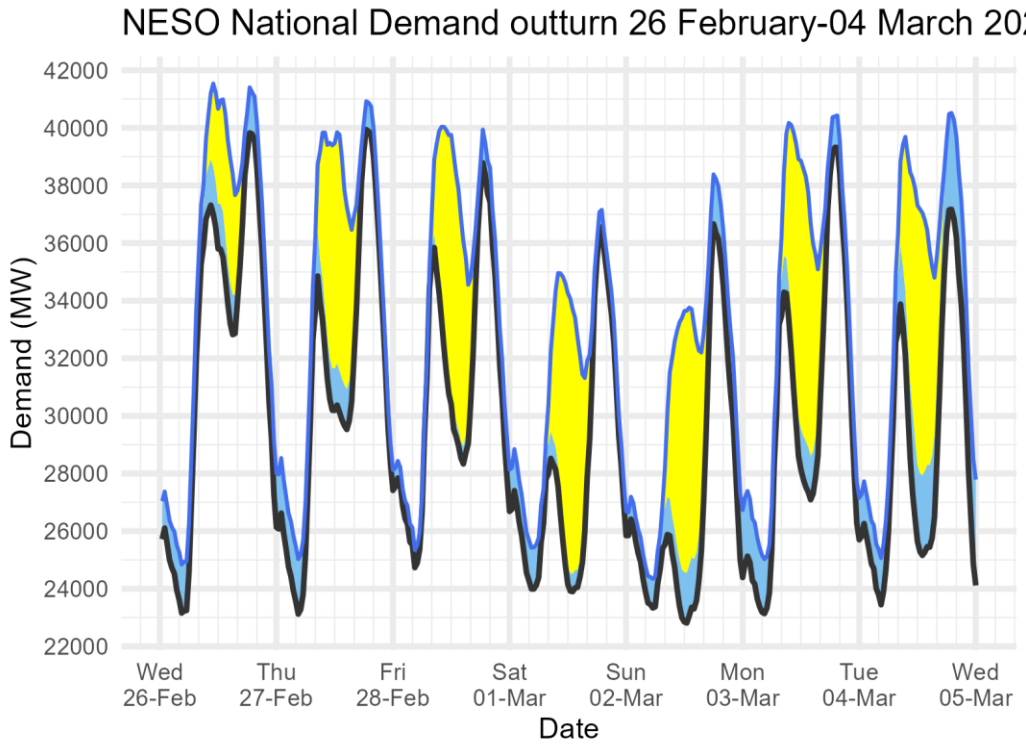
Previous interconnector-related OTF content:

- Settlements – 26th Feb 2025
- Managing Operational Margins - 15th Jan 2025
- Low Frequency Event – 17th Jan 2024

NESO
National Energy System Operator

Demand | Last week demand out-turn

Slido code #OTF



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 NESO has no real time data.

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

Distributed generation

Peak values by day

Date	OUTTURN	
	Daily Max Dist. PV (GW)	Daily Max Dist. Wind (GW)
26 Feb 2025	4.3	1.9
27 Feb 2025	8.2	1.9
28 Feb 2025	9.1	1.4
01 Mar 2025	9.5	1.4
02 Mar 2025	9.1	2.3
03 Mar 2025	9.3	2.3
04 Mar 2025	9.2	3.7

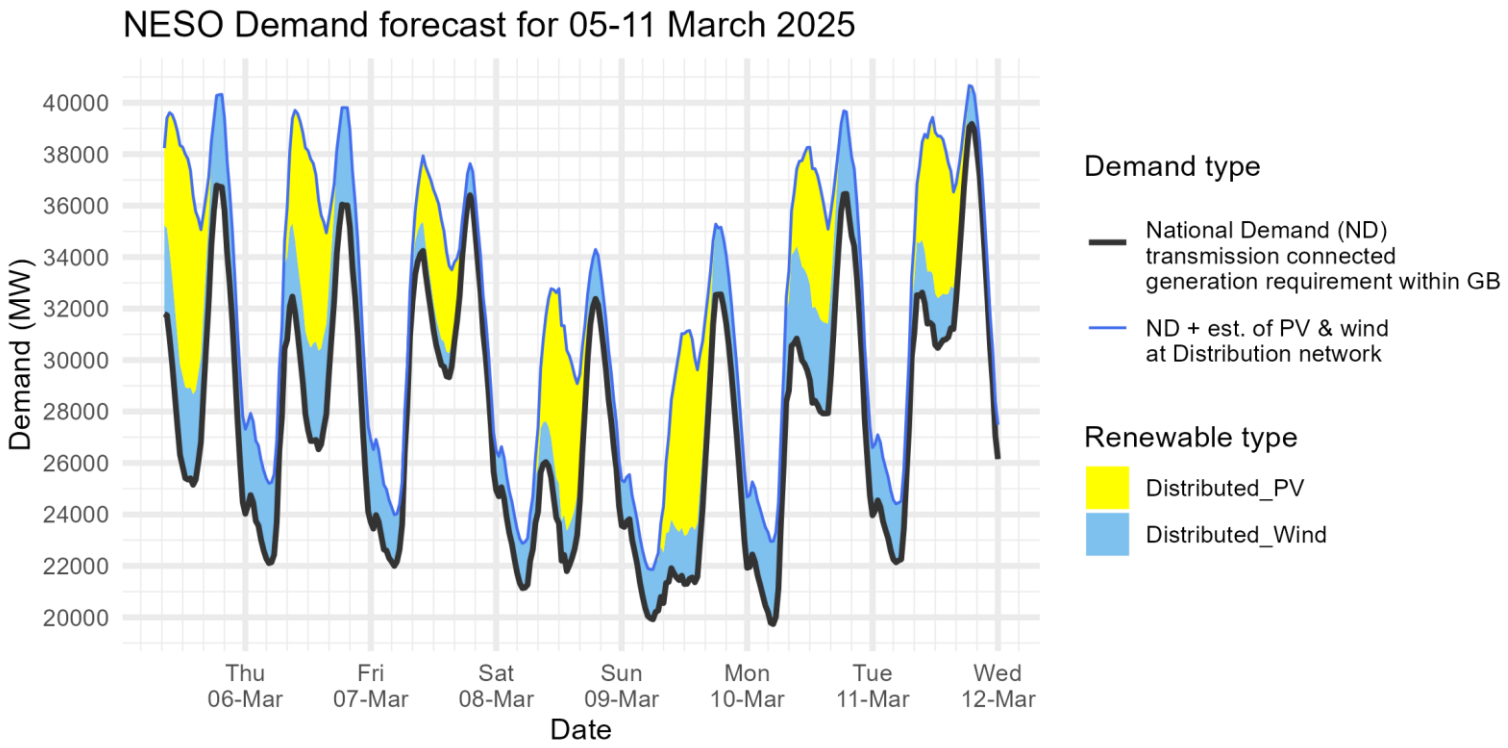
National Demand

Peaks and troughs

		FORECAST (Wed 26 Feb)		OUTTURN			
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)	National Demand (GW)	Triad Avoidance est. (GW)	N. Demand adjusted for TA (GW)	Dist. wind (GW)
26 Feb 2025	Evening Peak	39.6	1.5	39.8	0.0	39.8	1.4
27 Feb 2025	Overnight Min	23.0	2.2	23.1	n/a	n/a	1.9
27 Feb 2025	Evening Peak	40.8	1.2	39.9	0.0	39.9	1.0
28 Feb 2025	Overnight Min	25.1	0.9	24.7	n/a	n/a	0.6
28 Feb 2025	Evening Peak	38.8	1.3	38.8	0.0	38.8	1.0
01 Mar 2025	Overnight Min	23.1	1.6	24.0	n/a	n/a	1.4
01 Mar 2025	Evening Peak	36.3	0.9	36.6	0.0	36.6	0.6
02 Mar 2025	Overnight Min	22.6	1.0	23.3	n/a	n/a	1.0
02 Mar 2025	Evening Peak	36.3	1.9	36.7	0.0	36.7	1.7
03 Mar 2025	Overnight Min	22.0	2.4	23.1	n/a	n/a	1.9
03 Mar 2025	Evening Peak	38.8	2.2	39.3	0.0	39.3	1.1
04 Mar 2025	Overnight Min	22.0	2.9	23.4	n/a	n/a	1.6
04 Mar 2025	Evening Peak	37.3	3.7	37.2	0.0	37.2	3.3

Demand | Week Ahead

Slido code #OTF



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National Demand

Peaks and troughs

		FORECAST (Wed 05 Mar)	
Date	Forecasting Point	National Demand (GW)	Dist. wind (GW)
05 Mar 2025	Evening Peak	36.8	3.5
06 Mar 2025	Overnight Min	22.1	3.1
06 Mar 2025	Evening Peak	36.0	3.8
07 Mar 2025	Overnight Min	22.0	2.0
07 Mar 2025	Evening Peak	36.4	1.2
08 Mar 2025	Overnight Min	21.1	1.7
08 Mar 2025	Evening Peak	32.4	1.9
09 Mar 2025	Overnight Min	19.9	1.9
09 Mar 2025	Evening Peak	32.6	2.6
10 Mar 2025	Overnight Min	19.7	3.2
10 Mar 2025	Evening Peak	36.5	3.2
11 Mar 2025	Overnight Min	22.1	2.3
11 Mar 2025	Evening Peak	39.2	1.3

Operational Margins | Week Ahead

Slido code #OTF

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 NESO as of 22nd January 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 NESO needing to use its operational tools.

For higher surplus values, margins are expected to be adequate and there is a low likelihood of the NESO 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 NESO needing to use its tools, such as interconnector trading and 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	06/03/2025	41762	16730	5120	36650	19040
Fri	07/03/2025	40679	7070	5120	37370	11220
Sat	08/03/2025	39606	10390	5120	32900	18070
Sun	09/03/2025	39846	11460	5120	33330	17700
Mon	10/03/2025	41948	13120	5120	37380	17870
Tue	11/03/2025	42251	8120	5120	39700	11250
Wed	12/03/2025	42210	6520	5120	40570	8900

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

Margins do not include NESO enhanced or emergency actions

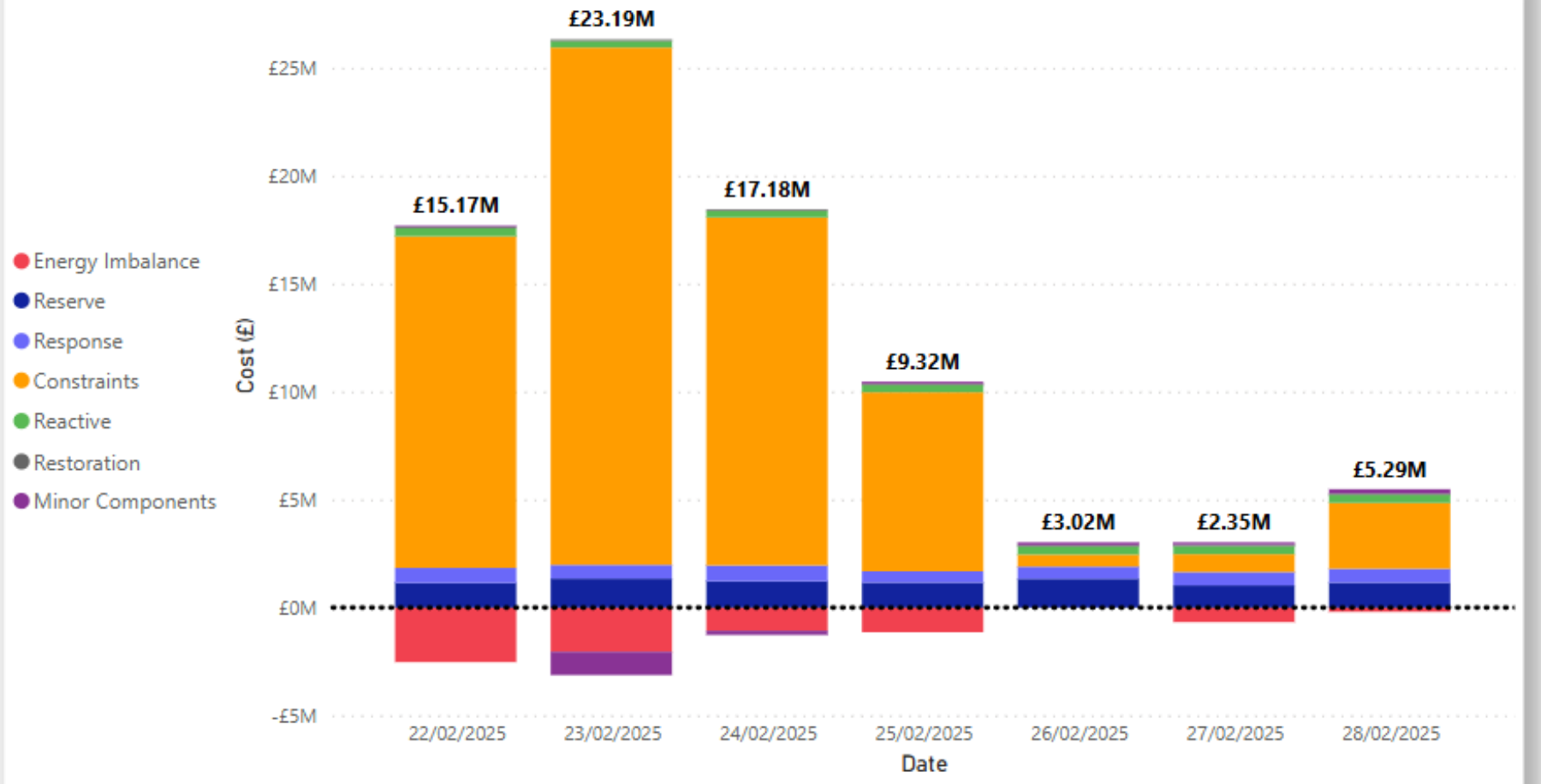
NESO National Energy System Operator

NESO Actions | Category Cost Breakdown

Slido code #OTF

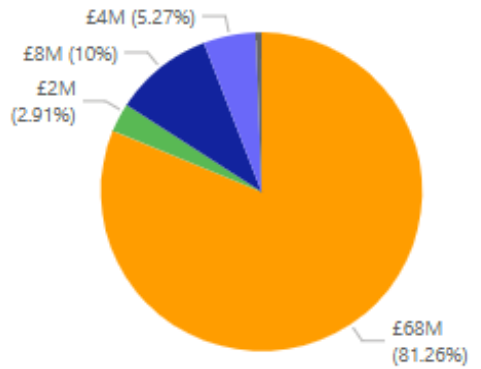
Date
22/02/2025 28/02/2025

Weekly Total Costs (£)	Last Week Total Costs (£)	Past 30-Day Average Costs (£)
£75.5M	£83.8M	£9.4M



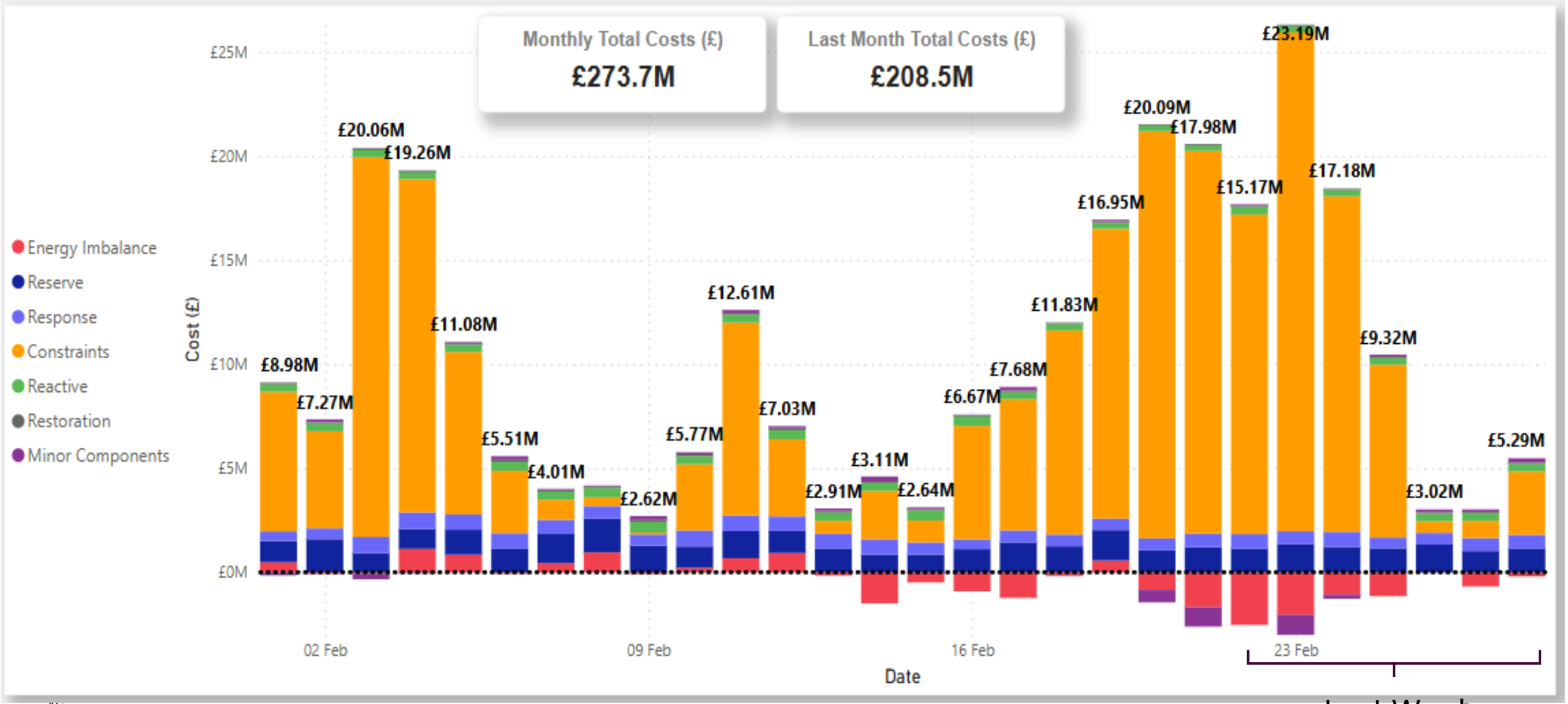
Date	Total Outturn Cost
22/02/2025	£15,169,830
23/02/2025	£23,190,646
24/02/2025	£17,176,064
25/02/2025	£9,319,979
26/02/2025	£3,021,027
27/02/2025	£2,346,947
28/02/2025	£5,286,231

Weekly Cost (£) and Share (%)



NESO Actions | Category Cost Breakdown

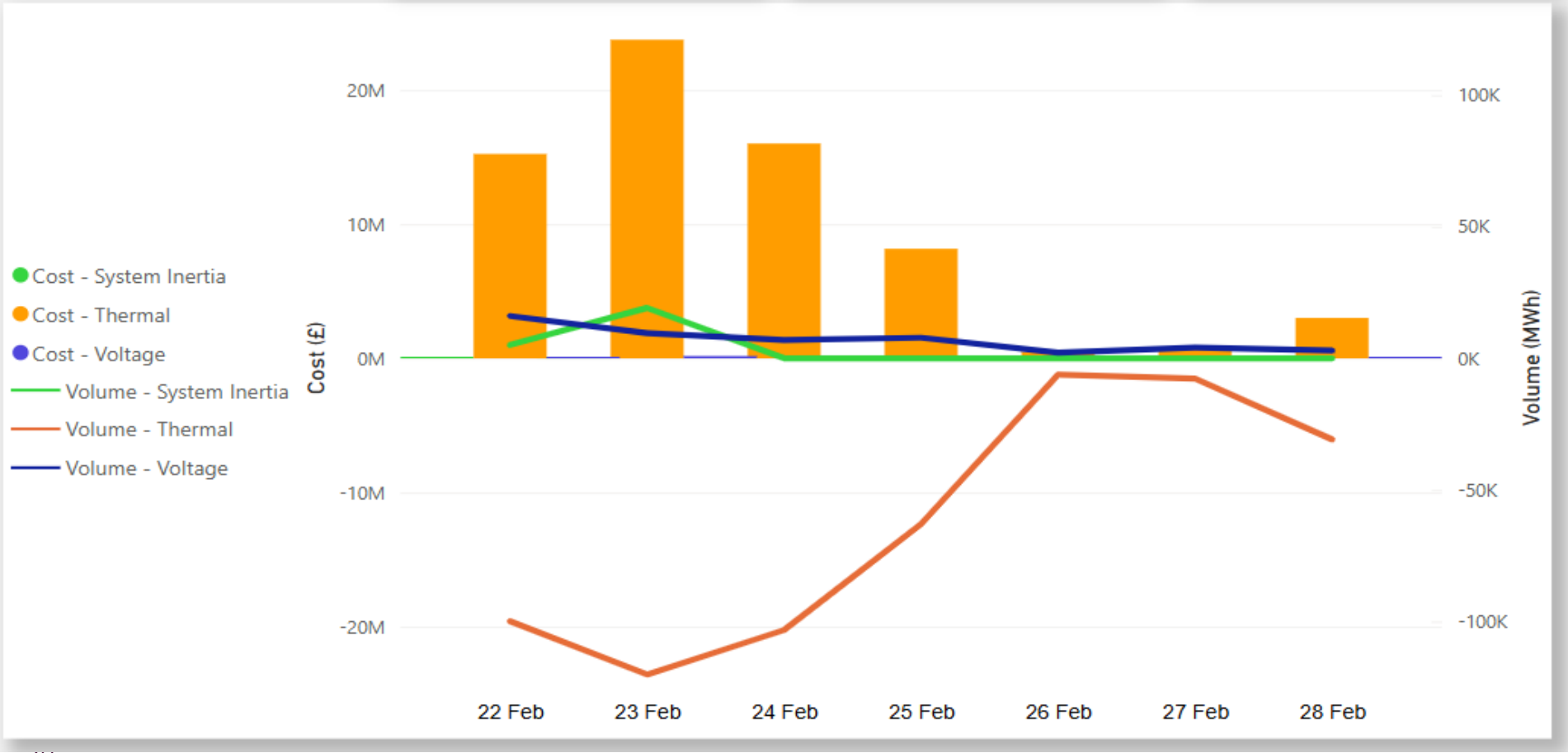
Slido code #OTF

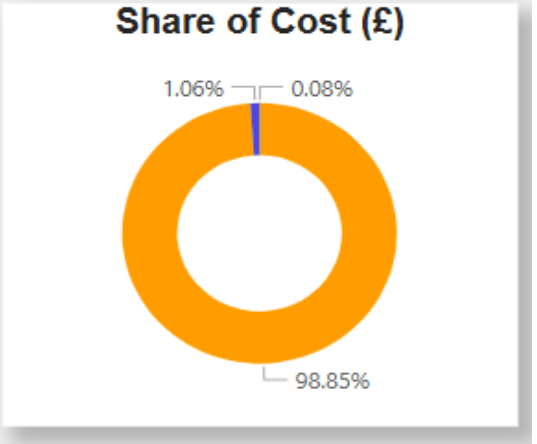


NESO Actions | Constraint Cost Breakdown

Date
22/02/2025 28/02/2025

Thermal Constraints		Voltage Constraints		System Inertia	
Costs (£)	Vol (MWh)	Costs (£)	Vol (MWh)	Costs (£)	Vol (MWh)
67.3M	-431.0K	724.7K	49.5K	56.4K	24.2K



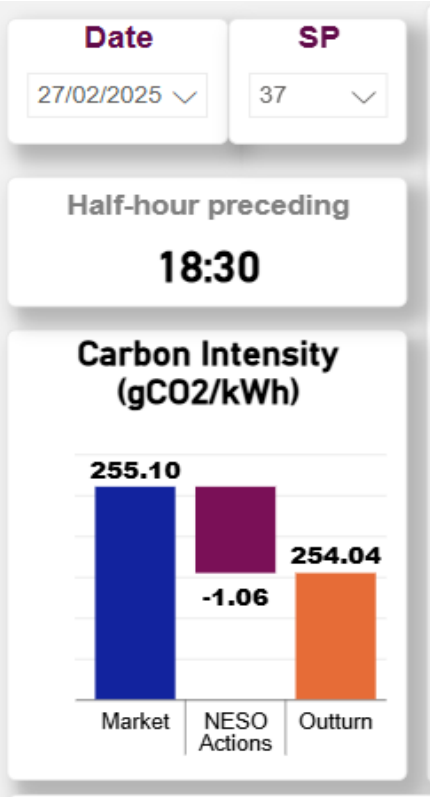


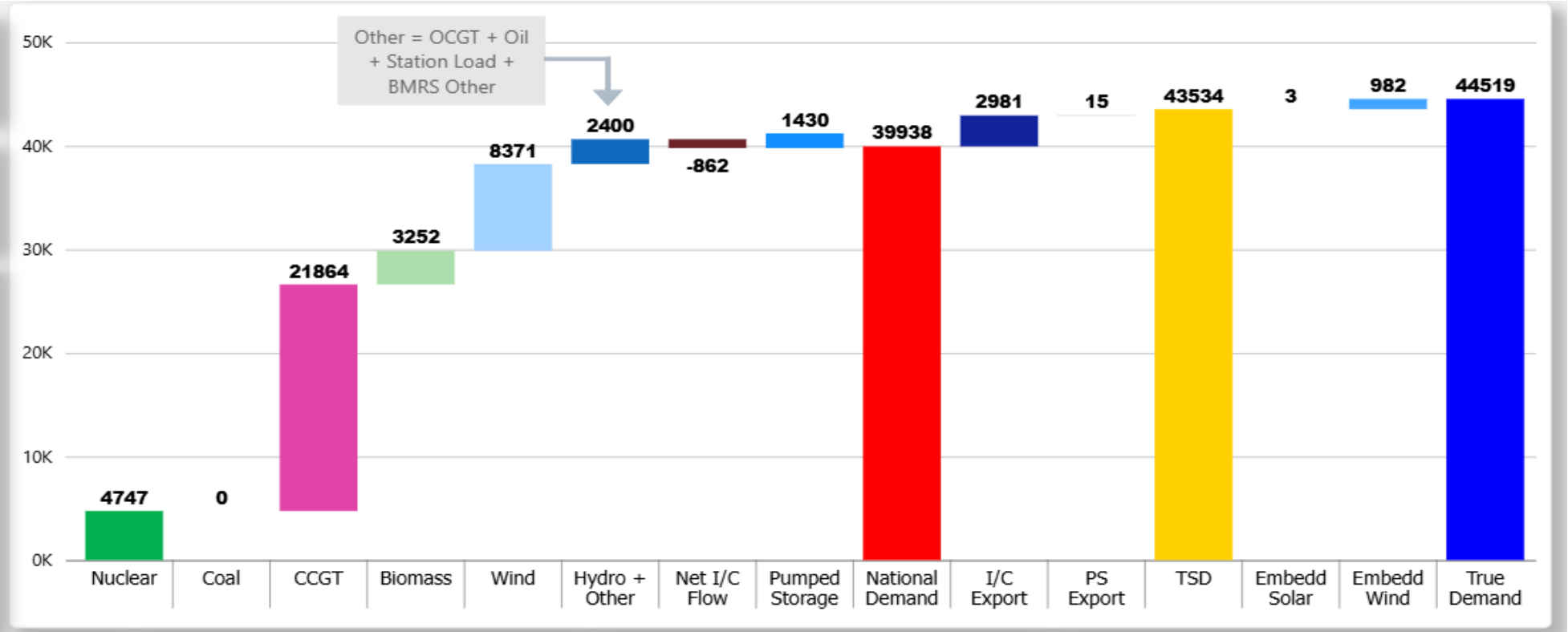
NESO Actions | Peak Demand – SP spend ~ £11k
Thursday 27th February

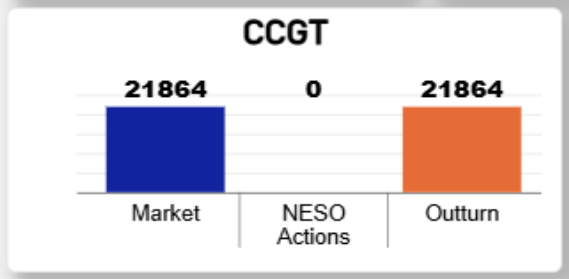
Slido code #OTF

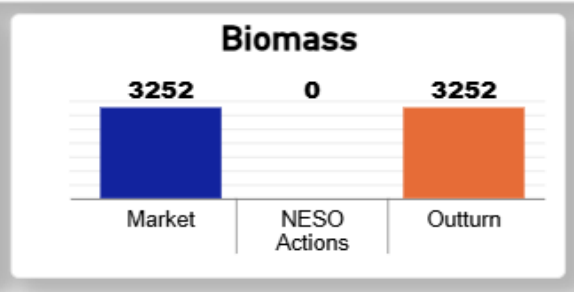
Date: 27/02/2025
SP: 37

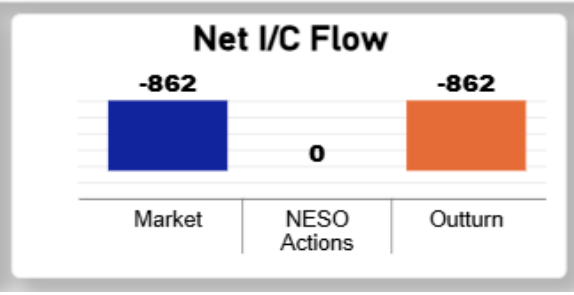
Half-hour preceding
18:30

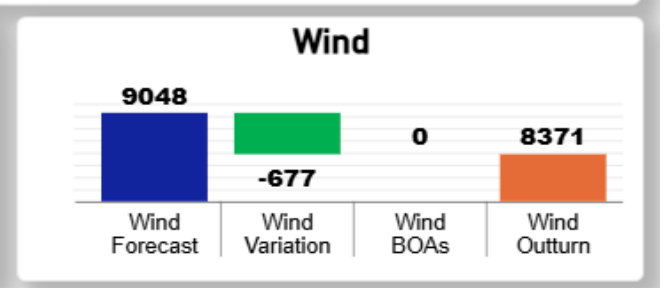






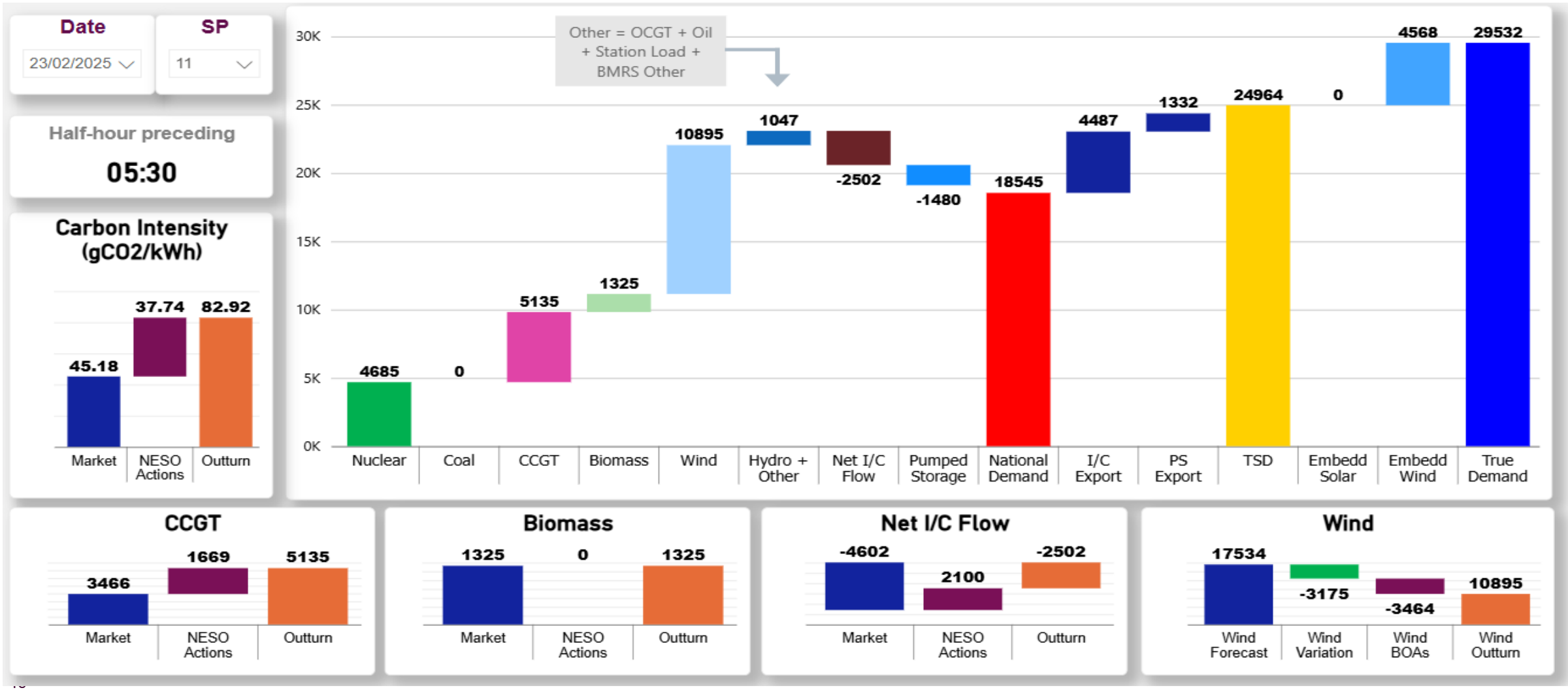






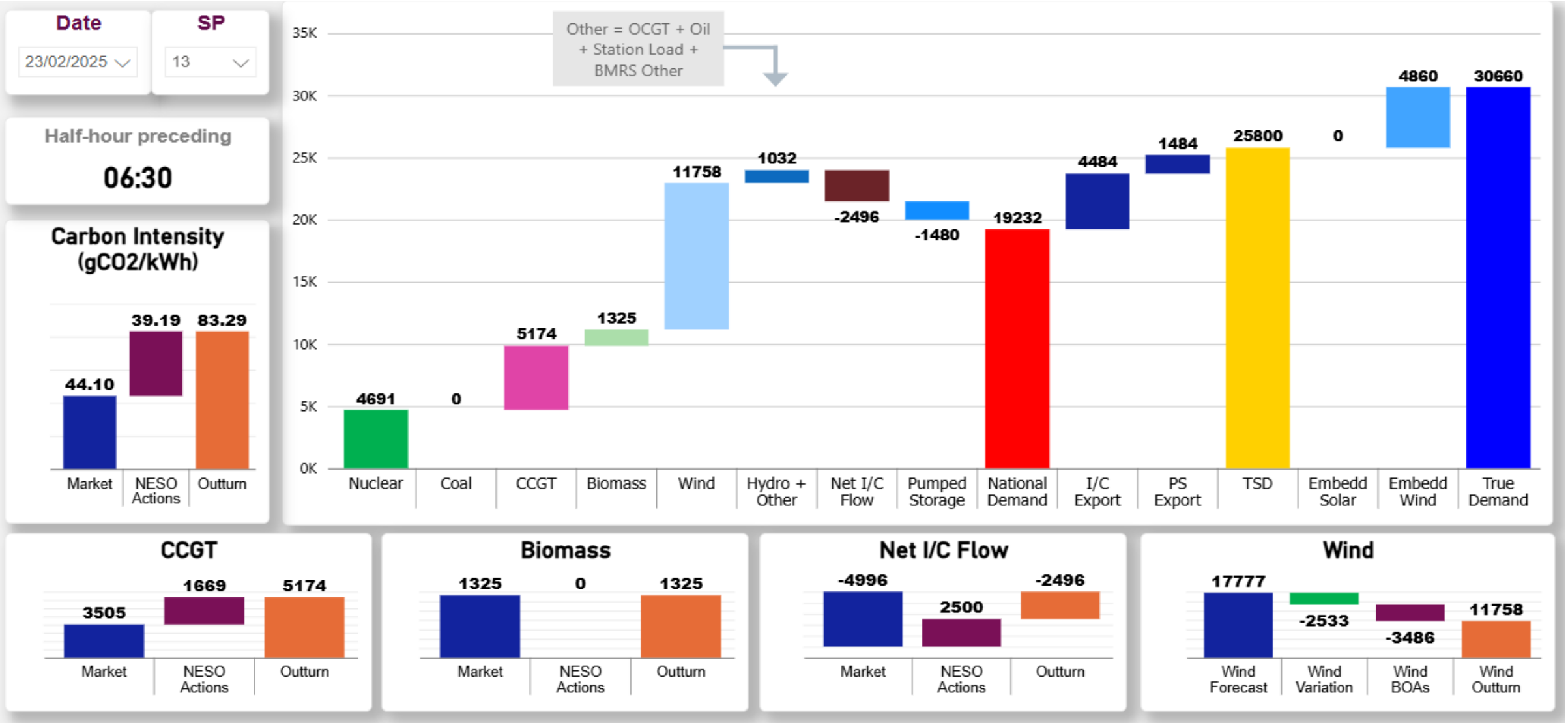
NESO Actions | Minimum Demand – SP spend ~ £600k
Sunday 23rd February

Slido code #OTF

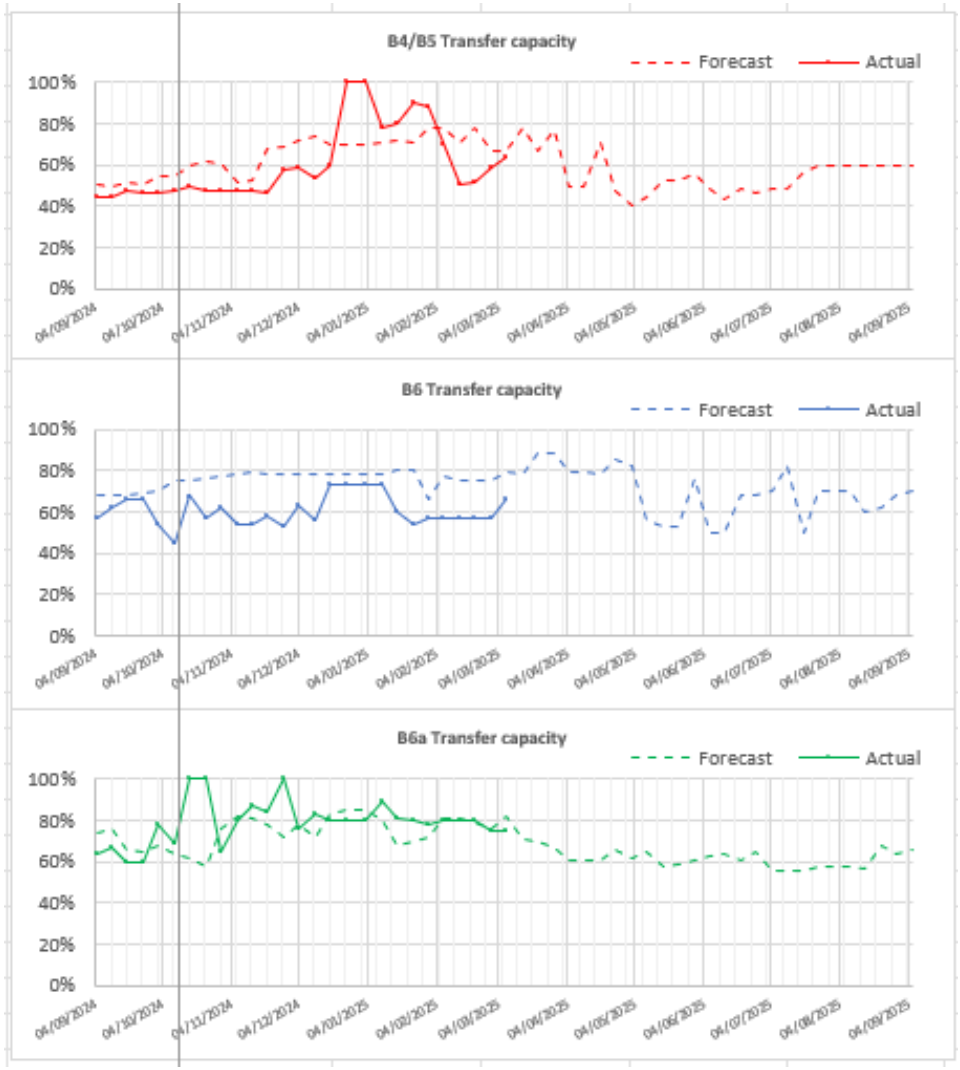


NESO Actions | – Highest SP spend ~ £619k
Sunday 23rd February

Slido code #OTF



Transparency | Network Congestion



Boundary	Max. Capacity (MW)	Current Capacity (%)
B4/B5	3400	64%
B6 (SCOTEX)	6800	66%
HARSPNBLY (B6a)	8000	74%
B7 (SSHARN)	9850	82%
GMSNOW	5800	47%
FLOWSTH (B9)	12700	71%
DRESHEX	9675	82%
EC5	5000	111%
LE1 (SEIMP)	8750	79%
B15 (ESTEX)	7500	100%
SC1	7300	71%

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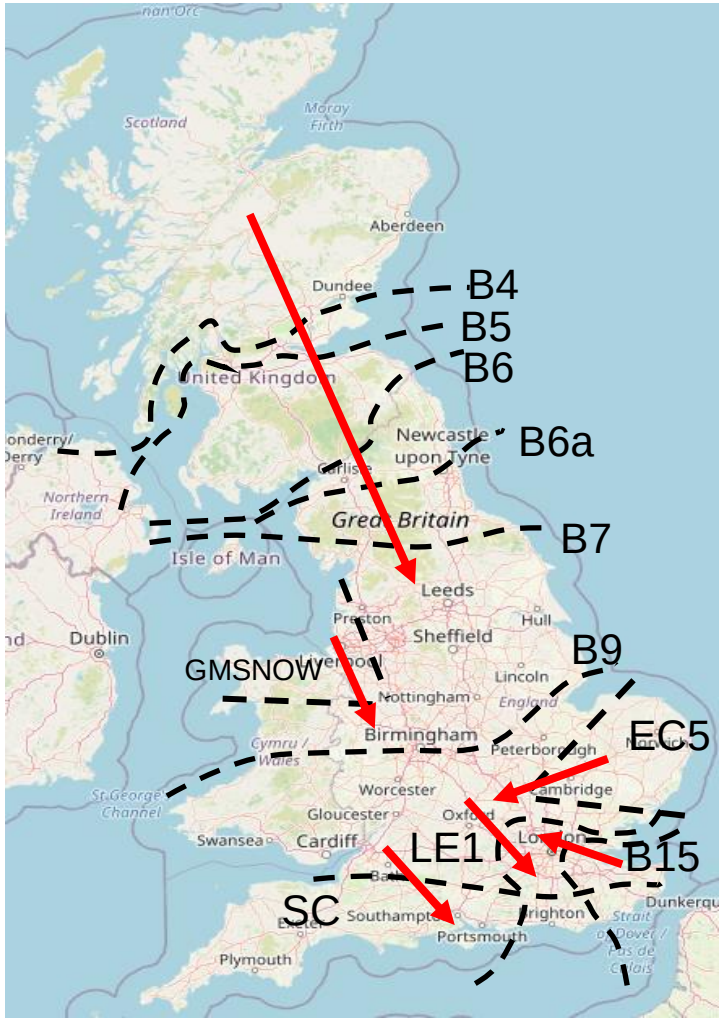
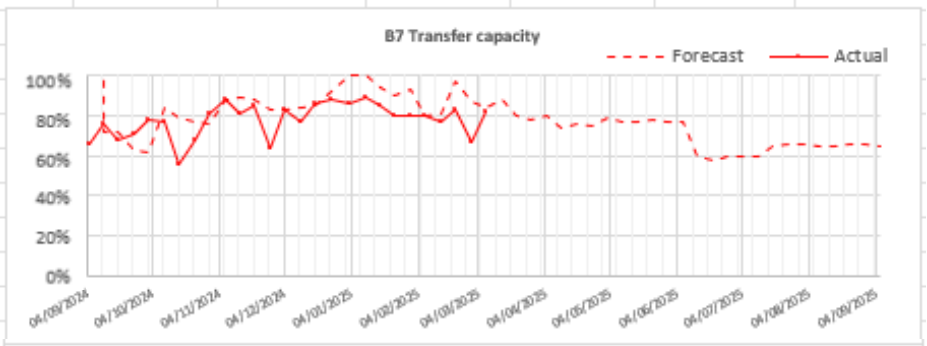


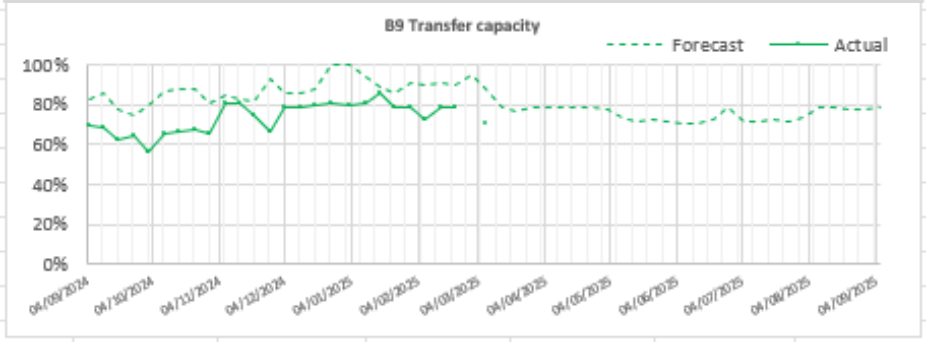
Day ahead flows and limits, and the 24-month constraint limit forecast are published on the ESO Data Portal: Constraints Management

(The forecast and day ahead limits may vary due to changes in the outage plan. The plan is reviewed periodically throughout the year to ensure we are optimising system conditions, whilst managing any necessary outage plan changes)

NESO National Energy System Operator

Transparency | Network Congestion





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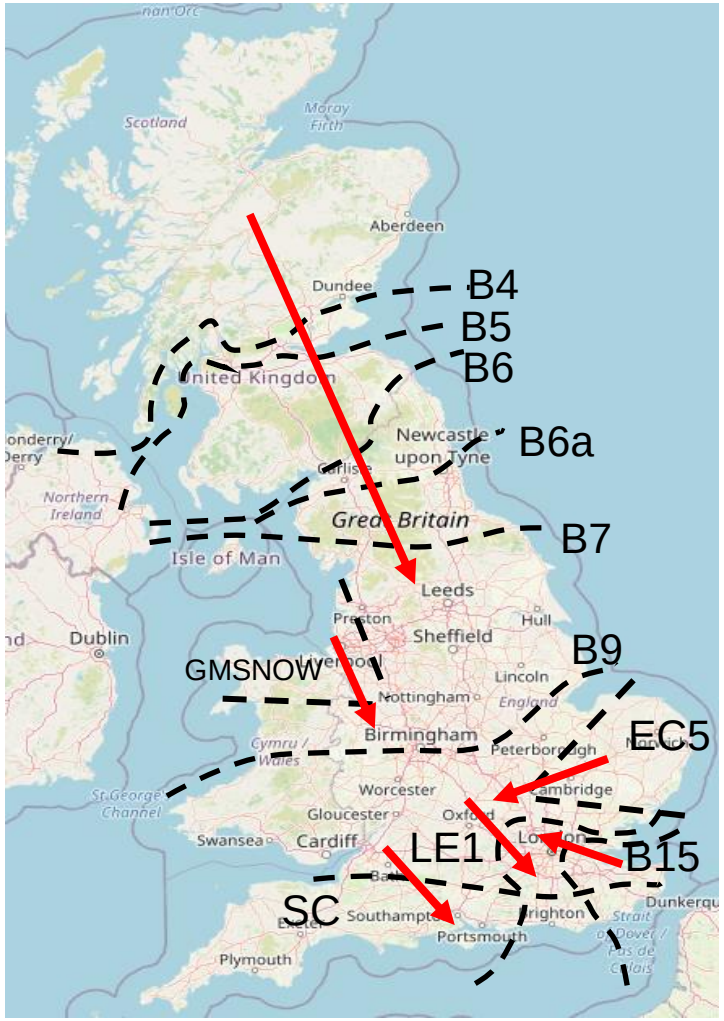

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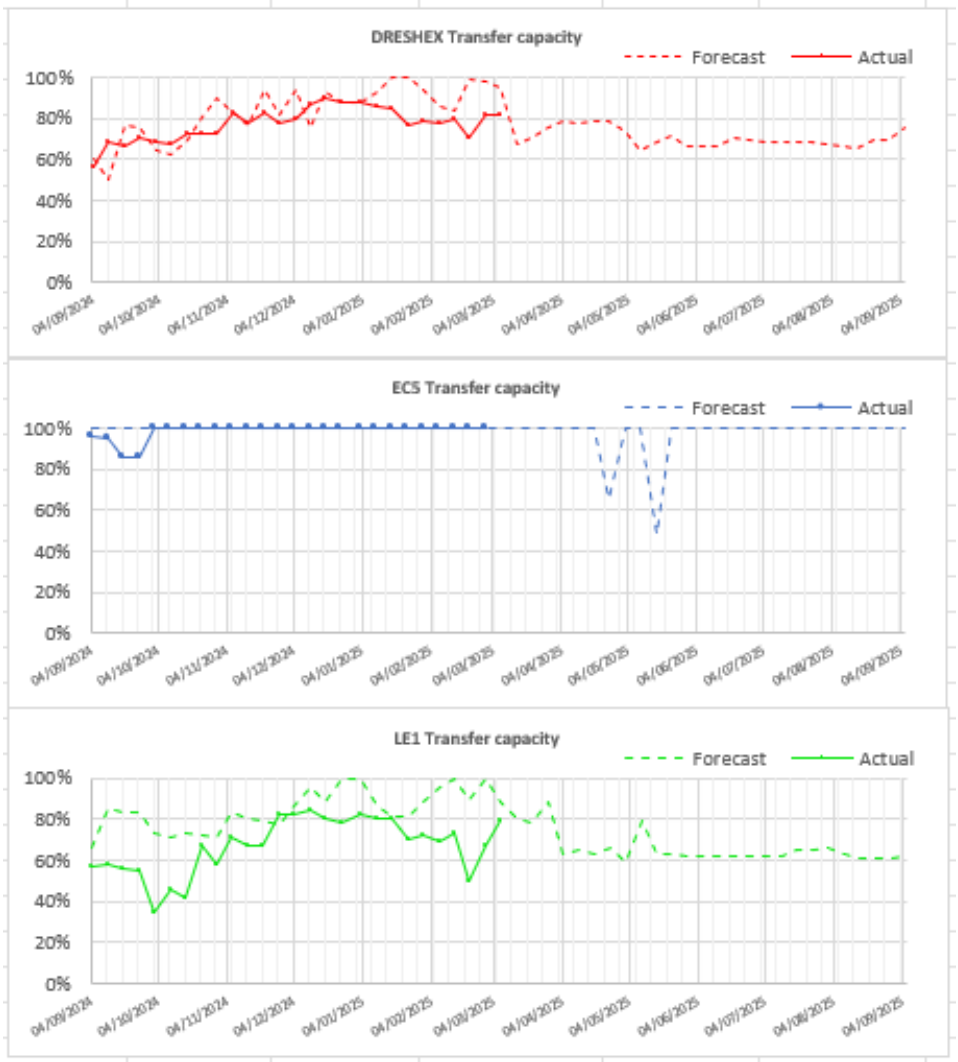

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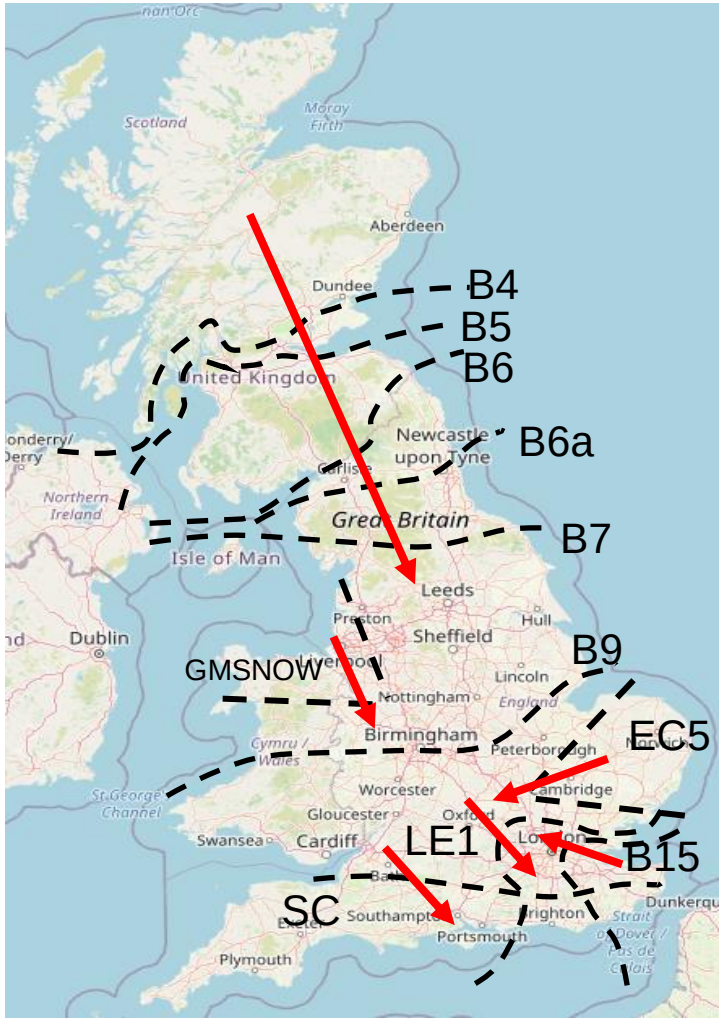

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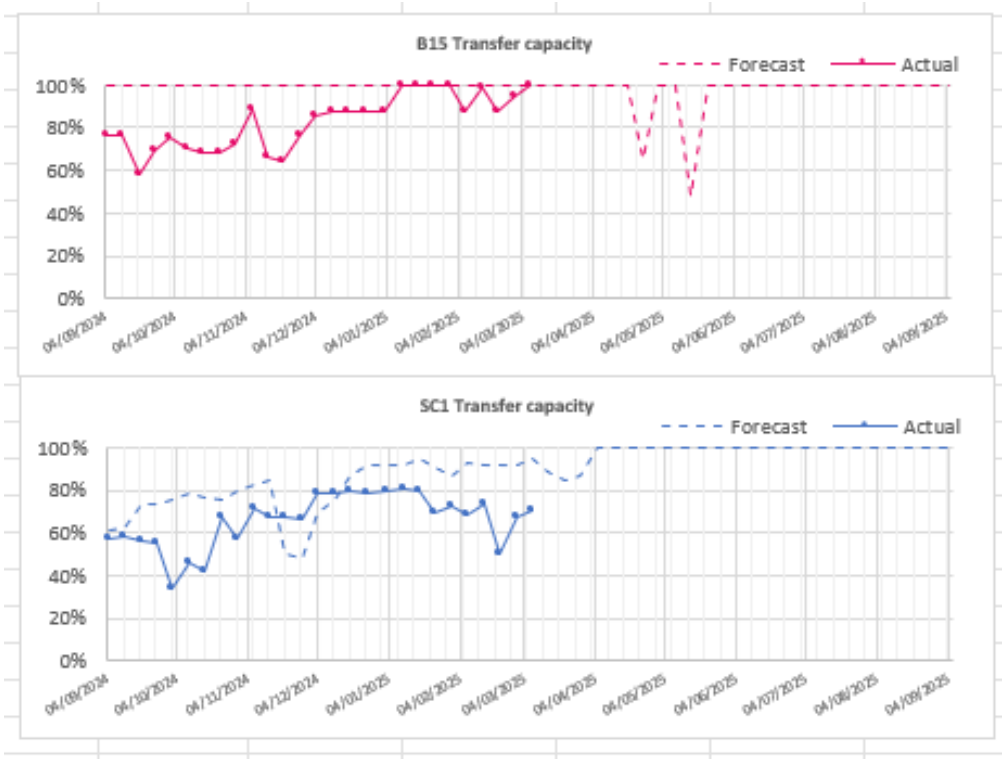

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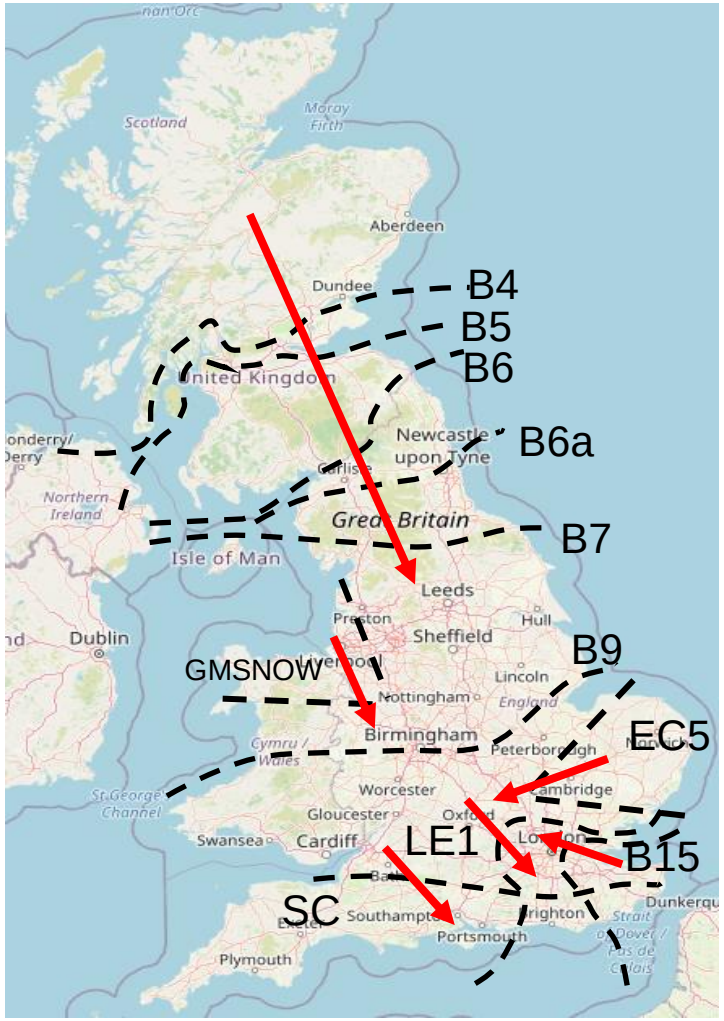

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NESO National Energy System Operator

Public

Skip Rates

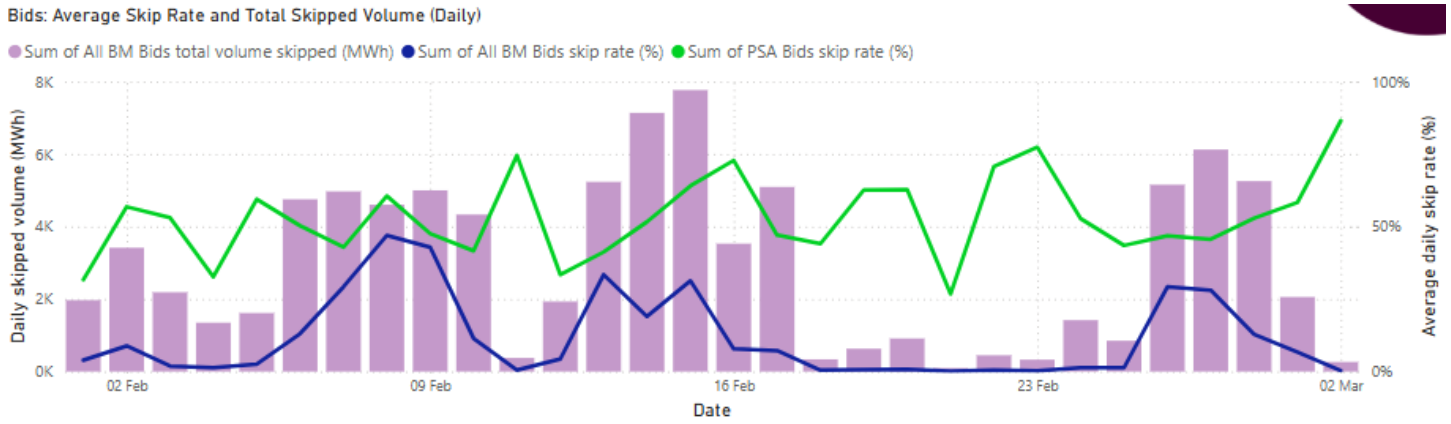
We are hosting a drop-in session to discuss the methodology & datasets on 12th March – please register here.

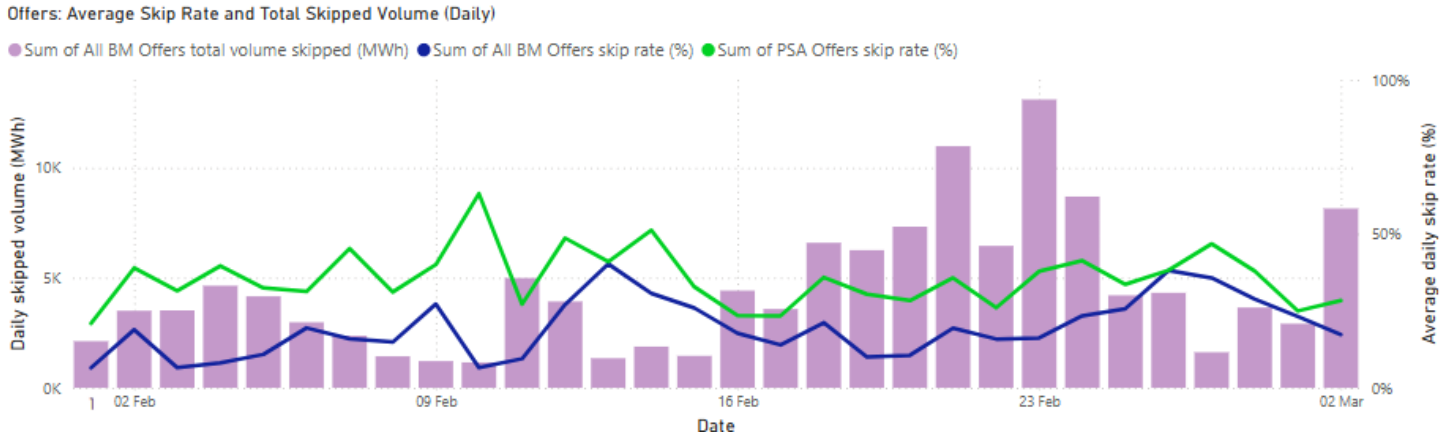
Slido code #OTF

We are now sharing the summary skip rate data on a rolling 4-week basis. We welcome your comments on if you find this valuable and feedback on how we present this data.

Weekly Average w/e	Offers - All BM	Offers - PSA	Bids - All BM	Bids - PSA
09/02	11%	35%	7%	49%
16/02	15%	33%	11%	50%
23/02	15%	32%	1%	51%
02/03	24%	34%	6%	49%

Monthly Average	Offers - All BM	Offers - PSA	Bids - All BM	Bids - PSA
January	18%	34%	11%	53%
February	15%	33%	5%	49%





Key Insights

2nd Mar: Low All BM bid skip rate and skipped volume, but high PSA bid skip rate – difference due to a high volume of system tagged actions and a low volume of energy actions.
w/e 02/03: Higher All BM offer skip rate (24%) than previous weeks due to less system actions. PSA offer skip rate is in line with previous weeks.

Note: due to size issues, both 'In Merit' datasets now have a separate file for each month. Based on feedback we intend to maintain this method of publishing the data.

Skip rate data and more info on skip rates and battery storage including methodology.

PSA: Post System Action

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Previously Asked Questions

Slido code #OTF

Q: (26.02.25) We have noticed a few instances over the last week where forward trades have been taken across the Irish interconnectors. These are System flagged and have a non-zero price. Are they correct, or are they likely to be removed in a future settlement run (possible, previous Ireland IC trades)?

A: As far as we're aware the SO-SO trades we have taken on Irish I/Cs recently are correct. If you have any specific concerns, please provide details to box.nc.customer@nationalenergyso.com

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Previously Asked Questions

Q: (26.02.25) For BSAD trades: is there an ex ante agreed basis by which prices for SO-SO trades that have been entered would subsequently be determined (e.g. by reference to published indices, market settlement data), or are you effectively writing a blank cheque at the time of making such trades?

A: SO-SO trade prices can be:

- Agreed and set ahead of real-time;
- Agreed with a fixed price during requesting stage; or
- Given as an indicative price during requesting stage

Indicative prices given by the supporting SO are either a calculated estimate of the average cost or highest cost of rebalancing actions required in their grid system, in order to provide support to GB.

SO-SO trade prices will be compared to available Balancing Mechanism costs and internal actions when making decisions.

Previously Asked Questions

Q: (26.02.25) When doing modelling on future pathways in FES or REMA, does the model account for the cost of scenarios on consumers - more specifically, how much cost consumers are willing to take until they start to push back on net-zero policies? Would be interested to know how this is considered

A: FES – Future Energy Scenarios

Our pathways must meet legally binding emissions reductions targets and net zero which means setting out ambitious uptake curves of new technology.

Our road transport and heat models look at the total cost of ownership of new technologies. The heat model also considers consumer willingness to pay. We vary the consumer willingness to pay across our pathways, but with lower consumer willingness to pay, it is necessary to increase the level of subsidies available in the model to achieve the roll out needed to meet legally binding emissions reductions.

Cost to consumers can be reduced through policy and energy efficiency improvements. We have recently conducted a heat survey which included exploring consumer willingness to pay. The results are expected to be published before the next FES and we will take insights from this to inform our recommendations in this area.

Future Energy Scenarios (FES) | National Energy System Operator

Advance Questions

Slido code #OTF

Q: (25/02/2025) Moyle BSAD trades have come back again. We had this issue last year and NESO assured market that a fix was identified and put in place. We had multiple Moyle BSAD buys reported via DISBSAD and fed into Cashout on 24th and 25th Feb. I assume NESO will be removing these Moyle trades from BSAD in near future. Can NESO provide a proper fix to this issue? It affects all market participants as it might provide incorrect view of NIV and cashout price.

A: We have investigated these trades and don't believe it's a system issue as they are in fact genuine trades. We are finalising the costs and plan to resubmit any required BSAD by the end of this week.

Outstanding Advance Questions

Slido code #OTF

Q: (28.02.2025) NESO previously stated that there was no appetite to procure any negative BR until later in the year. As we move further into 2025, when can we expect NESO to address this topic again? Will the market be notified beforehand? Thanks.

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Outstanding Questions

Slido code #OTF

NESO teams are still working to answer these questions

Q: (29.01.2025) NESO only send IPs to the BMU – this is a limitation of EDL - was this not meant to be resolved in the EBS1 2010 system refresh parties paid for?

Q: (26.02.2025) What was the level of flexible line ratings used during the periods of high constraints and low network availability over the last weeks? What is being done to accelerate network availability?

Q: (26.02.2025) Please could you address the flexible line rating question next time. This refers to utilising flexible boundary capacities based on temperature/ wind cooling. Thanks

Q: In terms of weekly balancing costs. The cost is often compared to the previous week. It could be more beneficial to compare with the corresponding week or month in the previous year in terms of the trend

Reminder about answering questions at the NESO OTF

Slido code #OTF

- **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. Details in the appendix to the pack.
- **The OTF is not the place to challenge the actions of individual parties** (other than the NESO), and we will not comment on these challenges. This type of concern can be reported to the Market Monitoring team at: marketreporting@nationalenergyso.com
- **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.
- **Slido will remain open until 12:00**, even when the call closes earlier, to provide the maximum opportunity for you to ask questions.
- **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.neso.energy/what-we-do/systems-operations/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 NESO 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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slido

Audience Q&A

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

Appendix

Purpose and scope of the NESO Operational Transparency Forum

Slido code #OTF

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 NESO 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
NESO operational approach & challenges
NESO 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 NESO Control Room actions & decision making
Activities & operations of particular market participants
NESO policy & strategic decision making
Formal consultations e.g.: Code Changes, Business Planning, Market development

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Managing questions at the NESO Operational Transparency Forum

Slido code #OTF

- OTF participants can ask questions in the following ways:
  - Live via Slido code #OTF
  - In advance (before 12:00 on Monday) at https://forms.office.com/r/k0AEfKnai3
  - At any time to box.nc.customer@nationalenergyso.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 | NESO
- **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 NESO 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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Skip Rates – 'In Merit' datasets

We recognise that these datasets aren't as intuitive as they could be – specifically the column headings. Please be reassured that we are looking at ways to improve this - we will update the documentation to include this information and will also discuss the datasets in more detail at the webinar on 27th February.

We will use 'accepted' and 'instructed' differently in this context, even though they are normally the same.

These datasets show the units that should have been instructed if decisions were solely based on price, rather than all units that were instructed. Therefore this dataset does not match the total accepted volume datasets in Elexon.

In Merit Volume = Accepted Volume + Skipped Volume

In Merit Volume
- This is the recreated in merit stack showing the lowest cost units that were available to meet the requirement, where the requirement is based on the volume of units that were actually instructed
- Therefore this is the volume that should have been accepted if decisions were solely based on price
- The sum of this column is the total instructed volume in the 5 minute period (subject to the relevant exclusions)

Accepted Volume
- This is the volume that was accepted in merit, as a subset of the 'In Merit Volume' column – i.e. how much volume was accepted in merit
- The sum of this column will be less than the sum of the 'In Merit Volume' column, unless there is no skipped volume
- Note: this column does not list all instructed units

Skipped Volume
- This is the volume that was skipped, as a subset of the 'In Merit Volume' column – i.e. of the volume that we should have instructed, how much was skipped

It's possible that the list of units increases, decreases, or stays the same between stages, but the total 'In Merit Volume' will always remain the same (or no volume is excluded) or decrease (due to exclusions).