Grid Code Development Forum

05 November 2025

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Agenda

1	Introduction, meeting objectives and review of previous actions - **Claire Newton, NESO**	
2	Code Administrator Update – **Claire Goult, NESO (Code Administrator)**	
3	Large Demand Technical Requirements – **Ronak Rabbani, NESO**	
4	GC0179: Removal of Balancing Code No.4 from the Grid Code – **Amanda Rooney, NESO**	
5	Amending BSC Change Process for Changes Affecting NCER T&Cs – **Steve Baker, NESO**	
6	NESO Control Room Expectations in the Event of a Third-Party Failure of EDT – **Ben Young, NESO**	
7	AOB and Meeting Close - **Claire Newton, NESO**	

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GCDF – Objectives and Expectations

Objective
Develop ideas, understand impacts to industry and modification content discussion, in relation to Grid Code related issues.
Anyone can bring an agenda item (not just NESO!)

Expectations
Explain acronyms and context of the update or change
Be respectful of each other's opinions and polite when providing feedback and asking questions
Contribute to the discussion
Language and Conduct to be consistent with the values of equality and diversity
Keep to agreed scope

The Forum will be recorded and made available on the GCDF webpage along with summary notes.

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Code Administrator Update

Claire Goult, NESO (Code Administrator)

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Key Updates since last GCDF

New Modifications / Nominations

GC0181: Enhance the Effectiveness of System Incidents Reporting– nominations opened on 28 August and were due to close on 18 September, but this was extended until 03 October. The first Workgroup is due to take place in November 2025.

Decisions

The Authority approved GC0166: Introducing new Balancing Mechanism Parameters for Limited Duration assets on 22 October 2025.

Implementations

GC0166: Introducing new Balancing Mechanism Parameters for Limited Duration assets will be implemented on 5 November 2025.

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Key Consultations

Workgroup Consultations

None

Code Administrator Consultations

GC0173: Consistency of Technical and Compliance Requirements between GB and European Users the second Code Administrator Consultation opened on 26 September and closed on 26 October.

GC0183: Generator and Interconnector Availability During a Severe Space Weather Event Code Administrator Consultation opened on 19 September and closed on 20 October.

Appeals Window

None

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Useful Links

Ofgem's expected decision dates/ date they intend to publish an impact assessment or consultation, for code modifications that are with them for decision are available [here](#)

Updates on all Modifications are available on the Modification Tracker [here](#)

The latest Grid Code Review Panel Headline Report and prioritisation stack are available [here](#)

If you would like to receive updates from the Code Administrator on Grid Code modifications, please join the distribution list [here](#)

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Large Demand Technical Requirements

Ronak Rabbani, NESO

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The asks of GCDF

1. Are there any impacts that have not been considered here?

2. Are there any other suggestions to consider within the proposal?

3. Is there a need to codify large demand requirements and align them with generation?

4. Are the proposed requirements suitable for large demand sites?

5. Any other feedback from GCDF members.

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Future Demand Increase

Issue:

- Total system demand is increasing.

- A big part of this increase comes from large demand sites.

- Many of these large demand sites exhibit similar behaviour:

  - Data Centres

  - Electrolyser Plant

- Data centre demand in GB is estimated at 7.6 TWh from the 2.4 GW connected facilities, mainly for traditional services.*

- Total Contracted Connection Demand in the queue: 125 GW.**

| Future Energy Scenarios (FES) 2025	2024 – 10 Year Forecast	2050
Electricity Annual Demand (TWh)	290	705 – 797
Electricity Peak Demand (GW)	58	120 – 144
Electrolytic Hydrogen Production (TWh)	0	67 – 173

Modelling Assumptions	10 Year Forecast	Hydrogen Evolution	Electric Engagement
2035 Data Centre demand (TWh)	33	30	41
2050 Data Centre demand (TWh)	N/A	51	71

*Future Energy Scenarios (FES) 2025, https://www.neso.energy/document/364541/download
**https://www.energynetworks.org/industry/connecting-to-the-networks/connections-data

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Data Centre Behaviour as an Example

- Multiple standards/specifications in place to ensure the safety of the IT equipment.

- Uninterruptible Power Supplies (UPSs) set to guarantee the supply and the power quality received by this equipment.

- Voltage fluctuations may cause entire load to shift to UPS then to standby generators.

- This would be seen by the system as a sudden loss of outfeed.

- When the voltage recovers behaviour is variable:

  - They may reconnect immediately.

  - They may reconnect after a delay.

  - They may reconnect after a delay with a slow ramp.

- Note: Other large demand sites, e.g. electrolyser plant, exhibit similar issues.

* Modified from: EPRI Hyperscale Data Centre Grid Integration Project
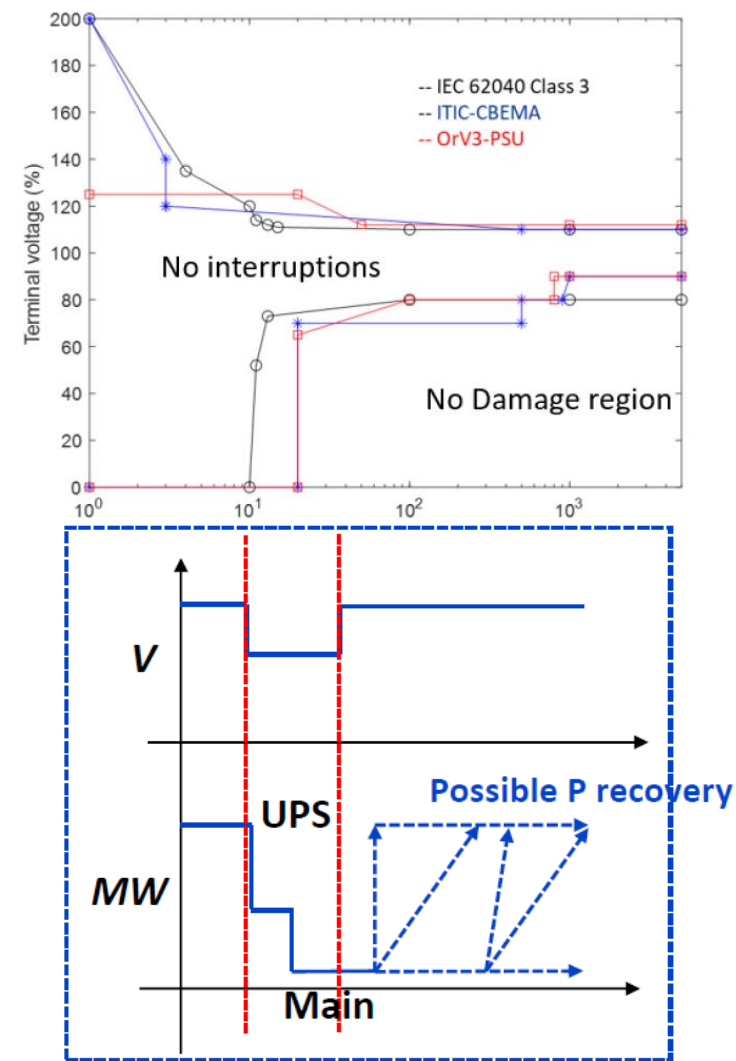
Data Centre Behaviour as an Example

Disconnection in response to fluctuations in system voltage:
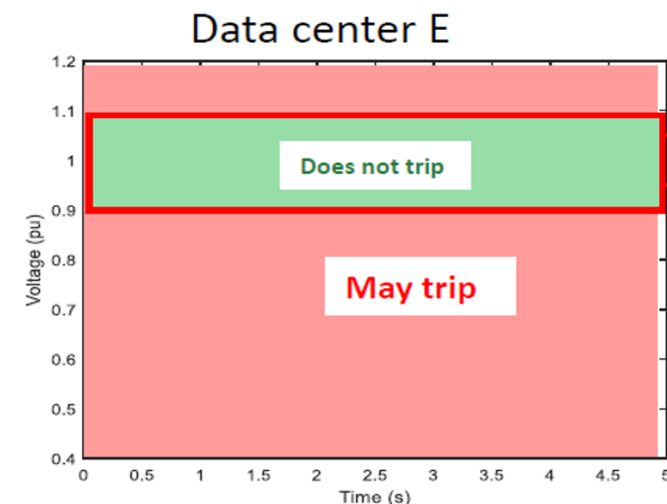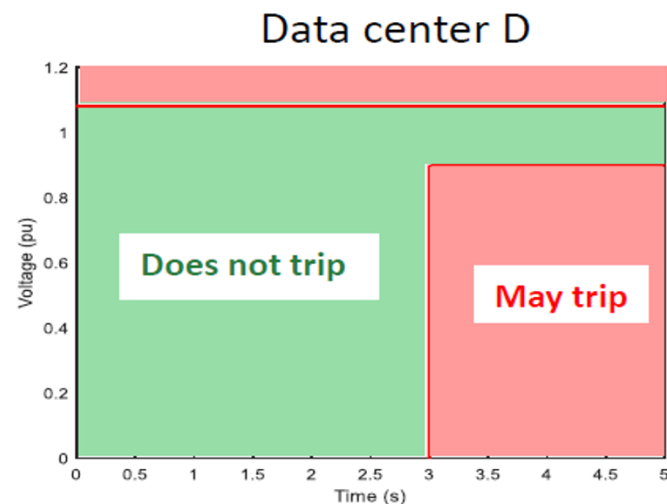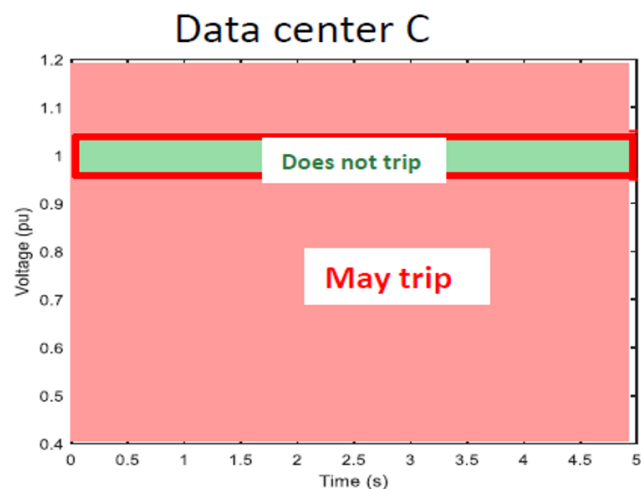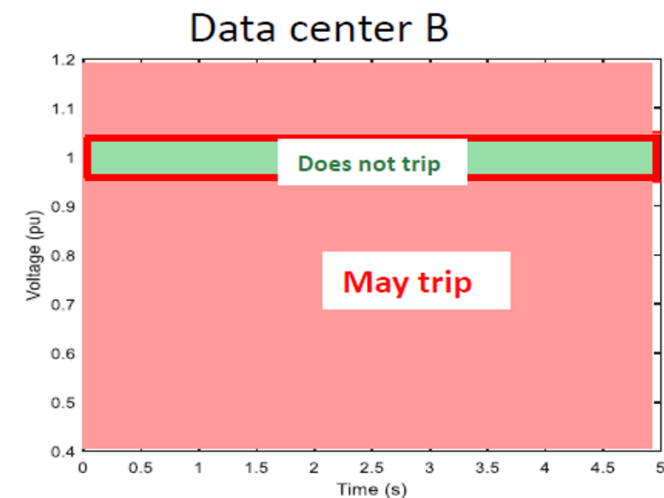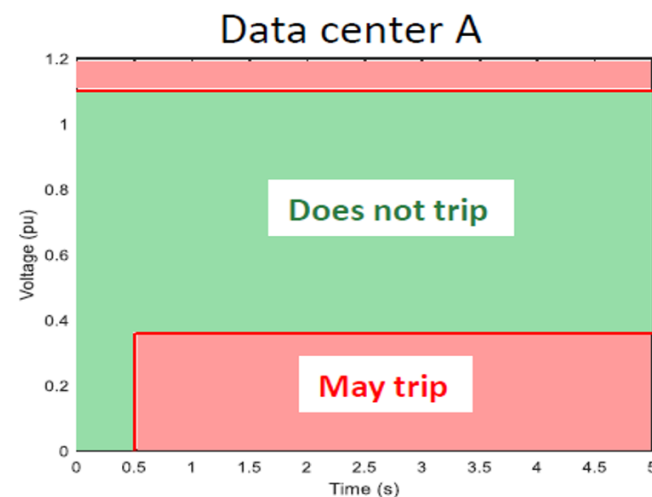
* Modified from: EPRI Hyperscale Data Centre Grid Integration Project

Data Centre Behaviour as an Example

Disconnection in response to fluctuations in system frequency:

Data Centre	Frequency Setting
A	Currently disabled
B	±2%
C	±5%
D	<57Hz, >63Hz, (±5%)
E	±5Hz

* Modified from: EPRI Hyperscale Data Centre Grid Integration Project

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Impact on the National Electricity Transmission System

```
┌─────────────────────────────────┐
│    Transmission System Fault    │
└─────────────────────────────────┘
              ↓
┌─────────────────────────────────┐
│          Voltage Dip            │
└─────────────────────────────────┘
              ↓
┌─────────────────────────────────┐
│  Initial Generation and UPS     │
│        Load Reduction           │
└─────────────────────────────────┘
              ↓
┌─────────────────────────────────┐
│         Fault Cleared           │
└─────────────────────────────────┘
              ↓
┌─────────────────────────────────┐
│  Generation Output Recovers     │
│  UPS Load Reduction Sustained   │
└─────────────────────────────────┘
              ↓
┌─────────────────────────────────┐
│   Power Imbalances Causes       │
│      Frequency to Rise          │
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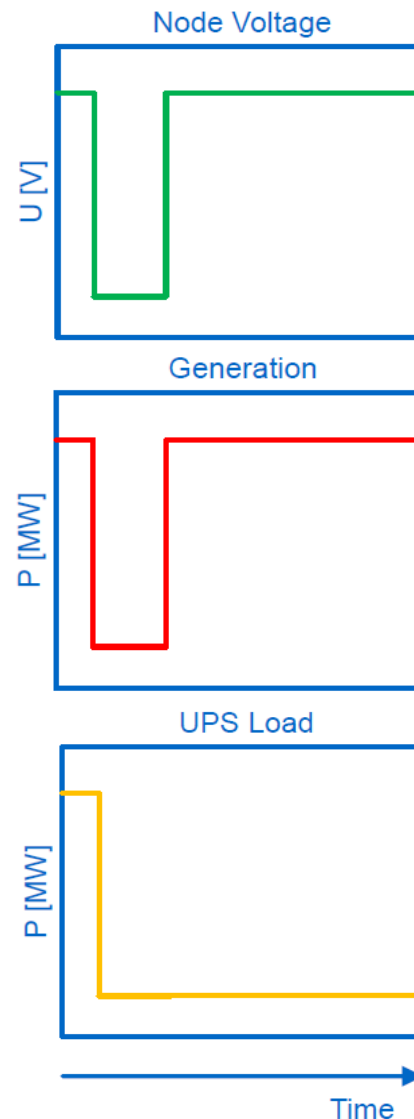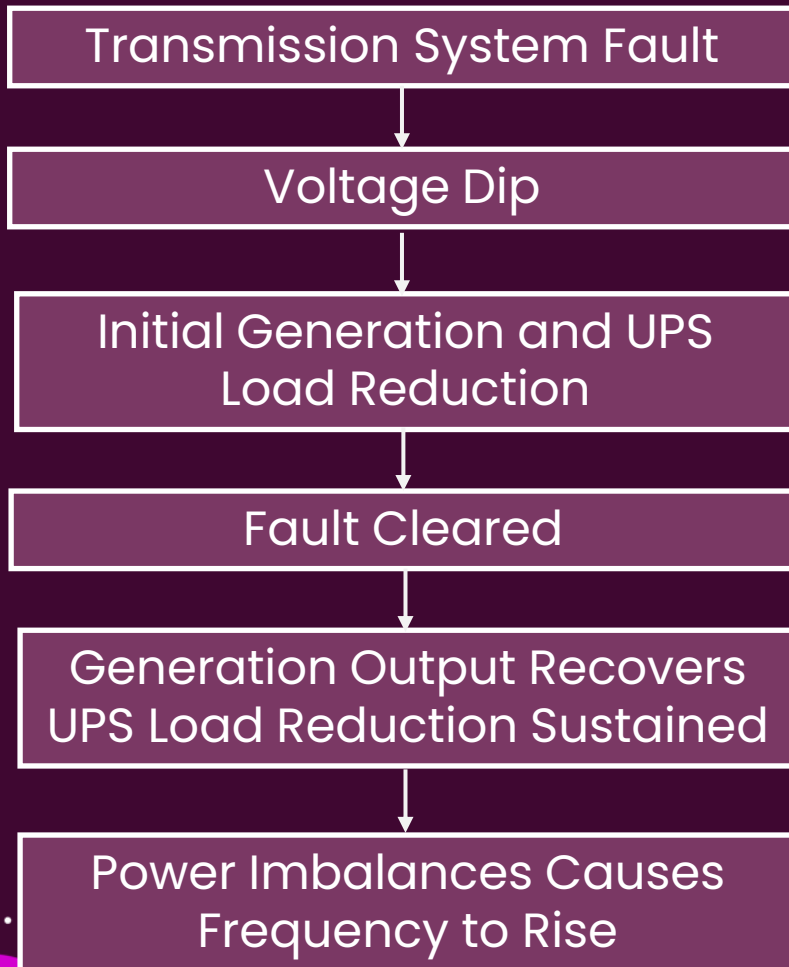

- Voltage fluctuations can cause imbalance and induce frequency rise as large demand sites disconnect from the system in response.*
- Same could apply to normal frequency fluctuations.

* Modified from: Eirgrid industry webinar 22 October 2024: Fault Ride-Through Requirements for Demand Facilities

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Example of events:

- EirGrid: 2022 over 200MW of load rapidly disconnected, system frequency increased to +200mHz above the standard 50Hz, and a high ROCOF value was observed.*

- ERCOT: In December 2022, more than 1.6GW of load unexpectedly disconnected from the grid due to a low-voltage fluctuation. System frequency increased to 60.235 Hz and did not return to normal for over 10 minutes.**

*https://cms.eirgrid.ie/sites/default/files/publications/SOEF-Advisory-Council-Meeting-Slides-12-October-2023.pdf
**EPRI Hyperscale Data Centre Grid Integration Project, Data Centre Growth and Operational characteristics technology brief Report.

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Challenges

- Each site has a significant capacity (100MW+).

- Many are in the same part of the network and will experience similar conditions.

- Specific settings may be different for each site, but overall behaviour is similar.

- Typical system voltage/frequency fluctuations, including faults, will see an increased risk of demand disconnection.

- If not managed correctly, that may drive uneconomic requirements on frequency response and reserve.

Managing the Challenges

- Requirement to remain connected during normal fluctuations.

- Requirement to ride through events.

- Understanding potential of rapid recovery following events.

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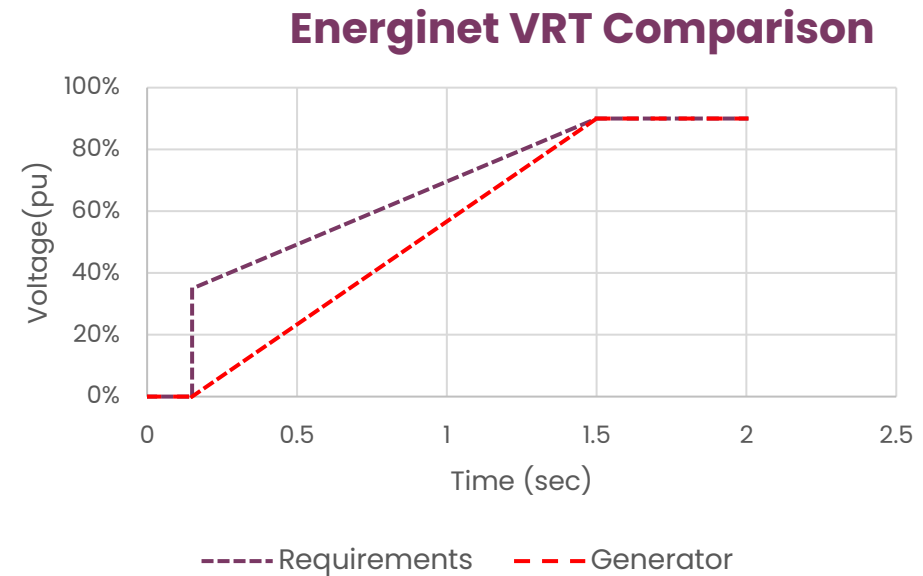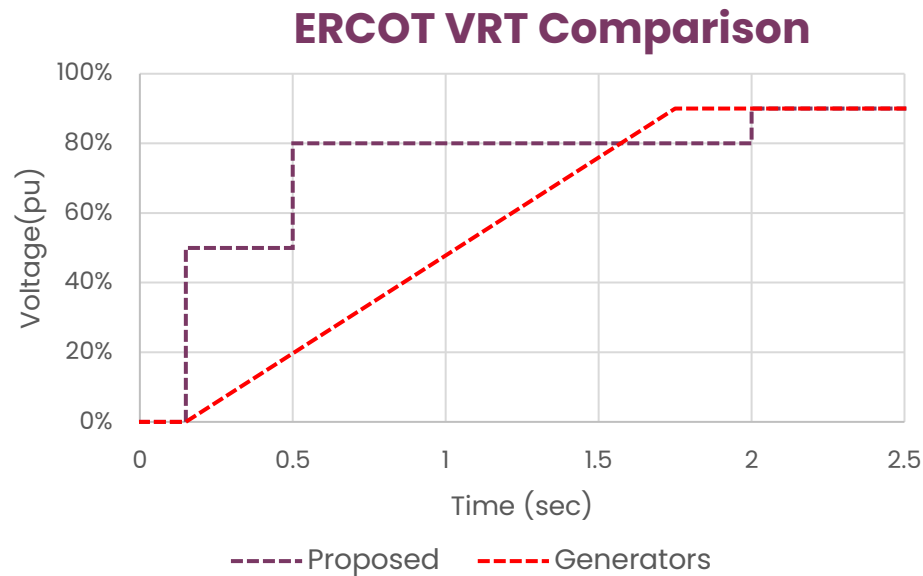National Energy
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Other TSOs are Exploring Similar Considerations

Various system operators have identified potential issues relating to large demand sites/data centres and are developing their own mandatory requirements.

- EirGrid requirements – Ireland (In progress)

- ERCOT (The Electric Reliability Council of Texas) requirement (In progress)

- ENTSO_E Demand Connection Code DCC requirements

- Energinet - Denmark (Mandated)

- Fingrid – Finland (In progress)

- Rte – France (Mandated)

- AEMO – Australia (In progress)

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Demand Requirements Modelled on/mirror Generation Requirements

ERCOT VRT Comparison

Voltage(pu) vs Time (sec)

- - - Proposed   - - - Generators

Energinet VRT Comparison

Voltage(pu) vs Time (sec)

- - - Requirements   - - - Generator

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Demand Requirements Modelled on/mirror Generation Requirements
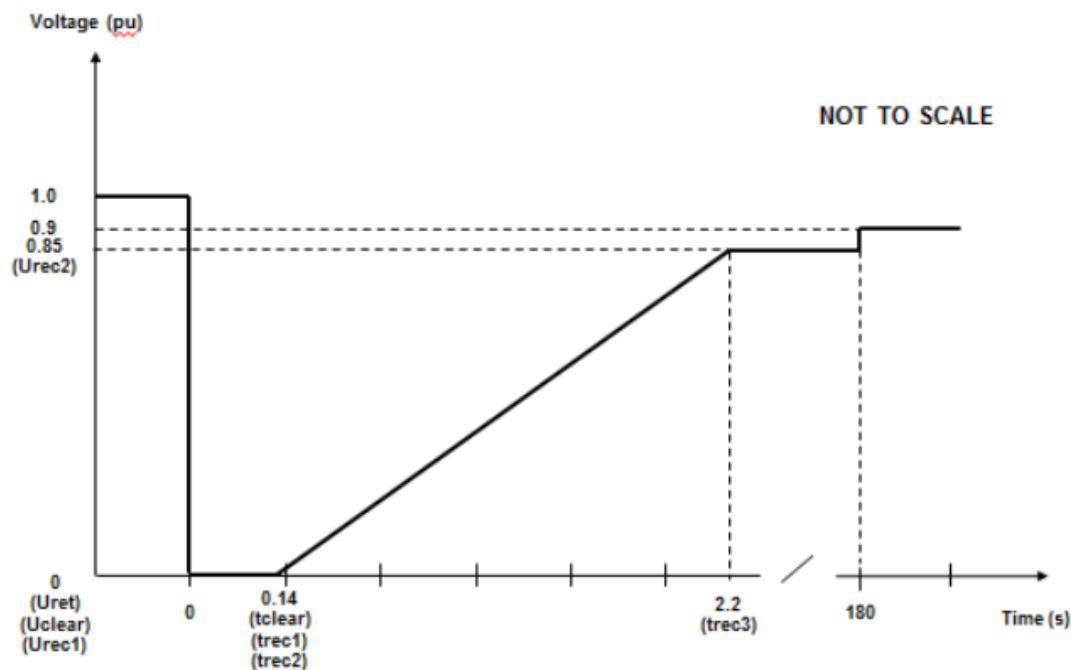
Figure 1

Voltage Parameters (pu)		Time parameters (seconds)	
Uret	0	tclear	0.14
Uclear	0	trec1	0.14
Urec1	0	trec2	0.14
Urec2	0.85	trec3	2.2

Fault Ride Through:
The EU Code User shall stay connected to the System and remain operable within the frequency ranges and time periods specified below:

Frequency Range (Hz)	Time Period of Operation (s)
47.0 – 47.5Hz	60s
47.5 – 49.0Hz	90min and 30s
49.0 – 51.0Hz	Unlimited
51.0 – 51.5Hz	90min and 30s
51.5 – 52Hz	20min

"**Active Power Recovery:** User's Plant and Apparatus shall be designed such that upon clearance of the fault on the Transmission System and within 0.5 seconds of restoration of the voltage at the Grid Entry Point to 90% of nominal voltage or greater, Demand shall be restored to at least 90% of the level immediately before the fault."

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Feedback Welcomed

- Please let me know if you have any feedback relating to technical difficulties implementing the proposed changes.

The asks of GCDF

1. Are there any impacts that have not been considered here?

2. Are there any other suggestions to consider within the proposal?

3. Are there any reasons why this modification should not go straight to Code Administrator Consultation (CAC)?

4. Any other feedback from GCDF members.

The Issue

- BC4 covers the UK's involvement in the European Union's Trans-European Replacement Reserve Exchange (TERRE) process.

- The Final Trade and Cooperation Agreement (TCA) means that GB participation to exchange Replacement Reserves (RR) using TERRE in the way it is currently written is not permitted. In addition, TERRE systems are being turned off on 31 December 2025.

- BC4 is therefore not applicable as originally intended and is redundant and there is no possibility of the text ever being used.

Proposal

Proposed Solution:

- This modification proposes the removal of section BC4, which covers the UK's involvement in the TERRE process, from the Grid Code along with any other references to TERRE.

- The legal text being removed will be archived, for reference

- This modification previously went to the Grid Code Review Panel (GCRP) where issues were raised with the proposed legal text changes. These issues have now been rectified and approved by NESO legal.

Alternative Option considered:

- Previously, the proposal included the removal of BC5, but this is no longer being considered within this modification.

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Legal text

Proposed legal text changes:

- Complete removal of BC4

- Remove reference to BC4 in multiple lists, including in European Compliance Processes, Operating Code 5, Balancing Code 4 (to be replaced with 'not used'), and Governance Rules.

- Removal of any other references to TERRE including Defined Terms used only in BC4.

Modification to the Defined Term **Committed Level** which currently references the Defined Term **RR Instruction**:

- **RR Instruction** – **Replacement Reserve** Instruction – used for instructing **BM Participants** after the results of the TERRE auction. An **RR Instruction** has the same format as a **Bid-Offer Acceptance** but has type field indicating it is for **TERRE**.

- **Committed Level** – The expected **Active Power** output from a **BM Unit** after accepting a **Bid-Offer Acceptance** or **RR Instruction** or a combination of **Bid-Offer Acceptances** and **RR Instructions**.

- Proposed new definition for **Committed Level** – The expected **Active Power** output from a **BM Unit** after accepting a **Bid-Offer Acceptance**.

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Governance

Proposed Governance Route:

- Following a request for workgroup nominees, no volunteers have come forward to support this work.

- We now propose to take the suggested legal text proposal to the November GCRP and recommend proceeding direct to CAC.

Consideration for fast-track:

- Due to the requirement to amend a Defined Term this modification is not eligible for fast-track processes.

Project Scope – Amending BSC Change Process for Changes Affecting NCER T&Cs

- The Electricity Balancing Guideline (EBGL) and the Network Code on Electricity Emergency and Restoration (NCER) were assimilated into UK law by the European Union (Withdrawal) Act 2018 following the UK-EU transition period.

- These Terms and Conditions are legally binding, and changes to them must follow a specific change process laid out in the NCER.

- Unlike the EBGL, the NCER does not have an explicit provision to allow the delegation of tasks by NESO.

- This has significant implications where specific provisions of the Balancing and Settlement Code (BSC) constitute the NCER Terms and Conditions.

- Currently NESO must carry out the NCER-prescribed amendment steps directly, either jointly or in parallel with Elexon conducting the BSC change process. This causes multiple issues including:
  - Lack of delegation means that NESO must be directly involved at each stage of the change process.
  - When NCER Terms and Conditions are mapped to the BSC, the amendments require NESO and Elexon to act jointly or in parallel, adding complexity & duplication.
  - Incompatibility with BSC processes such as Authority-led Significant Code Reviews.

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Proposal

Proposed Solution:

Incorporate the NCER change process within the BSC Modification Procedures, specifically where the approved Terms and Conditions for System Defence and System Restoration Service Providers under Article 4(4) are mapped to BSC provisions. This dual approach could ensure that both NCER and BSC processes are aligned.

Suggested steps in the process are:

- Initial Impact assessment – Elexon will assess for any BSC mod if there is any impact to the NCER.

- TSO Confirmation and Engagement – If there is, NESO to confirm if amendment is necessary and attend Panel.

- Stakeholder Involvement – NESO to participate in the workgroup to meet NCER obligations.

- Parallel Consultations – at the report phase NESO to publish a parallel NCER consultation.

- Consideration of responses - NESO and Elexon to jointly consider consultation responses, providing views and publish a consolidated conclusions.

- Dual Submission to Ofgem; NESO will submit the Modification to Ofgem for approval of the NCER T&C changes whilst Elexon submits the modification to Ofgem on the BSC. Ofgem to approve both concurrently.

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Public

Proposal

Alternative Proposal under consideration:

There is an alternative proposal, based on the existing similarities between NCER and EBGL articles both addressing the aggregation of balancing services. It could be interpreted that the aggregation of defence services is already covered in EBGL and so governed under modification P392.

Also, provision relating to the aggregation of demand response services for defence are included in the Grid Code not the BSC, so therefore no aggregations arrangements exist for restoration, and such should they be incorporated, they would be added into Grid Code not the BSC

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Questions?

- If you are interested in this BSC mod please contact Elexon.

- You can join the Workgroup as a voting member, a non-voting member or be added to the Workgroup mailing list.

- To sign-up, please fill out this form: https://www.elexon.co.uk/change/modifications/modification-workgroups/modification-and-issue-workgroup-sign-up/

- Further information on P501 can be found on the P501 page of Elexons website. https://www.elexon.co.uk/bsc/mod-proposal/p501/

- If you have any questions, or would like to discuss the Modification further, please contact Architi Batra on 020 7380 4124 or at bsc.change@elexon.co.uk

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NESO Control Room Expectations in the Event of a Third-Party Failure of EDT

Ben Young, NESO

What would the NESO control room expect in the event of 3rd party failure of EDT?

Background (Balancing Code 1)

BM participants initially submit commercial (PN and Bid Offer data) at 11:00 the day before the operational day. If no data is submitted at 11:00 for the next operational day then previous data will be used (i.e. defaulted) in line with the Data Validation, Consistency and Defaulting Rules until new data is submitted. This data can only be submitted via EDT which is the responsibility of the participant.

However, the data submitted via **EDT can be updated at any time until Gate Closure** ensuring NESO always have the latest commercial data.

BM participants can submit **dynamic data** (ramp rates, MNZT/MZT, NDZ, NTO/NTB etc) and Import/Export limits (MEL/MIL/SEL/SIL) **via EDL at any time or via phone if EDL is not available**. EDL is a NESO responsibility.

Failure of electronic communication

In the event of a failure of EDT which meant participants were unable to submit commercial data then NESO control room would expect (in line with Balancing Code 2.9.7 and 1.4.1)

Participants to follow last submitted Physical Notifications and last submitted Bid and Offer data to apply.

Instructions will be issued by NESO via telephone

If participants are unable to follow their submitted Physical Notifications, then they should revise their Export/Import Limits or submitted Dynamic Parameters via telephone and NESO will instruct according to this revised data.

The above process enables the NESO control room to ensure they have certainty on what participants will do and enables instructions to be issued to balance the system.

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Thank You

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AOB

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