SONI Grid Code Modification Proposal Form Email To: gridcode@soni.ltd.uk	

Title of Modification Proposal: Demand Side Unit Fault Ride Through

SPID (SONI PROPOSAL ID) **SPID_03_2025**

Date:	14 November 2025		
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Grid Code Version:	SONI Grid Code version – September 2025 **[Latest Version]** **Available here:** Latest Grid Code Doc		
Grid Code Section(s) Impacted by Modification Proposal:	CC14		
Modification Proposal Justification:	SONI (Northern Ireland's TSO) and EirGrid (Ireland's Transmission System Operator (TSO)) are responsible for operating and developing the respective transmission systems of Ireland and Northern Ireland in a secure and coordinated manner. A growing challenge to meeting these responsibilities is the impact on the power system of the response of some large Demand Facilities (primarily data centres) to faults on the transmission system. Data centres are a significant and growing component of Ireland's electricity demand (there are no large-scale data centre facilities currently in operation in Northern Ireland). There is over 2000 MVA of data centre demand, and other new technology demand, contracted by EirGrid with additional capacity also contracted by SONI and ESB Networks. Figure 1 below illustrates the potential growth in data centre and other new technology demand as presented in the All-Island Resource Adequacy Assessment 2025-2034[1].		

[1] All-Island Resource Adequacy Assessment 2025-2034

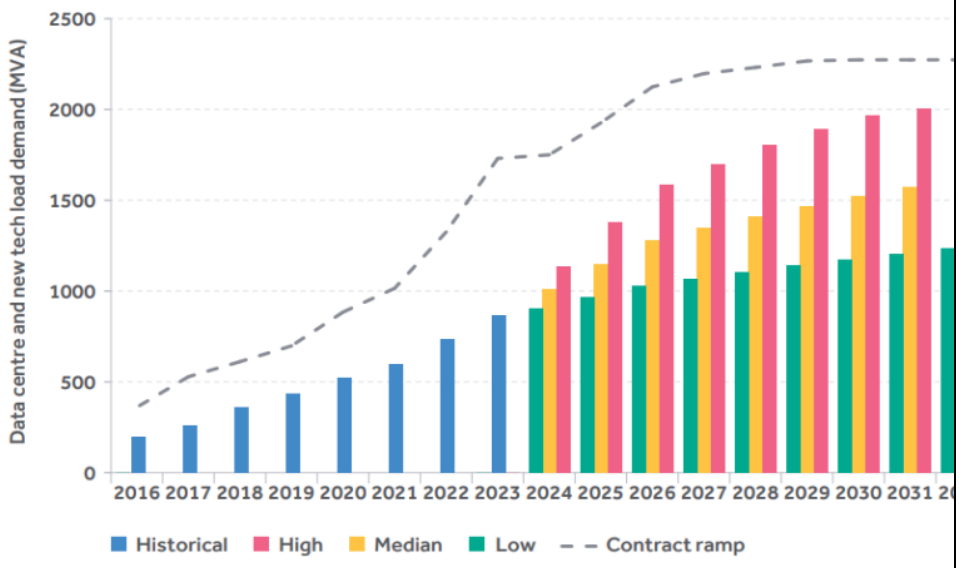


Figure 1 Ireland demand expected from assumed build out of data centres and new technology loads (from All-Island Resource Adequacy Assessment 2025-2034)

Data centres and new technology loads comprised approximately 24% of Ireland's electrical energy requirements in 2024. By 2032, it is expected this will have grown to 30% (median scenario).

The all-island power system, which is operated as one synchronous area, recorded a peak demand of 7502 MW on 8 January 2025, with a minimum demand of 3095 MW (recorded on 9 June 2024). Current data centre demand can therefore make up approximately 11% of peak demand or 26% of minimum demand (currently, data centre demand has a relatively flat profile when compared to the more cyclical total system demand). These proportions of data centre demand relative to total power system demand are important context when considering the overall power system impact of data centre demand reductions.

Historically, most transmission system users could withstand transient events and continue operating post-fault. Grid Code standards for 'ride-through' capability have long applied to conventional generators, wind farms, solar farms, batteries, and HVDC interconnectors. Demand customers had less stringent standards due to their inherent behaviour and diversity. However, the rise of large power electronic-interfaced demand facilities with similar characteristics and growing demand levels has introduced new challenges.

During remote, transient faults on the transmission system, some large demand facilities are automatically reducing their consumption from the grid and switching to their own back-up sources to protect their systems and processes. This behaviour has been observed through actual events on the power system with the aggregated level of demand reduction in each event increasing as these large demand facilities continue to ramp up their capacity.

Similar large demand facility response characteristics have been observed by other TSOs, particularly in the USA, and there is a growing focus among system

operators worldwide on addressing this issue. Information about these observed responses and the proposed grid code requirements by other TSOs is detailed in the Background Information Note.

This issue is particularly pronounced in Ireland and Northern Ireland however, as the installed capacity of large demand facilities exhibiting these characteristics is a significant proportion of the overall system demand. The island nature of our power system is also a significant factor in the potential impact of events relative to other larger, more interconnected power systems.

Figure 2 below illustrates the difference between how generators typically respond to faults compacted to the response of power-electronic interfaced demand facilities (the term UPS – Uninterruptible Power Supply, is used in the illustration). A transmission system fault causes a voltage dip to occur. This voltage dip causes both generation and demand to reduce. Subsequently, the fault is cleared and generation output recovers quickly, however, the reduction in some demand is sustained for a longer period. This difference in generation and demand response results in an imbalance on the power system which results in an increase in system frequency.

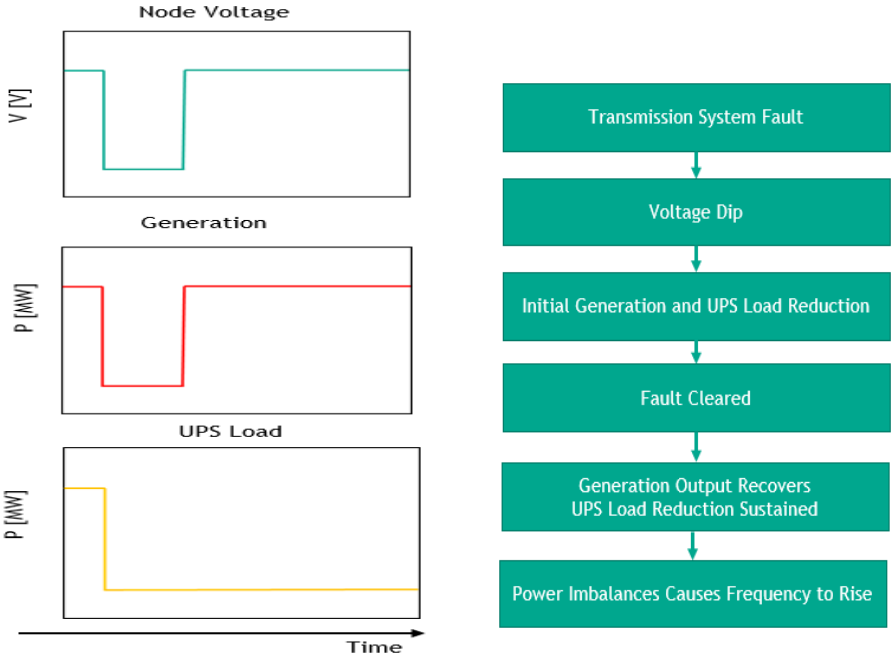


Figure 1 Illustration of Fault Impact on Generation and Power Electronics Demand

To illustrate the current demand facility performance issue, the table below summarizes the aggregate level of data centre demand reduction observed during three transmission system faults in Ireland. These events demonstrate that demand reduction increases as data centre demand grows. More details about these events can be found in the Background Information paper.

Date	Transmission System Contingency	Data Centre Demand Reduction	Perc Data Dem
7 Jan 2022	Limerick: Killonan-Kilpaddoge 220 kV Fault	74 MW	16%
13 Dec 2022	Dublin: Kellystown-Woodland 220 kV Fault	204 MW	34%

26 Jan 2025	Dublin: Poolbeg 220 kV Reactor Fault	321 MW	44%
8 May 2025	Dublin: North Wall – Poolbeg 220 kV Fault	387 MW	52%

The challenge now arising for balancing the power system is that the reduction in demand at some demand facilities can add to other imbalances to produce a much larger change in system frequency. Scenarios can arise in which an initial fault triggers a disco nnection of an interconnector exporting 500 MW (e.g. a fault on the circuit connecting the interconnector to the transmission system), with the voltage dip resulting from the fault also causing a reduction in consumption at some demand facilities. This 'consequential loss' of demand could be significantly greater than 500 MW, based on current 'at-risk' demand levels, which is double the historic maximum imbalance expected.

Based on the TSOs' modelled scenarios, detailed in the accompanying Background Information Note, the imbalance could result in widespread activation of special protection systems that disconnect generators, and violations of system standards related to the maximum allowable frequency deviation and the Rate of Change of Frequency (RoCoF). Unless resolved, such disturbances would present severe risks to the stability of the Ireland and Northern Ireland power system.

SONI and EirGrid's response to this issue considers both the current operational challenges and the future needs of the power system. Steps we are taking include:

- Implementation of operational mitigations to reduce the risk posed by the potential imbalance. To date, this has included actions to reduce HVDC Interconnector exports and run additional conventional generation at times to provide more inertia and reserves on the power system.

- Determining additional System Service needs, such as reactive power support, inertia and reserves that would be required to reduce, or respond to, the potential system imbalance;

- The development of new **'Fault Ride-Through' performance standards** that would apply to large demand facilities. It is proposed that these requirements are included in the EirGrid and SONI Grid Codes.

Actions in all these areas will be required to ensure that the TSOs can operate and develop a secure power system that can facilitate growth in the capacity of large demand facilities into the future.

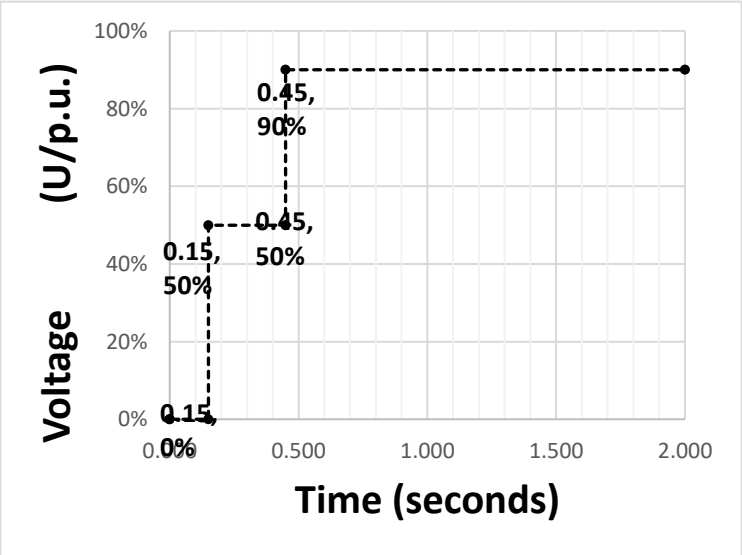
The proposed modification to the Grid Code aims to address the stability and security challenges posed by the increasing number of large demand facilities.

To mitigate this risk and maintain system resilience, and to align with requirements for other transmission system users SONI has identified requirements for large demand facilities to remain connected during short-term disturbances. This includes introducing fault ride-through (FRT), active

	power recovery, and Rate of Change of Frequency (RoCoF) robustness capabilities. This ensures that these facilities can tolerate short-term voltage and frequency disturbances without disconnecting from the grid. The proposal seeks to enhance overall grid stability and reliability. Details of the proposed changes are summarised below: 1- Fault Ride Through (FRT) Requirements: The TSOs require that demand facilities must remain connected and operate stably during and after any fault disturbance, provided the voltage deviation stays within the specified voltage-against-time profile at the connection point. This profile is detailed in the proposed Grid Code in the impacted Grid Code section. 2- Rate of Change of Frequency (RoCoF) Robustness: The TSOs propose extending the RoCoF standards of +/- 1 Hz/s to include demand facilities, ensuring uniformity across all system users. This is crucial for enhancing grid robustness, as it ensures all facilities can withstand rapid frequency changes without disconnecting, thereby improving overall grid stability and reliability during disturbances. 3- Active Power Recovery: The TSOs propose that demand facilities must recover their active power to 90% of the pre-fault value within 500 milliseconds after fault clearance and voltage recovery to 0.9 per unit. This rapid recovery is crucial for maintaining system stability and keeping RoCoF and frequency within operational ranges. Additional system services, like Inertia, Fast Frequency Response (FFR), Primary Operating reserve (POR) etc, are needed to support the grid during these events. The TSOs have engaged stakeholders on this issue. This includes hosting four webinars on 30 April 2024, 22 October 2024, 10 December 2024, and 3 November 2025, as well as conducting multiple bilateral meetings with demand customers. Stakeholders were invited to provide feedback on the proposed requirements. Initially, the TSOs proposed that demand facilities shall restore 95% of pre-fault demand within 500 milliseconds after fault clearance and voltage recovery to 90% of nominal voltage. However, based on stakeholder feedback, this requirement was revised to 90% recovery. This revised threshold aligns with requirements for other system users, including PPMs and HVDC. Additionally, feedback requested clarification on what 'remain connected' means within the Fault Ride Through requirements. In response, the TSOs clarified that "remain connected" means that the customer's facility must remain electrically connected to the transmission system. During the voltage dip, demand facilities may switch their demand to backup systems, but they should restore at least 90% of their pre-fault demand within 500 milliseconds after fault clearance and voltage recovery to 90% of nominal voltage. The proposed grid code modifications are crucial for ensuring the security and stability of power system facing increasing demand from large energy users and

	are in line with evolving industry best practices. Failure to implement these solutions could have significant consequences for all system users. An information paper prepared by the TSOs is attached. It provides background to the issue, examples of actual system events, power system studies of future scenarios, and outlines the proposed solutions as well as those under further consideration.

Red-line Version of Impacted Grid Code Section(s) - show proposed changes to text:
Deleted text in ~~strike-through red font~~ and new text highlighted in blue font

Clause	Context	Red Line Version Text ***Deleted text in ~~strike-through red font~~ and new text highlighted in blue font***
CC.14.1.5		**Demand Facilities** shall remain connected to the **Transmission System** during rate of change of Transmission System Frequency of values up to and including 1Hz per second as measured over a rolling 500 milliseconds period. (Voltage dips may cause localised RoCoF values in excess of 1 Hz per second for short periods, and in these cases, the Fault-Ride Through clause CC14.1.6 supersedes this clause CC14.1.5)
CC.14.1.6		**Demand Facilities** shall remain connected to the **Transmission System** during and following any **Fault Disturbance** on the **Power System** which results in a **Voltage** deviation which remains on or above the voltage-against-time profile specified in Figure CC.14.1.6 at the **Connection Point**. Following clearance of the **Fault Disturbance**, the **Demand Facility** should return to at least 90% of its prefault **Active Power Demand** within 500 milliseconds of the **Transmission System Voltage** recovering to 90% of the nominal **Voltage.** The post **Fault Disturbance** ramp up rate for the **Demand Facility**, shall be coordinated and agreed between the **TSO** and the **Demand Facility** owner. The voltage-against-time profile specifies the required minimum capability as a function of voltage and **Fault Ride-Through Time** at the **Connection Point** before, during and after the **Fault Disturbance**.  Figure CC.14.1.6: Voltage-against-time profile at the connection point for fault condition

Green-line Version of Impacted Grid Code Section(s) - show proposed final text:

Clause	Green Line Version Text
CC.14.1.5	**Demand Facilities** shall remain connected to the **Transmission System** during rate of change of Transmission System Frequency of values up to and including 1Hz per second as measured over a rolling 500 milliseconds period. (Voltage dips may cause localised RoCoF values in excess of 1 Hz per second for short periods, and in these cases, the Fault-Ride Through clause CC14.1.6 supersedes this clause CC14.1.5)
CC.14.1.6	**Demand Facilities** shall remain connected to the **Transmission System** during and following any **Fault Disturbance** on the **Power System** which results in a **Voltage** deviation which remains on or above the voltage-against-time profile specified in Figure CC.14.1.6 at the **Connection Point**. Following clearance of the **Fault Disturbance**, the **Demand Facility** should return to at least 90% of its prefault **Active Power Demand** within 500 milliseconds of the **Transmission System Voltage** recovering to 90% of the nominal **Voltage.** The post **Fault Disturbance** ramp up rate for the **Demand Facility**, shall be coordinated and agreed between the **TSO** and the **Demand Facility** owner. The voltage-against-time profile specifies the required minimum capability as a function of voltage and **Fault Ride-Through Time** at the **Connection Point** before, during and after the **Fault Disturbance**.

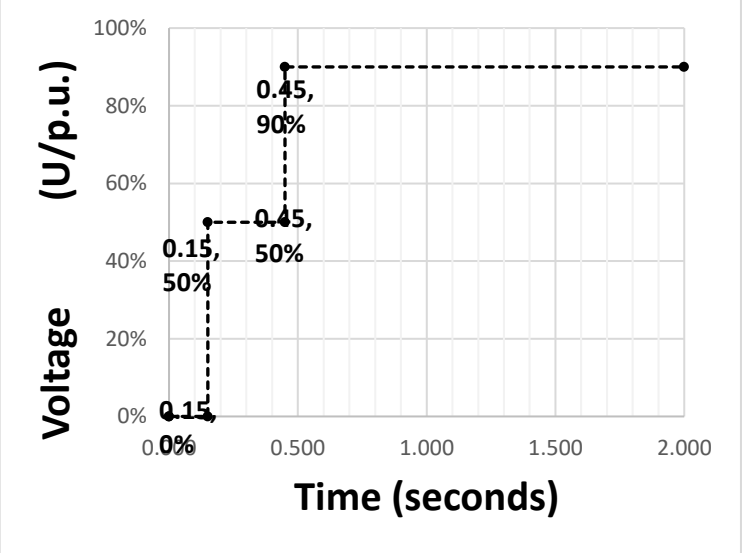


Figure CC.14.1.6: Voltage-against-time profile at the connection point for fault condition

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