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

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
- Questions from last week
- Business continuity
- Demand review and outlook
- Costs for last week
- Constraints

### Focus Areas
- Digitised Whole System Technical Code
- Scotland Voltage Oscillations
Questions outstanding from last week

Q: Considering the prices accepted for month ahead ffr why is week ahead ffr being capped artificially so far below these rates?
A: The market information report was published 26/10/21 on our data portal.

Q: Can we have a deep dive on BSADs please?
A: Yes – we’ll add this to our list.

Q: It appears that interconnectors have recently been traded to reduce input to UK at prices less competitive than available from UK pumped storage - why is that? Is it lack of flexibility on interconnectors or some other reason?
A: We trade for a variety of operability reasons on the interconnectors, can you provide specific dates for this occurrence please?

Q: Please could you let people know in advance of the day if DM & DR will be covered and not leave it to 4 mins before the session ends?
A: We’ll signpost on the OTF future slots slide

Q: Are we decarbonising the system too quickly and before the ESO/ Grid’s can catch up new renewable generation given there is 29y until 2050. This is causing excessive costs and system issues with a more fragile system. How much more is ESO’s 2025 zero Co2 ambition costing consumers than say in 2028?
A: Through the connect and manage regime we have the fastest decarbonising grid in the World, through this, the impact on TNUoS charges has moved to increased BSUoS costs, through higher constraint costs, as well as increased operational actions required to manage renewable generation. However, increased renewable generation means lower wholesale electricity prices overall.

More answers to questions being posted next week.
Future forum topics

While we want to remain flexible to provide insight on operational challenges when they happen, we appreciate you want to know when we will cover topics.

We have the following deep dives planned:

10th November:
Market Monitoring Team introduction
Protecting critical staff to maintain critical operations

Operational areas restricted & critical staff protected

Enhanced shift rota

Majority of employees WFH

Industry engagement

Pandemic Plans Activated

Lockdowns

Office access for essential reasons

Awareness of potential for local lockdowns/spikes in infection

Gradual reoccupation

Restrictions to operational areas relaxed

Reviewing lessons learnt & building into BAU

Identify & respond to system operability challenges

Post-Pandemic
Demand | Triad Avoidance (TA)

The Triads are the 3 half hour settlement periods with highest system demand between 1st Nov and the end of Feb Have to be separated from each other by a minimum of 10 clear days

Demand shape over the peak time interval, from 17:00 to 19:30GMT, is going to be flattened. Sometimes the avoidance activity starts before 17:00.

First time ESO shares its TA adjusted National Demand forecast is after 21:00 on D-1

As the a result of the “Embedded benefits” changes ESO anticipates lower than previous years triad avoidance volumes. Maximum expected TA during winter 2021/22 is 1200MW.

Indicative peak demand (operational metering)
On Elexon’s website shows the Transmission System Demand (TSD): ND + station load + pumping + I/C export *operational metering
The black line (National Demand) is the measure of portion of total GB customer demand that is supplied by the transmission network.

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

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.
ESO Actions | Monday 25 October Peak

Date: 25/10/2021
SP: 37

Carbon Intensity data on data portal: 
ESO Actions | Sunday 31 October Minimum

Date: 31/10/2021
SP: 13

Tuesday 26th and Sunday 31st October were the most expensive days with daily spend of nearly £14m in both cases.

Sunday 31st was 25 hours long due to clock change

**Constraints** actions were the main drive for the high spend days. Prevalently windy weather over the first three days of the week and Sunday as well. This was requiring high volume of BM actions to buy off generation in Scotland to manage thermal constraint.

Other category costs were relatively stable throughout the week

**Past 30 Days Average added**
Thermal
Between Monday and Wednesday, high volume of actions required to manage thermal constraints, particularly in Scotland.

Voltage
Action required to synchronise generation to meet our voltage requirements throughout the week.

Managing largest loss for RoCoF
Action required to manage largest loss on interconnectors on Sunday.

Increasing inertia
Intervention required to increase minimum inertia between Thursday and Sunday.

https://data.nationalgrideso.com/balancing/constraint-breakdown
Transparency | Constraint Capacity

B6 transfer capacity
  - Forecast
  - Actual

B7 transfer capacity
  - Forecast
  - Actual

B2/B4 transfer capacity
  - Forecast
  - Actual

Week commencing

22 Mar | 19 Apr | 17 May | 14 Jun | 12 Jul | 09 Aug | 06 Sep | 04 Oct | 01 Nov | 29 Nov | 27 Dec | 24 Jan | 21 Feb | 21 Mar

Map showing Great Britain with cities and counties demarcated.
Operational Margins:
OTF

3 November 2021
Operational Margins: week ahead
From 4 November to 10 November

Operational margins measure the situation in the Control Room before operational tools are utilised to ensure enough generation. Margins are adequate for next 7 days. Driven by high wind generation and returning conventional plant. We hope that, if margins are low, generators could respond by changing outage plans.

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Notified Conventional Generation (MW)</th>
<th>Forecast Wind (MW)</th>
<th>Forecast Interconnector Availability (MW)</th>
<th>Forecast Peak Demand (MW)</th>
<th>Forecast Surplus (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thu</td>
<td>04/11/2021</td>
<td>42076</td>
<td>8804</td>
<td>1900</td>
<td>43251</td>
<td>4785</td>
</tr>
<tr>
<td>Fri</td>
<td>05/11/2021</td>
<td>42411</td>
<td>5191</td>
<td>1900</td>
<td>41255</td>
<td>3655</td>
</tr>
<tr>
<td>Sat</td>
<td>06/11/2021</td>
<td>41975</td>
<td>14977</td>
<td>3900</td>
<td>35782</td>
<td>17145</td>
</tr>
<tr>
<td>Sun</td>
<td>07/11/2021</td>
<td>43030</td>
<td>14247</td>
<td>3900</td>
<td>37651</td>
<td>16265</td>
</tr>
<tr>
<td>Mon</td>
<td>08/11/2021</td>
<td>44779</td>
<td>6512</td>
<td>3900</td>
<td>41454</td>
<td>8466</td>
</tr>
<tr>
<td>Tue</td>
<td>09/11/2021</td>
<td>44973</td>
<td>9918</td>
<td>3900</td>
<td>41629</td>
<td>11423</td>
</tr>
<tr>
<td>Wed</td>
<td>10/11/2021</td>
<td>44953</td>
<td>9350</td>
<td>3900</td>
<td>43085</td>
<td>9358</td>
</tr>
</tbody>
</table>

The table above shows the input table into the model, but the model is more complex than a simple sum.
Operational Margins: change in generator availability
Delta from 11 Oct to 01 Nov

Total generator availability has increased by up to 500MW across all winter months
Operational Margins: Credible scenario range
Data as of 01 Nov

Operational margins measure the situation in the Control Room before operational tools are utilised to ensure enough generation. They indicate the likelihood that such tools might have to be utilised. Tools range from the issuing of market notices, to discussions with generators to change outage plans.

Lower margin periods are possible from the end of November to end of January, excluding the Christmas period.
Digitalised Whole System Technical Codes (WSTC) Webinar

**Purpose of this discussion**

1. To share and discuss the high level scope of the consultation paper
2. To signpost additional opportunities to engage with the digitalised WSTC project
Introduction

Refer to consultation section 2: Introduction

The digitalised WSTC project seeks to digitalise and consolidate or align technical codes through an industry-led approach.

- The Ofgem/BEIS Energy Codes Reform recommends code simplification and consolidation
- Stakeholder feedback is that the technical codes are lengthy, overly complex, and are structured differently across Transmission and Distribution – creating a barrier to market participation and difficulty in navigation
- This ambition was supported by stakeholders and Ofgem as part of the ESO RIIO2 business plan
- NGESO has consulted at various industry forums since June 2021 to gather initial input on the scope, objectives and approach for this consultation and the wider project. The information gathered from the engagements at these forums has been used to inform this consultation.

Q1. What challenges do you have with using the technical codes?
Q2. Where there are challenges, please provide examples of areas where you would like to see change.
Potential Solutions

Refer to consultation section 3.1: Whole System Consolidation or Alignment

- Do nothing
- Align technical codes on key issues
- Develop an overarching WSTC and retain existing codes
- Develop a single WSTC

Q3. Are there further advantages and disadvantages of the potential solutions above?
Q4. Which of the issues identified in section 2, (or by yourself in answer to Q1) would be addressed by each of the solution options?
Q5. Are there additional potential solutions for whole system alignment which could deliver value?
Potential Solutions

Refer to consultation section 3.2: Digitalisation

1. Do nothing
2. Enable self-service
3. Self-service with cross-code signposting
4. AI driven platform

Q6. Are there additional potential solutions for digitalisation that could deliver value?
Q7. Which of the potential solutions for digitalisation do you see as providing the most benefit?
Q8. What risks and/or opportunities do you see in digitalising codes in parallel to work on code alignment, potential consolidation, and the Energy Codes reform programme? Please also share your views on how best to mitigate these risks.
Q9. Do you think the digitalised codes should be legally binding or for guidance only? Why?
Potential Solutions

Refer to consultation section 3.4: Work that can progress independently of the ECR outcome

- Simplification & rationalisation of Distribution Code (& ERECs) and Grid Code separately
- Identifying areas where the Distribution Code (& ERECs) and Grid Code can be aligned
- Digitalising the Distribution Code (& ERECs) and Grid Code separately
- Inclusion of SQSS in the Grid Code
- Inclusion of P2/7 in the Distribution Code

Q10. Do you see value in progressing these work packages independently of the ECR and do you think they should be progressed?

Q11. Are there other opportunities that could be considered?
## Potential Solutions

Refer to consultation section 3.5: Delivery of Solutions

<table>
<thead>
<tr>
<th>Whole system alignment independent of ECR</th>
<th>Code consolidation/alignment or creating new codes</th>
<th>Digitalisation of codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Deliver modifications through existing governance process</td>
<td>a) Develop recommendations &amp; input to the BEIS/Ofgem ECR</td>
<td>Digitalisation of</td>
</tr>
<tr>
<td>b) Detailed recommendations for alignment delivered later, as part of ECR implementation</td>
<td>b) Postpone until ECR outcome</td>
<td>a) Grid Code only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Distribution Code (&amp; ERECs) only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Grid Code and Distribution Code (&amp; ERECs) separately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d) Grid Code and Distribution Code (&amp; ERECs) together</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e) Wait for BEIS/Ofgem ECR decision on consolidation</td>
</tr>
</tbody>
</table>

Q12. Stakeholders have articulated that there is strong interdependence between options in whole system consolidation or alignment (section 3.1), digitalisation (section 3.2) and the delivery of solutions (section 3.5). Do you have a preferred combination of these solutions that you see as delivering the best value considering the issues implementing the solutions? Please provide a rationale for your response.

Q13. Are there other aspects of the project delivery where you see risks and opportunities to mitigate these?
Key Benefits

Refer to consultation section 4: Key benefits

- More efficient resource requirements for a connection journey
- Increased market participation across the whole system
- Encouraging innovation in the market
- User-friendly technical codes
- Streamlined implementation of changes across the whole system

Q14. Do you agree with the key benefits outlined above and can you see other benefits resulting from this project?
Q15. Do you think that the proposed governance structure will enable delivery of the project? Would you change any aspects? If so, why?

Q16. Which elements of the project would you, or your organisation, like to be involved in? If so, please state in which capacity, and provide a short description of the perspective and value you would bring to the project?

Q17. What principles should apply when forming membership and ways of working for the various project groups?
Project Governance

Refer to consultation section 5.2: Proposed Terms of Reference – Steering Group

Q18. What are your views on the proposed Terms of Reference for the Steering Group?
Q19. Do you have further views on how best to include all relevant perspectives in the governance of the project?
Q20. How do you think the steering groups should make decisions, particularly if there is not consensus?
Project Governance

Refer to consultation section 5.3: Stakeholder Engagement

During Consultation:
- Webinars

During Project Execution:
- Webinars, Website & Email

Q21. What are your views on the proposed stakeholder engagement? Is there more that can be done to ensure effective stakeholder engagement?

Q22. Would you like to attend the webinars? If so, please leave your contact details in your feedback.

Q23. Would you like to request a regular update from the project at your forum? If so, please leave contact details of your forum in your feedback.
## Project Governance

Refer to consultation section 5.4: Schedule

<table>
<thead>
<tr>
<th>Consultation</th>
<th>Milestone</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSTC Consultation 1 issued to industry</td>
<td>27/09/21</td>
<td></td>
</tr>
<tr>
<td>Webinars</td>
<td>05/10/21, 11/10/21, 20/10/21, 02/11/21, 05/11/21, 10/11/21</td>
<td></td>
</tr>
<tr>
<td>WSTC Consultation 1 closes</td>
<td>12/11/21</td>
<td></td>
</tr>
<tr>
<td>First proposed Steering Group meeting</td>
<td>Before 17/12/21</td>
<td></td>
</tr>
</tbody>
</table>

Q24. What are your views on the proposed schedule?
How to Provide Feedback

Consultation Issued: 27th September 2021
Respond By: 12th November 2021

Contact Us
You can get the consultation document and response proforma here.
You can send your consultation responses to our email address: box.WholeSystemCode@nationalgrideso.com
You can subscribe to our mailing list here.

Webinars within the WSTC Consultation window
There will be regular webinars to explain the consultation and enable you to ask questions and provide feedback. (Repeat sessions – attend one)

• Tuesday 5 October, 11:00 – 12:00 (Click here to join the meeting)
• Monday 11 October, 10:00 – 11:00 (Click here to join the meeting)
• Wednesday 20 October, 10:00 – 11:00 (Click here to join the meeting)
• Tuesday 2 November, 14:00 – 15:00 (Click here to join the meeting)
• Friday 5 November, 10:00 – 11:00 (Click here to join the meeting)
• Wednesday 10 November, 14:00 – 15:00 (Click here to join the meeting)
If you have any further questions, please contact the team at box.WholeSystemCode@nationalgrideso.com
Voltage Oscillations in Scotland
David Gregory
3rd November 2021
Background

- On 24/08/2021 severe voltage disturbances were observed on the SSEN-T and SPEN transmission systems.
- Major disturbance lasted 20-25 seconds on two occasions, approx. 30 minutes apart
- Investigation of available data suggests:
  - The oscillations with the largest magnitude were in the north of Scotland
  - The oscillations had a frequency of ≈8 Hz
- Some Users tripped off during the disturbances
What’s being done?

• Short term operational advice provided, focusing on system strength

• We need to understand nature of oscillations and their source:
  • Data requested from Users (see next slide)
  • Working group convened with ESO and TO representatives to investigate events in more detail, aiming to:
    • Investigate the underlying drivers for the oscillations
      • EMT modelling of the supergrid network in the north of Scotland
      • Analyse events to explore underlying system behaviours
    • Investigate and recommend remedial actions that can be explored further with Licensees and/or Users as appropriate
    • Assess suitability of alternative screening techniques for use in operational timescales
Data requested

• To assist with the investigations, and to help identify potential triggering events or conditions, Users in Scotland were asked to provide:
  • Metering data at the times of the oscillations
  • Any alarms or actions from protection systems that may have taken place during the events
  • Other SCADA alarms or events that indicate abnormal or unusual operating conditions during the events
  • Their network configuration including number of turbines in service
  • Any change in state of plant, such as turbines being taken in or out of service
  • Any available fault recorder traces
  • Any controller tuning or framework updates carried out in the preceding months
  • These can help in the modelling and analysis work to identify and assess potential triggers
Building upon the events we held in March and June this year, we will be holding our next Market Forum on Thursday 18th November. Join us for an update of how the ESO is developing new and existing markets to enable the transition to net zero.

The event will be a one day interactive forum with the following sessions:

**Welcome and Introduction 10:00 – 10:15**
An introduction to the event and overview of what will be discussed during the day.

[Sign up here](#)

Latest news on current Market developments and the longer term Roadmap.

[Sign up here](#)

**Net Zero Market Reform 13:00 – 14:30**
Key challenges identified from our case for change modelling and how these influence the next phase.

[Sign up here](#)

**Energy Code Review 15:00 – 16:00**
Insights into BEIS/Ofgem Energy Code Reform work and the ESO’s thinking.

[Sign up here](#)
After the webinar, you will receive a link to a survey. We welcome feedback to understand what we are doing well and how we can improve the event ongoing.

Please ask any questions via Slido (code #OTF) and we will try to answer as many as possible now. If we are unable to answer your question today, then we will take it away and answer it at a later webinar.

Please continue to use your normal communication channels with ESO.

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

Start presenting to display the audience questions on this slide.
Q&A

Please remember to use the feedback poll after the event. We welcome feedback to understand what we are doing well and how we can improve the event ongoing.

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