Grid Code
Modification Recommendation Form

Title of Recommended Proposal:

MPID 345 Fault Ride Through, Rate of Change of Frequency and Post Fault Active Power Recovery for Demand Facilities

Date:	
Recommended at GCRP Meeting No.:	Meeting No. 4 2025 (December 2025)
Grid Code Version:	16.0
Grid Code Section(s) Impacted by Recommended Proposal:	CC.7.4.2; CC.7.4.3; CC.7.4.4.

Overview

This recommendation paper sets out EirGrid's proposals for Fault Ride Through, Rate of Change of Frequency and Active Power Recovery (FRT/RoCoF/APR) requirements for all transmission-connected demand facilities. The approval and implementation of these proposals is needed in order to ensure that there are technical requirements that all demand facilities, including any new transmission-connected demand facilitiescomply with.

Background

Fault Ride Through is a significant and growing challenge to the ability of the Transmission System Operators (TSOs)to operate the power system securely. During transient faults on the transmission system, most data centres, even those remote from the fault, automatically and near instantaneously reduce their consumption from the grid and switch to their own, temporary, back-up sources of supply and do not return to their pre-fault level of demand for an extended period. Data centres respond in this way to protect their IT systems and processes, ensuring that the key services they provide to their customers are maintained.

In October 2025, EirGrid published an information paper titled "Large Demand Facility Fault Ride Through Issue and Proposed Solutions" (the "Information Paper"). This paper set out the background to the FRT issue[1], documented actual fault incidents experienced to date, provided analysis of the power system impact, and outlined the mitigatory actions being taken and under further consideration. Existing mitigation actions are outlined below. The Information Paper also included information on the requirement for a Grid Code modification to address the risk posed to system stability and subsequent risk to security of supply. The Information Paper was shared with key stakeholders for review with feedback gathered by EirGrid and SONI. An update to the Information Paper was subsequently issued on 17 November 2025 reflecting updates to the proposed Grid Code modification based on stakeholder feedback. The Information Paper was also submitted to the Joint Grid Code Review Panel as a supporting document for the proposed Grid Code modification. The Information Paper is linked here.

On 11 December 2025, ENTSO-E published a recommendation paper entitled "ENTSO-E position on the need for national connection requirements to ensure EU power system stability" that recommended:

- TSOs to take actions to update national technical connection requirements as soon as possible to support EU-wide power system stability needs identified by ACER, the Grid Connection European Stakeholder Committee, and the EC organised "roundtable discussions on sustainable integration of data centres in the energy system".
- As this action may include involving the National Regulatory Authorities, Member States, and Distribution System Operators, ENTSO-E encourages ACER and the Council of European Energy Regulators to convey this message towards the National Regulatory Authorities and - where needed - to ask them to support the TSOs for the above.

Risk to system security

EirGrid and SONI's analysis, including through system studies, indicates that the loss of 900 MW of demand is the maximum upper bound ("load rejection limit") which the TSOs deem should be manageable with the available operational mitigations

and system defence measures. At levels of non-MPID345 compliant demand that result in demand loss greater than the load rejection limit, there is a high risk of a significant system incident as a result of an FRT incident, unless action is taken. This load rejection limit assumes mitigations actions (detailed below) are in place.

Managing the FRT risk has required the implementation of a range of mitigation actions (outlined below) which are required to ensure the secure operation of the power system. However, the demand utilisation has not yet reached the point when real time management of non-MPID345 compliant demand would be required. For the avoidance of doubt, the real-time management of the FRT issue could involve having to take demand control actions to reduce the amount of non-MPID345 compliant demand on the system, where EirGrid considers it necessary to do so in order to maintain real time security of supply.

EirGrid has engaged with data centre customers to assess data centre demand utilisation to determine when the load rejection limit may be reached. Based on the forecast demand utilisation information provided by data centre customers, this critical limit. could be reached over the next few months.

It should be noted that this demand utilisation projection is lower than the contracted demand capacity available, or contracted to become available, for use by data centres under existing connection agreements. Should data centres utilise their contracted demand capacity above the forecasted utilisation levels, the load rejection limit may be reached sooner.

Existing mitigation actions

EirGrid has already put in place a series of actions to mitigate the risk to grid stability and security of supply posed by the FRT performance of data centres and the proportion of data centre demand on the system, as outlined in the Information Paper. These actions include restricting Interconnector exports to reduce total level of potential demand loss, Battery Energy Storage Systems (BESS) management, maintaining a certain number of Synchronous Condensers on the system at any given time and dispatch of conventional generation to ensure adequate inertia availability and reserve provision. Each mitigating action has an associated cost and a knock-on impact on consumers and/or individual market participants.

While actions adopted to date have kept this FRT risk within manageable limits, their utility is being exhausted as data centre demand utilisation increases. Above the load rejection limit , as outlined above, existing mitigations will not be sufficient to maintain the required level of grid stability. Demand control actions to reduce non-MPID345-compliant demand would then need be taken, as is required of the TSO, to protect the integrity of Ireland's power system, as necessary. Therefore, the inclusion of FRT standards in the Grid Code and their implementation by large demand facilities supported by a compliance and derogation framework are urgently required.

Impact on the Operational Policy Roadmap

EirGrid and SONI's Operational Policy Roadmap 2025 to 2035 sets out our plans for the evolution of operational policy to enable integration of additional renewable energy on the power system in line with the respective national targets. As a result of the power system challenges resulting from the FRT issue, we have paused a planned increase in SNSP from 75% to 80%, with any reduction in the Minimum Units On (MUON) constraint now also at risk until the FRT issue is resolved. These delays will increase renewable energy curtailment levels and risk our ability to achieve renewable energy targets.

Industry Engagement

EirGrid has engaged extensively with industry over the past number of years on the FRT performance issue. Our engagement initially focused on understanding the drivers of the issue from a data centre demand facility perspective, gathering individual data centre site protection setting data (to inform our models), notifying data centres of performance issues observed during fault events, and communicating the broader power system challenges arising and the need for solutions. While our engagement initially focussed on data centres, as the issue evolved this engagement extended to wider non-data centre transmission connected demand customers and other key stakeholders.

[1] In this form, references to FRT performance or compliance include Fault Ride Through (FRT), Active Power Recovery (APR) and Rate of Change of Frequency (RoCoF), as addressed in the proposed Grid Code modification (MPID345).

Commencing in 2024, and running through to the end of 2025, EirGrid engaged extensively with industry on the proposed Grid Code requirements for demand facilities to remain connected during short-term disturbances. This process concluded with the development of MPID345 covering FRT, APR, and RoCoF requirements for Demand Facilities. EirGrid has focused its most recent industry webinars and bilateral engagement on the proposed Compliance and Derogation Framework, with the data centre industry and wider non-data centre transmission-connected demand customers providing feedback to EirGrid on earlier versions of the proposed framework.

This engagement has included a series of webinars/task force meetings with data centres held in April, July and August 2024, broader industry webinars held in April, October and December 2024, and further webinars more recently on 3 November 2025, 26 November 2025, 14 January 2026, 19 January 2026, 11 February 2026 and 12 March 2026.

In addition to these group engagements, the EirGrid has held bilateral meetings with individual demand customers, Original Equipment Manufacturers ("OEMs") and developers of newer power supply systems for data centres. These meetings have provided an opportunity for more detailed discussions on specific technical and operational challenges and solutions.

In addition to the above engagement, EirGrid wrote to contracted data centre customers in December 2025 to request confirmation of specific plans for any additional load growth throughout 2026 and 2027. Customers were asked to provide a forecast of the percentage of total demand utilisation volume expected to behave in line with the proposed Grid Code FRT requirements. This feedback has been considered in assessing the scale of immediate risk and whether further action is needed.

Required actions
EirGrid's response to this issue considers the current operational challenges, immediate actions to support system security and actions to meet the future challenges as data centre demand increases. We have also accounted for feedback received through stakeholder engagement.

In addition to the actions already in place as outlined above, the development of new enhanced capabilities of demand facilities, including 'fault ride through' standards that apply to large demand facilities is necessary to address the identified risks. It is proposed that these requirements are included in the Grid Code. This action is urgently required.

In that context, EirGrid is proposing a modification to the Grid Code, published 17th November 2025 (MPID345) and brought to the Joint Grid Code Review Panel on 3rd December 2025, which would introduce FRT response, RoCoF and Active Power Response standards. If adopted and complied with, this would contribute to alleviating the risk to system stability and subsequent risk to security of supply.

In parallel, EirGrid has considered the feedback from some Demand Customers that they will not be able to readily comply with the new Grid Code modification. To provide clarity and support to customers, while recognising the importance of compliance with the Grid Code Modification, EirGrid is submitting a Compliance and Derogation Framework, including 'Demand Utilisation Thresholds' for non-MPID345-compliant data centre demand during the derogation period, and requests that the CRU assesses and approves this framework. EirGrid has engaged with industry in the process of developing the compliance and derogation framework.

EirGrid is engaging positively with Demand Customers on this issue. It is our hope that by working constructively with industry that it will be possible to avoid the necessity to take further action to reduce the risks posed by FRT issues.

As set out in the Information Paper, the impact of data centre demand beyond currently contracted levels, and analysis of other technical challenges associated with the integration of new technology loads onto power systems, are subject to further consideration.

Conclusion
EirGrid requests that the CRU prioritises the assessment of the FRT Grid Code Modification (MPID345) and associated Compliance and Derogation framework. It is critical that this modification and associated compliance and derogation framework is put in place as quickly as possible.

Structure of the Recommendation Paper:
Due to the complexity of the proposed Modification, along with the detailed industry engagement, a number of additional sections have been added to this recommendation paper to outline the level of engagement between EirGrid and Industry and to ensure that the views of all parties are appropriately represented.

These additional sections are:

1. An Engagement Timeline section, detailing a timeline of the relevant industry webinars, task force meetings, Joint Grid Code Review Panel meetings and Grid Code Review Panel Meetings;
2. Appendix A contains the relevant presentations from the Industry webinars, Task Force meetings as well as those from the Joint Grid Code Review Panel and Grid Code Review Panel meetings.
   Extracts of the approved meeting minutes from the Joint Grid Code Review Panel and Grid Code Review Panel meetings have also been included, as appropriate.
3. Appendix B contains additional evidence including email correspondence received from Grid Code Review Panel Members in relation to MPID345.
4. Appendix C – Reference Document links to Large Demand Facility Fault RideThrough Issue and Proposed Solutions Information Paper, along with an ENTSO-E position paper entitled "ENTSO-E position on the need for national connection requirements to ensure EU power system stability" that was issued by ENTSO-E on 11 December 2025.

These additional sections are provided for information only. For the avoidance of doubt, the proposed Modification MPID345, and the associated Compliance and Derogation Framework, take precedence over the content set out in the additional sections referenced above including any slides or information otherwise provided at engagements including industry webinars and bilateral engagements.

The Reason for the Recommended Modification:

EirGrid (Ireland's Transmission System Operator (TSO)) and SONI (Northern Ireland's 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.

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 Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper. 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 1 below illustrates the difference between how generators typically respond to faults compared 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.

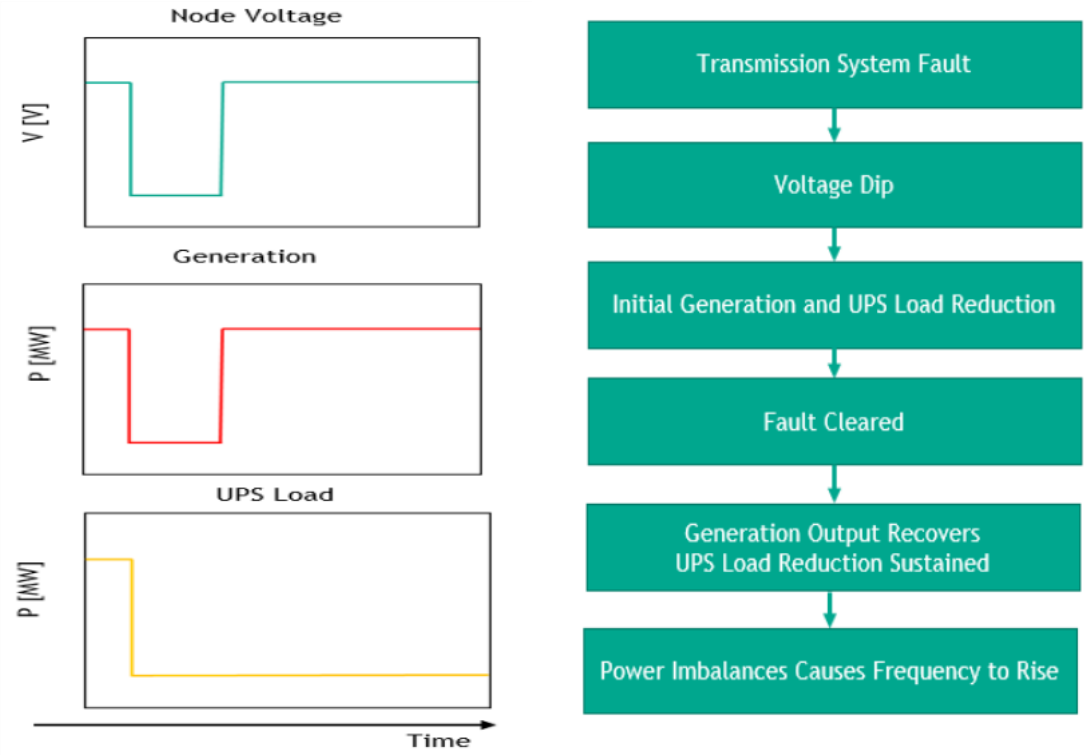


Figure 1 Illustration of Fault Impact on Generation and Power Electronics Demand

To illustrate the current demand facility performance issue, the table below summarises the aggregate level of data centre demand reduction observed during four 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 Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper.

Date	Transmission System Contingency	Data Centre Demand Reduction	Percentage of Total Data Centre Demand
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 disconnection 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 Large Demand Facility Fault RideThrough Issue and Proposed Solutions Information Paper prepared by EirGrid and SONI, 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.
EirGrid and SONI's response to this issue considers both the current operational challenges and the future needs of the power system. Steps the TSOs 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, EirGrid has identified requirements for large demand facilities to remain connected during short-term disturbances. This includes introducing fault ride-through (FRT), active power recovery (APR), and Rate of Change of Frequency (RoCoF) robustness capabilities. This proposal will enhance overall grid stability and reliability while supporting the continued growth of all Demand Facilities in line with connection contracts and government policy.

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 modification 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 also needed to support the grid during these events.

Separately and solely for information purposes, EirGrid intends to apply the standards in CC.7.4.2.1 (frequency) and CC.7.4.2.2 (voltage) to non-DCC units, and such a proposal will require compliance with Article 4(3) of the EU Demand Connection Code (DCC), which includes:

- Conducting a public consultation in accordance with Article 9, and
- Carrying out a quantitative cost-benefit analysis (CBA) as per Articles 48 and 49.

These requirements will be progressed as a separate modification proposal, subject to the steps above, in due course.

The TSOs have engaged stakeholders on this proposal. This includes hosting several webinars, 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 of pre-fault demand. This revised threshold aligns with requirements for other system users, including PPMs and HVDC.

Additionally, industry 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.

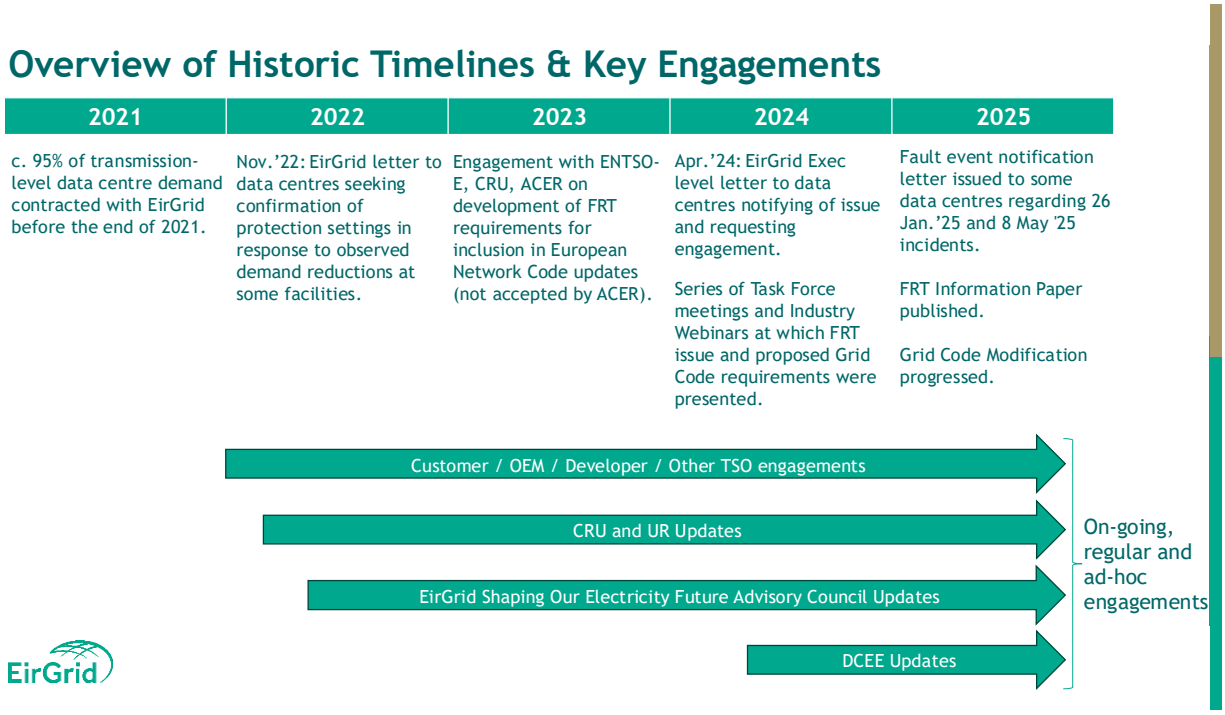
The proposed grid code modification is crucial for ensuring the security and stability of the power system facing increasing demand from Demand Customers and are in line with evolving industry best practices. Failure to implement these solutions could have significant consequences for all system users.

An Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI 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.

Engagement Timeline:

Engagement with data centre industry and key stakeholders on the FRT issue began in 2022 in response to the observed behaviour of data centres during faults. EirGrid wrote to data centre owners requesting data on their protection settings and a process of regular bi-lateral meetings with many data centre customers commenced to develop mutual understanding of the issues. While our engagement initially focussed on data centres, as the issue evolved this engagement extended to wider non-data centre transmission connected demand customers and other key stakeholders.

Some of the key engagements over the 2022 to 2025 period are summarised in the illustration below. CRU were briefed regularly on the issue via the monthly EirGrid/SONI-CRU/UR 'Shaping Our Electricity Future Operations Programme' meetings and at 'Shaping Our Electricity Future Advisory Council' meetings.



Throughout April 2024 to December 2025, when MPID345 was formally proposed as a Grid Code Modification proposal, there was significant engagement between EirGrid and Industry participants. For ease, the timeline shown below illustrates this engagement along with the subsequent engagement between January 2026 and March 2026 on the proposals for the associated Compliance and Derogation Framework which accompanies this modification proposal:

Please note that between December 2024 and September 2025, a number of other activities relevant to the development of the Grid Code Modification proposal were undertaken. These included:

- Multiple bi-lateral meetings with key stakeholders;
- The development of a suite of studies by the TSO to:
    - Provide a detailed background of the issue;
    - Determine the future challenges, if the issue is not addressed; and
    - To determine the necessary demand recovery time.

The outcome of these studies was detailed in the/MPID345-Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper originally published to the EirGrid Website in October 2025 and updated in November 2025.

History of Progression through GCRPs, Working Group and/or Consultation:

30 April 2024:
The first Industry Webinar with EirGrid and All Transmission Connected/Contracted Data Centre Demand Facilities" with the focus on the "Overview of the FRT issue". .
The key outcome of this webinar was the establishment of a Task Force, consisting of both EirGrid and Data Centre Members to discuss the identified issue and solutions.
The presentation from this webinar is available in Appendix A part 1.

16 July 2024:
The first meeting of the Task Force took place and was focused on the Development of Grid Code Standards for Fault Ride Through.
The presentation from this Task Force Meeting is available in Appendix A part 2.

27 August 2024:
The second task Force Meeting between EirGrid and Data Centre Customer representatives was held to discuss the working draft Grid Code Modification.
The presentation from this Task Force Meeting is available in Appendix A part 3.

This particular 'Task Force' group did not meet again as EirGrid determined that a broader industry engagement approach was needed rather than a data centre only task force.

24 September 2024:
At the Joint Grid Code Review Panel, EirGrid presented discussion item on the introduction of Fault-Ride-Through requirements for Demand Customers.
A number of items were discussed including:

- If the proposal would include requirements for reactive power provision. It was confirmed that reactive power provision would not be sought as part of the proposal;
- The use of UPS by Large Energy Users to protect their critical loads;
- The retrospective application of the proposal and the associated costs; and
- Fault-ride-Through for Large Energy Users is a challenge for other TSOs.

It was also noted that the next Industry Webinar would take place on 22nd October 2024.
The presentation from this discussion item, along with the extract from the Joint Grid Code Review Panel meeting minutes, are available in Appendix A part 4 and part 5 respectively.

22 October 2024:
The second Industry Webinar took place online, between all Transmission-Connected Demand Facilities, EirGrid Grid Code Review Panel, CRU. In addition to the provision of information on the Fault-Ride-Through requirements, attendees were also provided with the contact details of the Demand Customer representatives on the EirGrid Grid Code Review Panel.
EirGrid also stated their intention to seek recommendation of the proposal at the December 2024 Grid Code Review Panel meeting.
The presentation from this webinar is available in Appendix A part 6.

04 December 2024:
At the December 2024 Joint Grid Code Review Panel meeting, the Fault-ride-through requirements for Demand Facilities was presented as a discussion item by EirGrid. The Demand Customer Representatives for the EirGrid Grid Code Review Panel raised a number of items:

- Frequency changes and active power recovery should be further discussed at the webinar.
- The March GCRP meeting appears to be very premature to bring forward a Grid Code modification. Will all the studies be complete by then?
- Requirements that need a 100% derogation shouldn't be implemented.
- The full weight of this requirement falls on Demand Users. A substantial economic weight. They would like the TSO to consider a public consultation.

Another EirGrid Grid Code Review Panel member asked if an upward frequency system services product could serve to reduce this problem, as in procuring system services to manage the imbalance is an option. EirGrid described a worst-case scenario of a fault near the interconnector with the loss of 500 MW of demand and EWIC trips, in the Dublin area where there is a large proportion of demand energy users this will result in demand reduction and it would be very difficult for any TSO to manage this imbalance even with high system services. He also clarified that there is a FRT requirement for interconnectors.
The presentation from this Joint Grid Code Review discussion item, along with the extract from the approved Joint Grid Code Review Panel meeting minutes, are available in Appendix A part 7 and part 8 respectively.

10 December 2024:
At the third industry webinar with all Transmission-Connected Demand Facilities, EirGrid Grid Code Review Panel, CRU, in addition to providing an overview of the issues and seeking further feedback from industry, EirGrid also noted that there would be engagement with data centre owners in the new year (2025) to address modelling issues.
Again, feedback from industry regarding the then-current Grid Code proposal was sought and EirGrid indicated their intention to share a revised version in February 2025, in advance of seeking recommendation at the March Grid Code Review Panel meeting.
The presentation from this webinar is available in Appendix A part 9.

December 2024 to September 2025:
A number of other works relevant to the development of the Grid Code Modification proposal were undertaken. These included:

- Bi-lateral meetings with key stakeholders;
- The development of a suite of studies by the TSO to:
- Provide a detail background of the issue;
- Determine the future challenges, if the issue is not addressed; and
- To determine the necessary demand recovery time.

The outcome of these studies was detailed in the Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper published to the EirGrid Website in October 2025.

At the June 2025 Joint Grid Code review Panel meeting, a verbal update was provided by the EirGrid GCRP Chairperson where she stated ""These requirements are still under consideration by the two TSOs. Further industry communication will take place in due course." No further comments were received from the Joint Grid Code Review Panel. The slide and extract from the Joint Grid Code Review Panel Meeting minutes are available in Appendix A part 10.

25 September 2025:
At the September 2025 Joint Grid Code Review Panel meeting, EirGrid gave an overview of the proposed Fault Ride-Through requirements for Demand Facilities.

Following the presentation by EirGrid, there was an in-depth discussion regarding the proposal. The main points raised by the JGCRP members were:

- Concerns that all parties would be non-compliant if the proposal was implemented in December 2025;
- The inclusion of the requirement for post fault active power recovery, which was not previously communicated to industry;
- Concerns regarding the retrospectively application of the proposed requirements to the existing Demand Facilities. However, it should be noted that all Grid Code Modifications are retrospectively applied, unless there is a very specific reason for not doing so and such a reason would form part of the Grid code modification proposal;
- Questions were raised about how such requirements would be tested and it was clarified that this would be achieved via studies; and
- The DSO representative noted that if Grid Code modification is approved, similar change will be needed for Distribution Code, although a MW threshold may need to be developed.

The presentation from this Joint Grid Code Review Panel meeting, along with the extract from the Joint Grid Code Review Panel meeting minutes, are available in Appendix A part 11 and part 12 respectively.

03 November 2025:

A fourth industry webinar was held with participants attending online. This webinar was held post the publication of the Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper. The intention of the webinar was to:

- Provide an overview of the published Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper;
- To set out the next steps; and
- To facilitate an open discussion regarding the Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper and the proposed Grid Code Modification.

Further feedback from industry was requested by 7 November 2025. It was also noted that:

- A further webinar would be held on 26 November 2025, in advance of the proposal being brought forward to EirGrid and SONI Grid Code Review Panels in December 2025;
  It was intended to provide further information regarding the Grid Code Compliance/derogation processes.
- EirGrid remains open to continuing bi-lateral engagements with industry.

The presentation from this webinar is available in Appendix A part 13.

26 November 2025:

At the 5th industry webinar, a summary of the feedback received from industry was provided, along with the TSO response. This summary included, but was not limited to:

Industry Feedback	**EirGrid Response**
No market ready solutions that meet the proposed FRT requirements currently exist	The data centre industry is actively engaged in development of technical solutions to the FRT issue with one OEM indicating that a technical solution may be available for commence roll-out during 2026.
Some non-data centre customers did support the proposal from a grid security perspective.	EirGrid acknowledged and appreciated this support. The proposed modification is designed to enhance overall system resilience and maintain security of supply for all customers.
Concern with the proposed Grid Code modification timeline	It was noted that the first draft of the modification was shared with the Joint Grid Code Panel in September 2024, and broader industry in October 2024.
This will lead to severe reputational damage for the impacted customers and 'Ireland Inc'.	The application of the proposed requirements will strengthen grid resilience and support Ireland's reputation as a leader in sustainable energy growth. Continued collaboration with industry will help mitigate potential reputational impacts.
This is a non-standard approach when compared internationally.	The grid code modification approaches are following established grid code governance arrangements.

An overview of the "splitting" of the proposed modification was presented during the webinar. The application of the European Connection Network Code Demand Connection Code (DCC) frequency and voltage ranges to Non-DCC units is subject to a Cost-Benefit-Analysis, as defined in the DCC. This would need to be progressed as a separate Grid Code modification.

Finally, an overview of the Grid Code submission Timeline and next steps was presented to industry.

The full presentation from this webinar is available in Appendix A part 14.

3 December 2025:

At the Joint Grid Code Review Panel, EirGrid presented on MPID345, which had been renamed "Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities" to reflect all of the proposed elements of the modification.

Following the presentation, a detailed discussion took place, including the following key points:

- How a three-phase voltage dip would be lower than a single-phase voltage dip and would propagate across the island, and so is more likely to cause the demand reduction response;
- A compliance and derogation framework was under development by EirGrid and are aiming to present this to industry, at a webinar, week commencing 12 January 2026, in advance of the submission of the Grid Code Proposal recommendation paper on 30th January.
- If the system modelling addressed other potential mitigations, such as increased response and inertia to the system. To which, EirGrid noted that given the level of demand reduction compared to the total system demand, and the nature of the power system studies show a loss of 17 – 39% of demand for an N-1 scenario.
- If the loss of an interconnector at full export uniquely impactful to trigger a 39% demand loss, or is that just the tip of the spear and other events could be equally impactful? EirGrid noted that such a scenario is one of the most critical, as a fault close to EWIC would result in loss of the HVDC export, with the voltage dip from the fault also resulting in a high loss of demand, as most of the relevant demand is connected in Dublin. However, many transmission faults, especially a fault on the transmission network around Dublin, will cause a significant reduction in demand. This level of demand reduction will increase as future non-FRT-compliant demand increases.
- A member queried the value in putting requirements into the Grid Code when the technology is not available to allow Demand Facilities to comply with the requirements. One member stated "that one OEM has stated that they may have a possible solution, but this is not a one size fits all. The other issue with the proposed modification is that the requirements are retrospectively applied." EirGrid noted that retrospection is not unique to this modification proposal and applies to all EirGrid Grid Code modifications. In addition, given the level of issues that the system is currently experiencing with Demand Facilities, retrospective application of the proposed Grid Code requirements is critical to system security.
  Later in the meeting, another member queried the merit of pushing ahead with the proposed modification when all parties will need to seek a derogation. To which EirGrid noted that TSOs have engaged with many customers on the proposed requirements and both SONI and EirGrid understand the challenges ahead. The TSOs have weighed compliance with this requirement against the security of the power system. The TSOs recognise the importance of the compliance and derogation framework in understanding a customer's feasible path to compliance, and the importance of submitting the proposed framework to the CRU together with the modification recommendation.
- EirGrid have taken industry feedback on board in relation to the post fault active power recovery and revised the proposal to include Demand Facilities return at least 90% of their pre-fault Demand within 500 milliseconds of the Transmission System Voltage recovering to 90% of the nominal Voltage.
- A member queried the status of the compliance and derogation framework, indicating that the proposed Grid Code modification should not be recommended without it. However, EirGrid noted that the proposal has been under development for a significant period of time and is now required urgently for system security. It was noted that a further industry webinar regarding the proposed framework would take place in January 2026.
- EirGrid stated that the TSOs work very closely with existing customers to achieve compliance and SONI and EirGrid are committed to continue working with all users to mitigate non-compliance.
- Another member added that this requirement will drive costs for the TSOs too for a solution that may or may not work. A member recommended that the TSOs add a cost comparison analysis to the recommendation paper. EirGrid explained that the primary driver for the proposed requirements is to maintain power system security. If this issue is not resolved, system security is at risk.
  Currently, mitigation measures are impacting the market, such as needing to restrict exports on Interconnectors to reduce the risk to the system. It is infrequent that the market is driving exports in recent times, so those costs may not be huge at the minute, but that could change in future. But the main driver is system security, not cost.
- Another member noted that energy users need a reliable and secure grid, but echoed support for earlier comments on the retrospective application of the requirements.
- It was also noted that the contracted demand due to connect to the Transmission System is far in excess of the currently connected 800 MW, while the existing mitigation measures, such as over-frequency generation shedding (e.g. tripping of wind farms), can only go so far in terms of managing the issue.

As the discussion drew to a close, EirGrid and SONI noted the need for urgency in addressing this issue, and that the TSOs intend to recommend the modification proposal to the Regulators for approval.

The presentation from this Joint Grid Code Review Panel meeting, along with the extract from the Joint Grid Code Review Panel meeting minutes, are available in Appendix A part 15 and part 16 respectively.

Following the closure of the Joint Grid Code Review Panel meeting, the EirGrid Grid Code Review Panel meeting took place. The EirGrid Grid Code Review Panel members were asked if members wished to voice their support for the proposed modification. A number of member voiced their opinions, including:

- Two members, (TSO representative and DSO representative) supported the modification;
- The on-Synchronous Renewable Generators member stated that he could not raise an objection but must acknowledge and understand the challenges that the demand customers face in complying with this requirement;
- One of the Demand Customers members stated that his Grid Code requirement is not achievable, and a Working Group should be established;
- The Fast Acting Peaking Generators members support the recommendation in general, but noted how it is applied requires further discussion;
- The DSU member stated that while there may be one possible solution to fix this but that is in the pipeline, it doesn't seem like a sensible way forward given the discussion at the JGCRP meeting;
- The thermal generators member noted that the proposed modification, in its current format, is not mature enough. This view was echoed by the second Demand Customers member, who further noted that Industry wishes to work with EirGrid to resolve the issue.

Following the feedback from the Grid Code Review Panel members, EirGrid noted the comment on the maturity of the proposed modification and highlighted the update and clarifications to the proposal following industry feedback. EirGrid also highlighted that the predominant issue is the safety and resilience of the grid. This requirement is in the best interest of all users including Demand and Generation. The TSO is close to breaching their security standard and that those standards are there for the security of the system. EirGrid understands and appreciates the challenges that Demand Customers face but will be recommending this requirement for approval to the CRU.

It was again noted that there had been a significant level of engagement with individual parties and the TSO is confident there will be solutions brought forward but if this requirement is not implemented then there will be a significant operational security risk to the grid.

Finally, the DSO member noted that the DSO will bring forward a similar modification to the Distribution Code. The DSO will need to consider a MW threshold otherwise the DSO will be swamped with derogation applications given the level of connections.

The presentation from the Grid Code Review Panel meeting, along with the extract from the Grid Code Review Panel meeting minutes, are available in Appendix A part 17 and part 18 respectively.

Further to the engagement on the proposed Grid Code modification itself, a further series of engagements took place related to EirGrid's proposals for a Compliance and Derogation Framework to support the modification. These engagements are summarised in the table below.

Date	Webinar/ Task force meeting	Topic	Recipient / Participant
17 December 2025	N/A	Overview of proposed Grid Code Modification MPID345 Framework issued via email.	All Transmission-Connected Demand Facilities, EirGrid Grid Code Review Panel, CRU
14 January 2026	6th Industry Webinar	Presentation of the proposed Grid Code Modification MPID345 Framework.	All Transmission-Connected Demand Facilities, EirGrid Grid Code Review Panel, CRU
19 January 2026	7th Industry Webinar	Follow-up engagement on the proposed Framework.	All Transmission-Connected Demand Facilities, EirGrid Grid Code Review Panel, CRU
11 February 2026	8th Industry Webinar	Presentation of updated Grid Code Modification MPID345 Framework proposals.	All Transmission-Connected Demand Facilities, EirGrid Grid Code Review Panel, CRU

12 March 2026	9th Industry Webinar	Presentation of updated Grid Code Modification MPID345 Framework proposals.	All Transmission-Connected Demand Facilities, EirGrid Grid Code Review Panel, CRU

Details of these engagements are contained in the accompanying 'EirGrid Grid Code Modification MPID345 Compliance and Derogation Process Framework' proposal that accompany this modification proposal.

In addition to the industry engagement described above, further correspondence was received from two Grid Code Review Panel Members, as detailed below:

- A letter from Tom Birney (Energy Storage Ireland) which noted:
  - They could see merit in considering imposing additional grid code requirements on LEUs, however they also noted that there is concern raised generally from LEUs in respect to mass non-compliance with the proposed requirements;
  - They believe that the issue should be assessed more comprehensively with consideration for higher volumes of additional reserves and inertia and any other potential services (e.g. DRR) that might help alleviate the issue;
  - They also stated that there have been recent changes imposed by the TSOs to limit the operational state of charge on operational energy storage units (e.g. >85%) which they understood was intended to reserve certain volumes of over frequency reserves in an attempt to resolve the issue identified in the Large Demand Facility Fault Ride Through Issue and Proposed Solutions EirGrid and SONI Information Paper and that this topic warrants careful consideration and consultation with industry to ensure there is no unintended impact to existing and future investment decisions.

  The full transcript of Tom Birney's letter is available in Appendix B part 1.

- An email from Patrick Liddy (DRAI) in which he stated "I believe I made a comment to the effect that possibly this modification could be approved if it was not retroactive, and that as such that alternative should be considered. I really think this should be included as it would reduce the damage to investor confidence (both generator and DC) that this retroactive measure will create".

  The full transcript of Patrick Liddy;s email is available in Appendix B part 2.

Summary Note of any Objections to the Recommended Change from GCRP Members or Consultation Responses:

Throughout the engagement with Industry, the main points raised were:

1. Demand Users' ability to comply with the proposal. Many Users noted that there currently isn't an "off the shelf" solution. Their existing plant and apparatus was not designed to be fault ride through capable, or to have the post fault power recovery, as specified in the modification proposal. However, EirGrid has highlighted that at least one Original Equipment Manufacturer (OEM) indicated the intention to roll-out a commercial level solution within the next year and while this may not be a one size fits all solution, it is an indication of the developments in this area. EirGrid expects that other OEMs will follow suit.
2. All existing Demand Users would be non-compliant with the proposed modification, if approved. EirGrid has acknowledged that this is an issue and is developing a Compliance/Derogation Framework proposal to assist and support Demand Users with achieving compliance.
3. Demand Users also raised concerns around costs:
   - the potential costs of achieving compliance currently being unknown. They will need to engage with their respective OEMs to determine the works involved to achieve compliance or mitigating against non-compliance; and
   - the potential financial impact of not being able to ramp up their demand utilisation due to ongoing non-compliance. EirGrid has noted that demand, which is compliant with the proposal, will be able to ramp up and that the demand Utilisation cap is only applies to the non-compliant Demand.

Outcome of any GCRP Meeting Actions Relating to the Recommended Modification:

EirGrid, as the TSO, is submitting MPID345 to the CRU for approval, noting the objections and concerns raised by the GCRP members, as detailed above.

While actions adopted to date have kept this FRT risk within manageable limits, their utility is being exhausted as data centre demand utilisation increases. Above the Load Rejection limit outlined in this document, existing mitigations will not be sufficient to maintain the required level of grid stability. Demand control actions to reduce non-MPID345 compliantdemand would then need be taken, as is required of the TSO, to protect the integrity of Ireland's power system. **Therefore, the inclusion of the requirements outlined in this document in the Grid Code and their implementation by large demand facilities supported by a compliance and derogation framework are urgently required.**

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

CC.7.4.2 **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** shall:

CC.7.4.2.1 Remain synchronised to the **Transmission System** and operate within the frequency ranges and time periods specified in *Table CC.7.4.2.1*.

*Table CC.7.4.2.1: Minimum Time Periods for **Demand Facilities,** **Closed Distribution Systems** and **Distribution Systems** to Remain Operational without Disconnecting*

Frequency Range	Time Period
47 – 47.5 Hz	20 seconds
47.5 – 48.5 Hz	90 minutes
48.5 – 49 Hz	90 minutes
49 – 51 Hz	Unlimited
51 – 51.5 Hz	90 minutes
51.5 – 52 Hz	60 minutes

CC.7.4.2.2 Remain synchronised to the **Transmission System** and operate within the ranges of the **Transmission System Voltage** at the connection point, for an unlimited time period, as specified below:

i. 400 kV system: 360 kV to 420 kV (0.9 p.u. – 1.05 p.u.)
ii. 220 kV system: 198 kV to 245 kV (0.9 p.u. – 1.114 p.u.)
iii. 110 kV system: 99 kV to 123 kV (0.9 p.u. – 1.118 p.u.)

CC.7.4.2.3 **Demand Facilities** which alter their MW consumption at their **Connection Point**, based on changes in **Transmission System Frequency** and/or **Voltage**, shall co-ordinate and agree their controls, protection, triggers and/or settings with the **TSO** in advance of such alterations as appropriate.

CC.7.4.3.1 **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 CC.7.4.3.2 supersedes this clause (CC.7.4.3.1).

CC.7.4.3.2 **Demand Facilities** shallremain 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.7.4.3.2 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 ms 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**.

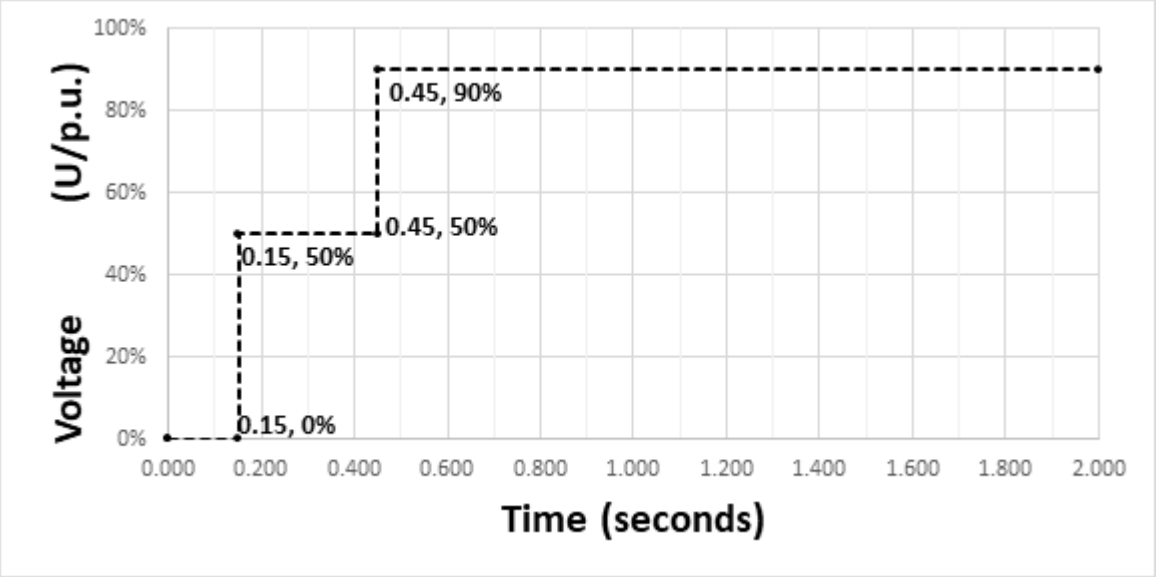


Figure CC.7.4.3.2: Voltage-against-time profile at the connection point for fault condition

CC.7.4.~~2.~~ 4.1 **Reactive Power**

CC.7.4.~~2.~~ 4.1.1. **Demand Facilities** without onsite generation shall be capable of maintaining their steady-state operation at their **Connection Point** within a **Reactive Power** range of 0 to 0.48 [Qmax/PMIC] equal to a power factor of 1 to 0.9 lagging.

Demand Facilities with onsite generation shall be capable of maintaining their steady- state operation at their **Connection Point** within a **Reactive Power** range of -0.48 [Qmin/max{PMEC,PMIC}] to 0.48 [Qmax/PMEC] which is equal to a power factor of 0.9lagging to 0.9 leading.

CC.7.4.~~2.~~4.1.2. The **Distribution System** shall be capable of maintaining steady-state operation at the **Connection Point** within a **Reactive Power** range of -0.48 Q_{min}/max{P_{MEC},P_{MIC}} during **Reactive Power** import/consumption, and 0.48 Q_{max}/P_{MEC} during **Reactive Power** export/production equal to a power factor of 0.9 lagging to 0.9 leading, except in situations where either technical or financial system benefits are proved by the **TSO** and the **DSO** through joint analysis. The **TSO** and **DSO** shall agree on th e scope of such an analysis, which shall address the possible solutions, and determine the optimal solution for **Reactive Power** exchange between their systems, taking adequately into consideration the

specific system characteristics, variable structure of power exchange, bidirectional flows and the **Reactive Power** capabilities in the **Distribution System**.

CC.7.4.~~2~~.4.1.3. The **TSO** may require a **Closed Distribution System or Distribution System** to have the capability at the **Connection Point** to not export **Reactive Power** (at reference 1 p.u. voltage) at an **Active Power** flow of less than 25 % of the **Maximum Import Capacity**. The request will be justified through a joint analysis with the **Closed Distribution System** or the **Distribution System Operator** and the **TSO**. If the requirement is not justified based on the joint analysis, the **TSO** and the **Closed Distribution System** or **Distribution System Operator** shall agree on necessary requirements according to the outcomes of the joint analysis.

CC.7.4.~~2~~.4.1.4. Without prejudice to CC.7.4.~~2~~4.4.3, the **TSO** may require a **Closed Distribution System** or the **Distribution System** to actively control the exchange of **Reactive Power** at the **Connection Point** for the benefit of the entire system. The **TSO** and the **Closed Distribution System** or **Distribution System Operator** shall agree on a method to carry out this control, to ensure the justified level of security of supply for both parties. The justification shall include a roadmap in which the steps and the timeline for fulfilling the requirement are specified.

CC.7.4.~~2~~.4.1.5. The **Closed Distribution System** or **Distribution System Operator** may require the **TSO** to consider its **Closed Distribution System** or **Distribution System** for **Reactive Power** management.

CC.7.4.~~2~~.4.2 **Reconnection**

CC.7.4.~~2~~.4.2.1. The **TSO** will specify the conditions under which **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** can reconnect following a **Disconnection**.

CC.7.4.~~2~~.4.2.2. **Demand Facilities**, **Closed Distribution Systems** and **Distribution Systems** shall facilitate **Synchronising** to the **Transmission System** within the limits 47 – 52.0 Hz.

CC.7.4.~~2~~.4.2.3. The **TSO** shall agree the settings for synchronisation devices with **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** prior to connection.

CC.7.4.~~2~~.4.3 **Disconnection**

CC.7.4.~~2~~.4.3.1. **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** shall be capable of remote **Disconnection** from the **Transmission System**. The equipment required for automated remote **Disconnection** will be specified by the **TSO**. The automated remote **Disconnection** system will be required to operate without any time delays, other than those inherent in the design of the system.

CC.7.4.~~2~~.4.4 **Short-circuit**

Demand Facilities, **Closed Distribution Systems** and **Distribution Systems** shall be capable of withstanding maximum short-circuit currents as specified in CC.8.6

Green-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

CC.7.4.2 **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** shall:

CC.7.4.2.1 Remain synchronised to the **Transmission System** and operate within the frequency ranges and time periods specified in *Table CC.7.4.2.1*.

*Table CC.7.4.2.1: Minimum Time Periods for **Demand Facilities,** **Closed Distribution Systems** and **Distribution Systems** to Remain Operational without Disconnecting*

Frequency Range	Time Period
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CC.7.4.2.2 Remain synchronised to the **Transmission System** and operate within the ranges of the **Transmission System Voltage** at the connection point, for an unlimited time period, as specified below:

i. 400 kV system: 360 kV to 420 kV (0.9 p.u. – 1.05 p.u.)
ii. 220 kV system: 198 kV to 245 kV (0.9 p.u. – 1.114 p.u.)
iii. 110 kV system: 99 kV to 123 kV (0.9 p.u. – 1.118 p.u.)

CC.7.4.2.3 **Demand Facilities** which alter their MW consumption at their **Connection Point**, based on changes in **Transmission System Frequency** and/or **Voltage**, shall co-ordinate and agree their controls, protection, triggers and/or settings with the **TSO** in advance of such alterations as appropriate.

CC.7.4.3.1 **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 CC.7.4.3.2 supersedes this clause (CC.7.4.3.1)

CC.7.4.3.2 **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.7.4.3.2 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 ms 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**.

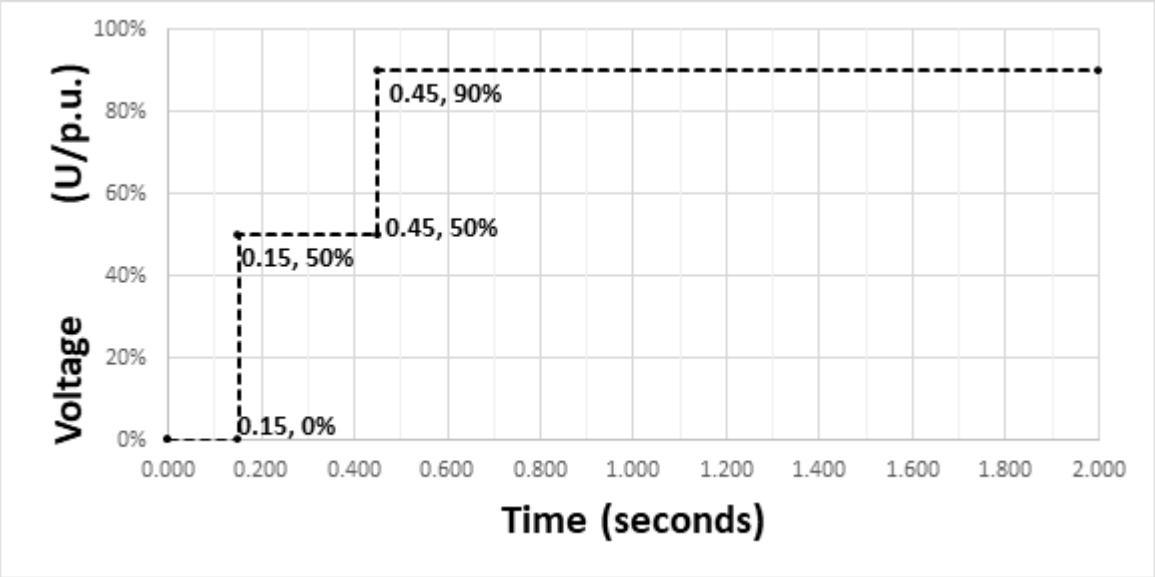

Figure CC.7.4.3.2: Voltage-against-time profile at the connection point for fault condition

CC.7.4.4.1 **Reactive Power**

CC.7.4.4.1.1. **Demand Facilities** without onsite generation shall be capable of maintaining their steady-state operation at their **Connection Point** within a **Reactive Power** range of 0 to 0.48 [Qmax/PMIC] equal to a power factor of 1 to 0.9 lagging.

Demand Facilities with onsite generation shall be capable of maintaining their steady- state operation at their **Connection Point** within a **Reactive Power** range of -0.48 [Qmin/max{PMEC,PMIC}] to 0.48 [Qmax/PMEC] which is equal to a power factor of 0.9lagging to 0.9 leading.

CC.7.4.4.1.1 The **Distribution System** shall be capable of maintaining steady-state operation at the **Connection Point** within a **Reactive Power** range of -0.48 Q_{min}/max{P_{MEC},P_{MIC}} during **Reactive Power** import/consumption, and 0.48 Q_{max}/P_{MEC} during **Reactive Power** export/production equal to a power factor of 0.9 lagging to 0.9 leading, except in situations where either technical or financial system benefits are proved by the **TSO** and the **DSO** through joint analysis. The **TSO** and **DSO** shall agree on th e scope of such an analysis, which shall address the possible solutions, and determine the optimal solution for **Reactive Power**

exchange between their systems, taking adequately into consideration the specific system characteristics, variable structure of power exchange, bidirectional flows and the **Reactive Power** capabilities in the **Distribution System**.

CC.7.4.4.1.3. The **TSO** may require a **Closed Distribution System or Distribution System** to hav e the capability at the **Connection Point** to not export **Reactive Pomwer** (at reference 1 p.u. voltage) at an **Active Power** flow of less than 25 % of the **Maximum Import Capacity**. The request will be justified through a joint

analysis with the **Closed Distribution System** or the **Distribution System Operator** and the **TSO**. If the requirement is not justified based on the joint analysis, the **TSO** and the **Closed Distribution System** or **Distribution System Operator** shall agree on necessary requirements according to the outcomes of the joint analysis.

CC.7.4.4.1.4. Without prejudice to CC.7.4.2.4.3, the **TSO** may require a **Closed Distribution System** or the **Distribution System** to actively control the exchange of **Reactive Power** at the **Connection Point** for the benefit of the entire system. The **TSO** and the **Closed Distribution System** or **Distribution System Operator** shall agree on a method to carry out this control, to ensure the justified level of security of supply for both parties. The justification shall include a roadmap in which the steps and the timeline for fulfilling the requirement are specified.

CC.7.4.4.1.5. The **Closed Distribution System** or **Distribution System Operator** may require the **TSO** to consider its **Closed Distribution System** or **Distribution System** for **Reactive Power** management.

CC.7.4.4.2 **Reconnection**

CC.7.4.4.2.1. The **TSO** will specify the conditions under which **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** can reconnect following a **Disconnection**.

CC.7.4.4.2.2. **Demand Facilities**, **Closed Distribution Systems** and **Distribution Systems** shall facilitate **Synchronising** to the **Transmission System** within the limits 47 – 52.0 Hz.

CC.7.4.4.2.3. The **TSO** shall agree the settings for synchronisation devices with **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** prior to connection.

CC.7.4.4.3 **Disconnection**

CC.7.4.4.3.1. **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** shall be capable of remote **Disconnection** from the **Transmission System**. The equipment required for automated remote **Disconnection** will be specified by the **TSO**. The automated remote **Disconnection** system will be required to operate without any time delays, other than those inherent in the design of the system.

CC.7.4.4.4 **Short-circuit**

Demand Facilities, **Closed Distribution Systems** and **Distribution Systems** shall be capable of withstanding maximum short-circuit currents as specified in CC.8.6

Appendix A – Supporting Documentation

Part 1 – Presentation from 1st Industry Webinar on 30 April 2024:

Data Centre Response to Power System Faults

Industry Webinar

30 April 2024

EirGrid GROUP

CONFIDENTIAL- Not for Onward Circulation

Key Messages

1. The demand response of multiple data centres to a fault on the power system continues to present challenges to the resilience and stability of the power system.
2. Sensitive protection settings (Under/Over Voltage, Under/Over Frequency, Rate of Change of Frequency) on data centre electrical systems are driving this response.
3. EirGrid is requesting the support of the data centre industry in the establishment of a Task Force focused on resolving this matter.

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Agenda

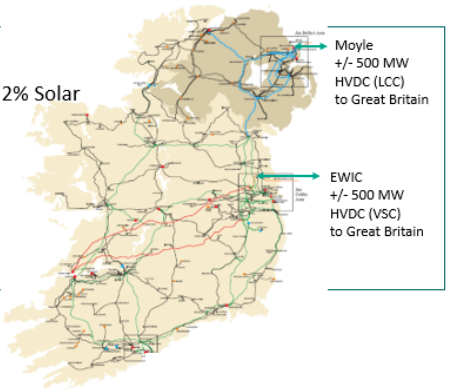
1. Power System Background and Data Centre Demand
2. Fault Ride Through Behaviour of Data Centres and Impact on the Power System
   a) Actual System Events
   b) Potential Future Events
3. International Experience
4. Cyclical Fluctuations of Data Centre Demand and Impact on Power/Frequency Quality
5. Task Force Proposal
6. Next Steps and Open Discussion

Background: All-Island Power System and Data Centres

System
- Two Jurisdictions
- SONI is the TSO in N.Ireland
- EirGrid is the TSO in Ireland
- Single Synchronous Area & Market
- Transmission: 110/220/275/400 kV
- Jurisdictional Transmission Control
- All-Island Scheduling and Dispatch

Generation
- 55% Gas/Coal/Oil, 36% Wind, 1.2% Solar
- Installed Wind: 6.0 GW
- Peak Wind: 4.7 GW (Dec 2023)

Demand
- Peak Demand: 7.0 GW
- Minimum Demand: 2.5 GW



Data Centres
- In Ireland, there is presently approximately 2000 MVA of demand capacity that is contracted to data centres and other new technology loads at the transmission level, and approximately a further 300 MVA contracted at the 110 kV distribution level. By end of 2022, there was 734 MVA of these loads connected.
- Data centre demand could potentially account for 30% of peak demand by 2030.
- A significant proportion of this demand is connected or expected to be connected in the Dublin area subject to CRU directions.

Source: EirGrid & SONI Generation Capacity Statement 2023-2032

Background: Size of the Power System Matters

- The All-Island Power System is smaller and has less interconnection than the Continental European Power System.
- As a result, frequency deviations tend to be quicker and have a larger magnitude during normal and abnormal system conditions (e.g., trips/faults) on the All-Island Power System.
- This is illustrated in the Figure below.

System Parameter	All-Island Power System	Continental European Power System
Peak Demand (GW)	7	~441
Minimum Inertia Level (GVA·s)	23	~1000

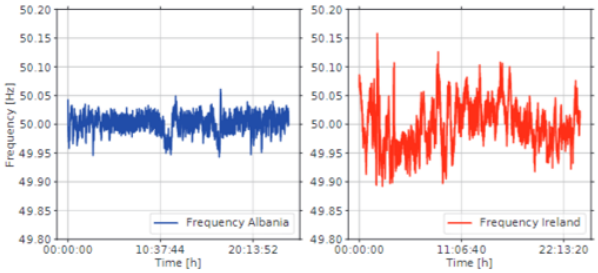
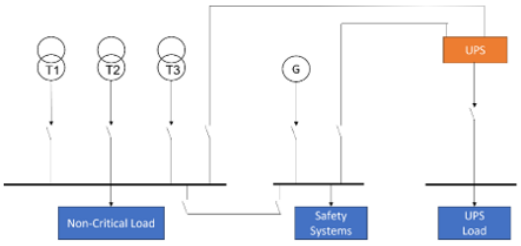


Fig. 1: Frequency in the CE and IE/NI power systems for 01.01.2021.

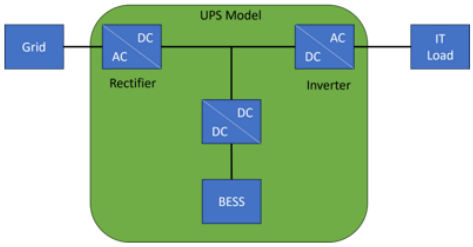
Source: T. Kërçi, M. Hurtado, M. Gjergji, S. Tweed, E. Kennedy and F. Milano, "Frequency Quality in Low-Inertia Power Systems," 2023 IEEE Power & Energy Society General Meeting (PESGM), Orlando, FL, USA, 2023, pp. 1-5.

Issue 1: Fault Ride Through Behaviour of Data Centres and Impact on the Power System

Illustration of Fault Ride Through Behaviour of Data Centres



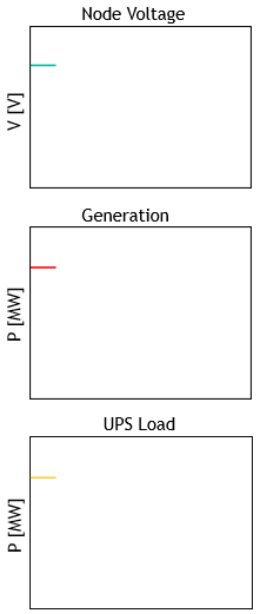
Load supply structure of a typical data centre.



Typical UPS schematic.

Voltage Induced Frequency Rise - Step Through

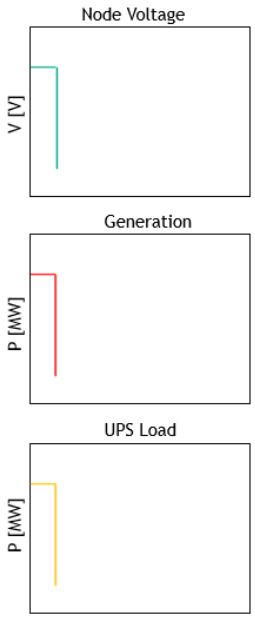
Severe System Fault



Voltage Induced Frequency Rise - Step Through

Severe System Fault

Voltage Dip



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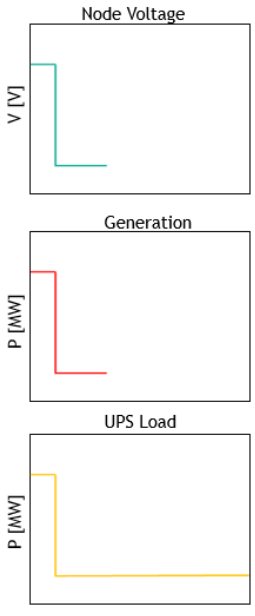
Voltage Induced Frequency Rise - Step Through

Severe System Fault

Voltage Dip

G - Reduction temporarily
UPS Load - Reduction permeant



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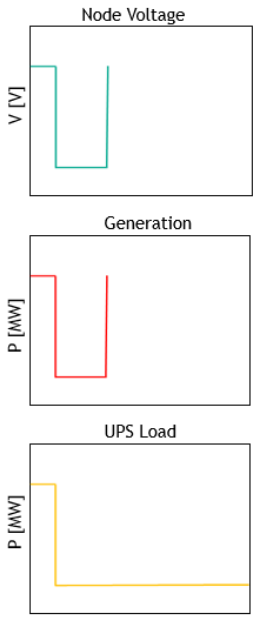
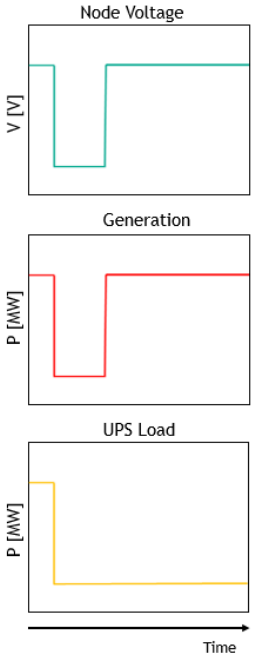
Voltage Induced Frequency Rise - Step Through

- Severe System Fault
- Voltage Dip
- G - Reduction temporarily
  UPS Load - Reduction permeant
- Fault Cleared



Voltage Induced Frequency Rise - Step Through

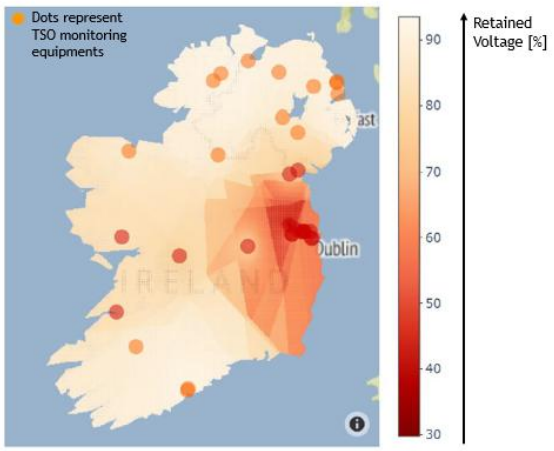
- Transmission System Fault
- Voltage Dip
- Initial Generation and UPS Load Reduction
- Fault Cleared
- Generation Output Recovers
  UPS Load Reduction Sustained
- Power Imbalances Causes Frequency to Rise



Fault Ride Through Behaviour of Data Centres and Impact on the Power System

Transmission Fault 1

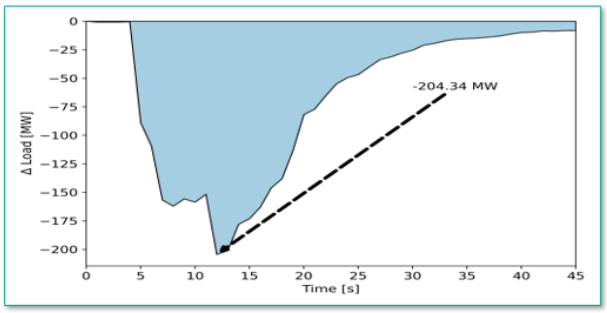
- At 16:57 hours on Tuesday 13 December 2022, the Kellystown - Woodland 220 kV line tripped, reclosed and tripped for a single phase to ground fault (RE).
- This fault caused the largest data centre demand reduction to date with a 204 MW data centre demand reduction (approximately 50% of total data centre demand at the time of incident).
- This caused a Rate of Change of Frequency (RoCoF) of 0.12 Hz/s and a Frequency Zenith of 50.22 Hz (see next slide).

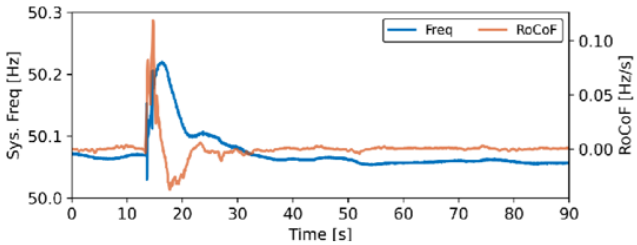


Voltage dip propagation (contour map)

Fault Ride Through Behaviour of Data Centres and Impact on the Power System

Transmission Fault 1

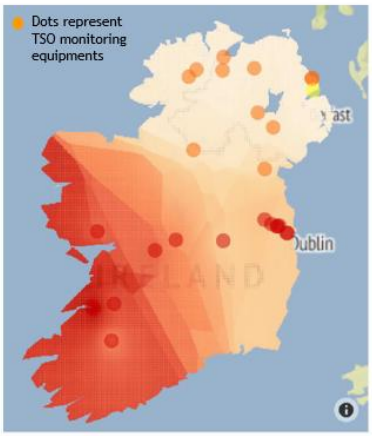




Fault Ride Through Behaviour of Data Centres and Impact on the Power System

Transmission Fault 2

- On 07th January 2022 at 01:50 hours, the Killpaddoge-Killonan 220 kV line tripped for a phase-phase fault (ST) causing a nearby generator to trip from 171 MW combined with 80 MW of data centre demand reduction.

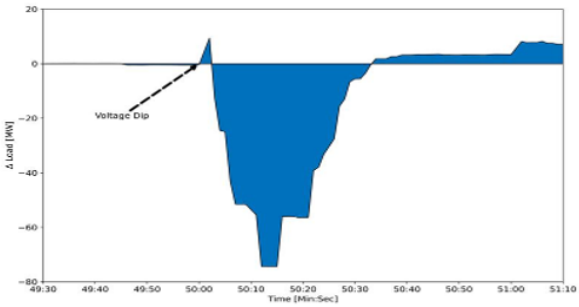


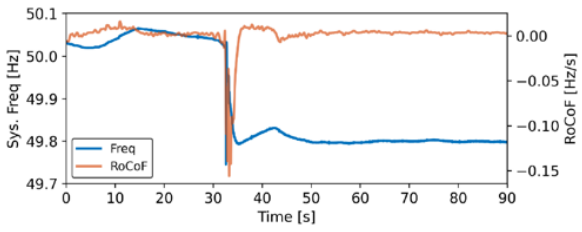
Voltage dip propagation (contour map)

Distance of data centres from the fault.

Fault Ride Through Behaviour of Data Centres and Impact on the Power System

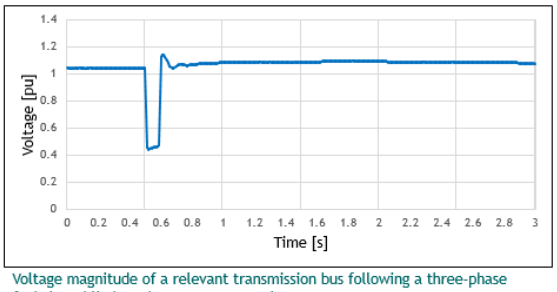
Transmission Fault 2



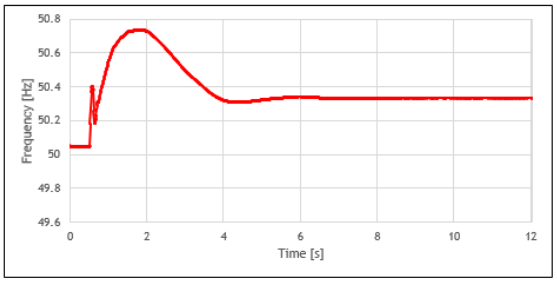


Fault Ride Through Behaviour of Data Centres and Impact on the Power System: 2025 Scenario

- The example presented here is based on simulation of a 2025 scenario with additional data centre demand with performance characteristics reflective of existing behaviour.
- The impact of a three-phase fault on the Dublin transmission system was modelled in our power system dynamic simulation tool.
- The fault results in a voltage dip that triggers a high level of demand reduction at data centres causing a significant power imbalance and high frequency. In the model approximately 800 MW of data centre demand reduction was observed which triggered an equivalent 900 MW tripping of wind generation to maintain stability.
- Additional data centre demand with similar performance characteristics will further exacerbate this issue.



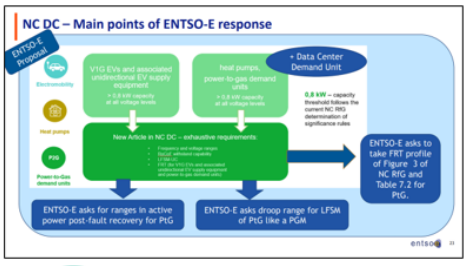
Voltage magnitude of a relevant transmission bus following a three-phase fault in Dublin based on a 2025 Scenario.

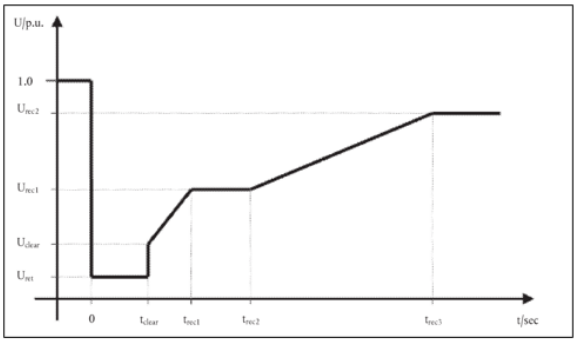


System Frequency following a three-phase fault in Dublin based on a 2025 Scenario.

Fault Ride Through Behaviour of Data Centres and Impact on the Power System: International Experience

The European Network of Transmission System Operators for Electricity (ENTSO-E) proposed to the European Union Agency for the Cooperation of Energy Regulators (ACER) to include a new data centre demand category (110 kV and above) requirements in to Network Code on Demand Connection (DCC 2.0) and apply Fault Ride-Through, RoCoF and Limited Frequency Response, among others.

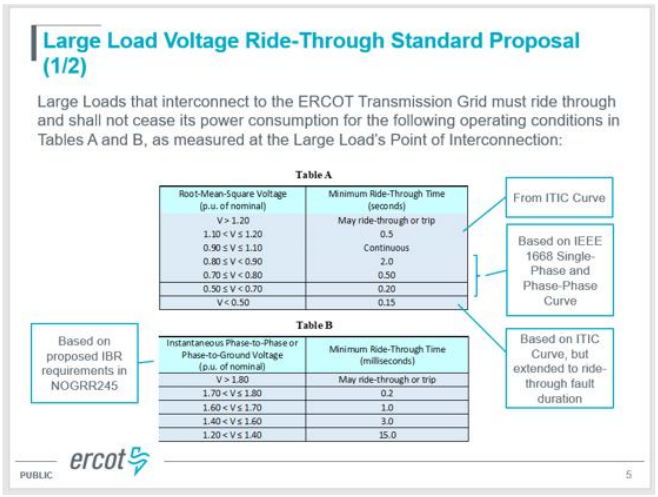




Voltage parameters (pu)		Time parameters (seconds)	
U_{ret}:	0	t_{clear}:	0,14-0,15 (or 0,14-0,25 if system protection and secure operation so require)
U_{clear}:	U_{ret}	t_{rec1}:	t_{clear}
U_{rec1}:	U_{clear}	t_{rec2}:	t_{rec1}
U_{rec2}:	0,85	t_{rec3}:	1,5-3,0

Source: ENSTO-E proposal

Fault Ride Through Behaviour of Data Centres and Impact on the Power System: International Experience



Large Load Voltage Ride-Through Standard Proposal (1/2)

Large Loads that interconnect to the ERCOT Transmission Grid must ride through and shall not cease its power consumption for the following operating conditions in Tables A and B, as measured at the Large Load's Point of Interconnection:

Table A

Root-Mean-Square Voltage (p.u. of nominal)	Minimum Ride-Through Time (seconds)
V > 1.20	May ride-through or trip
1.10 < V ≤ 1.20	0.5
0.90 ≤ V ≤ 1.10	Continuous
0.80 ≤ V < 0.90	2.0
0.70 ≤ V < 0.80	0.50
0.50 ≤ V < 0.70	0.20
V < 0.50	0.15

From ITIC Curve

Based on IEEE 1668 Single-Phase and Phase-Phase Curve

Based on ITIC Curve, but extended to ride-through fault duration

Table B

Instantaneous Phase-to-Phase or Phase-to-Ground Voltage (p.u. of nominal)	Minimum Ride-Through Time (milliseconds)
V > 1.80	May ride-through or trip
1.70 < V ≤ 1.80	0.2
1.60 < V ≤ 1.70	1.0
1.40 < V ≤ 1.60	3.0
1.20 < V ≤ 1.40	15.0

Based on proposed IBR requirements in NOGRR245

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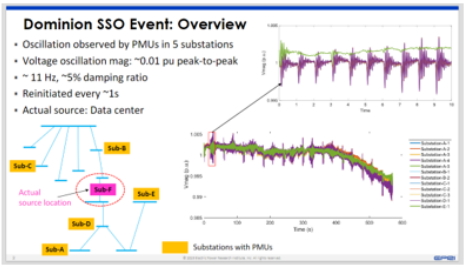
Source: Electric Reliability Council of Texas (ERCOT), USA

Issue 2: Cyclical Fluctuations of Data Centre Demand and Impact on Power/Frequency Quality

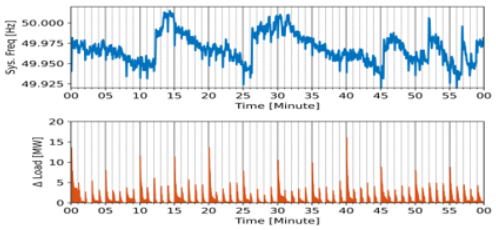
EirGrid GROUP

Cyclical Fluctuations of Data Centre Demand and Impact on Power/Frequency Quality

- Load perturbations from data centres are visible in system frequency measurements and results in relevant frequency deviations between (e.g., 10-50 mHz).
- The size of the perturbations are dependent on the amount of data centre load.
- This is having an impact on system performance, exciting system oscillations on the system and interacting with frequency response (i.e., governors and Active Power Control (APC) of wind/solar).



Source: EPRI Sub-Synchronous Oscillations (SSO) Workshop - Spring 2023



Impact of cyclical fluctuations on the All-Island power system.

What does this mean for the operation of the power system?

1. The demand response of multiple data centres to a fault on the power system presents challenges to the resilience and stability of the power system. Challenges relate to both the initial reduction in demand and the subsequent restoration of demand.
2. EirGrid is actively monitoring the response of data centres for both the fault response issue and the power quality issue. Real-time dynamic analysis tools are being used to simulate contingency conditions and flag potential issues caused by data centre demand response.
3. The minimum system inertia level needs to be maintained above what we had previously planned in order to help manage this issue.
4. Contingency measures, in the form of automated disconnection of generation, are also required to mitigate potential high frequency events.
5. These issues are currently at manageable levels with the above mitigations. Further increases in data centre demand with similar characteristics will present additional challenges for the operation of the power system as demonstrated in EirGrid's power system analysis of future years.
6. The issues impact on the whole power system. EirGrid has been keeping the wider electricity industry and key stakeholders up to date via EirGrid/SONI's Shaping Our Electricity Future (SOEF) Advisory Council.

What are we asking of data centre owners?

1. Ensure that any changes to data centre protection settings (Frequency, Voltage and Rate of Change of Frequency) or response characteristics that interact with the grid are communicated to EirGrid (or ESB Networks if connected to the distribution system).
2. To consider the ability to widen sensitive setting ranges and/or introduce time delays on existing equipment protection settings.
3. To consider the ability to delay the restoration of demand post reduction until permitted by EirGrid (or ESB Networks if connected to the distribution system).
4. For future data centre demand increases, consider what design changes can be made to avoid the response issues highlighted.
5. To work with EirGird (and ESB Networks if connected to the distribution system) to resolve these issues through participation in an industry Task Force - see next slide.

Task Force - we are seeking views on the following proposal

- **Scope**
  - TSO and Data Centre industry task force to assist in the development of solutions to address the power system impact of Data Centre fault response behaviour and power quality issues.
  - Data provision processes, e.g. provision of protection setting changes to TSO
  - Explore options for short term fixes, e.g. Data Centre protection setting changes, restoration procedures.
  - Develop proposals for Grid Code standards, e.g. Fault Ride Through capabilities.
  - Enduring solutions, e.g. Data Centre electrical system design solutions.
- **Membership**
  - Led / Chaired by EirGrid. SONI and ESB Networks represented.
  - In order to efficiently manage the task force, our preference is for an industry representative body to coordinate industry input.
- **Engagement**
  - Keep engagement at an industry level - no requirement to discuss individual data centre issues or solutions (unless offered).
  - Monthly meetings, online, 2 hours.
  - Review progress and arrangements after 6 months.
  - Wider electricity industry and key stakeholders will be briefed on progress via EirGrid/SONI's Shaping Our Electricity Future (SOEF) Advisory Council. Advisory Council | Shaping Our Electricity Future | EirGrid

Next Steps

- Feedback on Task Force proposal by 10 May 2024 (to your EirGrid Customer Account Manager or contact us at info@eirgrid.com, or ESB Networks Customer Account Manager for distribution connected data centres).
- Aim to hold first Task Force meeting before end of May 2024.

Part 2 – Presentation from 1st Task Force meeting on 16 July 2024:

Transmission / Distribution System Operator and Data Centre Industry Task Force on Fault Response

Meeting 1, 16 July 2024

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Agenda

1. Terms of Reference for the Task Force
2. Development of Grid Code standards related to Fault Ride Through capabilities
3. Next steps and A.O.B.

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Task Force - Terms of Reference

Task Force - Terms of Reference

Scope

This Task Force will provide a forum for Transmission/Distribution System Operator and Data Centre Industry engagement on Data Centre fault response and power quality issues impacting power system planning and operations.

The purpose of the Task Force is to:

- Facilitate communications and engagement on the issues and challenges.
- Allow for sharing of relevant information and data.
- Consider solutions.

Task Force - Terms and References

Membership

- Chaired/led by EirGrid with representation from SONI and ESB Networks.
- Data Centre owners or their nominated representatives.
- Membership is by invitation from EirGrid.
- Membership is voluntary.

Engagement

- Monthly online meetings (2 hours) or as agreed by Task Force members.
- Meeting minutes, including list of attendees, key messages, action items and next steps will be circulated to all attendees after each meeting.
- Progress and structure will be reviewed as required.

Grid Code - Modification Process

What is The Grid Code?

Procedures for governing the actions of all transmission system users	➢Ensures transparent and equitable treatment of users ➢Supports a sustainable, efficient transmission system ➢Allows users to safely engage with the transmission system
Minimum technical requirements that must be met by users to connect to and operate on the transmission system	➢Short Circuit Levels, Transformer Earthing, Synchronisation, Fault Ride-Through, Voltage and Frequency Regulation etc. ➢Supports the stable and secure operation of the Transmission System for the benefit of all Users
Rules governing the operation, maintenance and development of the transmission system	➢Supports the provision of reliable power ➢Enables the implementation of new and diverse technology to support the grid ➢Advances the development of a robust transmission system

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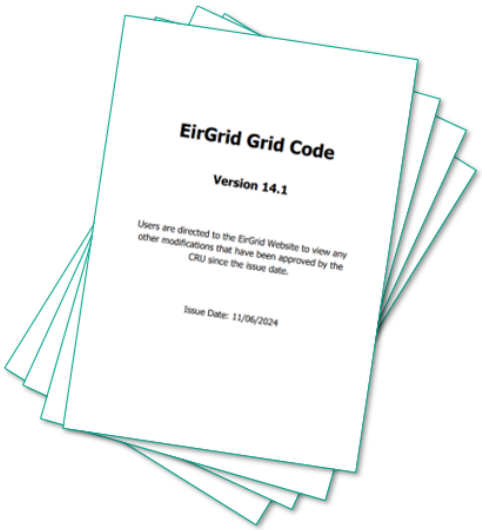
Grid / Distribution Codes

- EirGrid Grid Code applies to all transmission connected Users in Ireland.
- SONI Grid Code applies to all transmission connected Users in Northern Ireland.
- ESB Networks Distribution Code applies to all distribution connected Users in Ireland
- NIE Networks Distribution Code applies to all distribution connected Users in Northern Ireland

- Each Grid Code is managed by a Grid Code Review Panel (GCRP).
- A Joint Grid Code Review Panel (JGCRP) is the forum for considering common Grid/Distribution code items.



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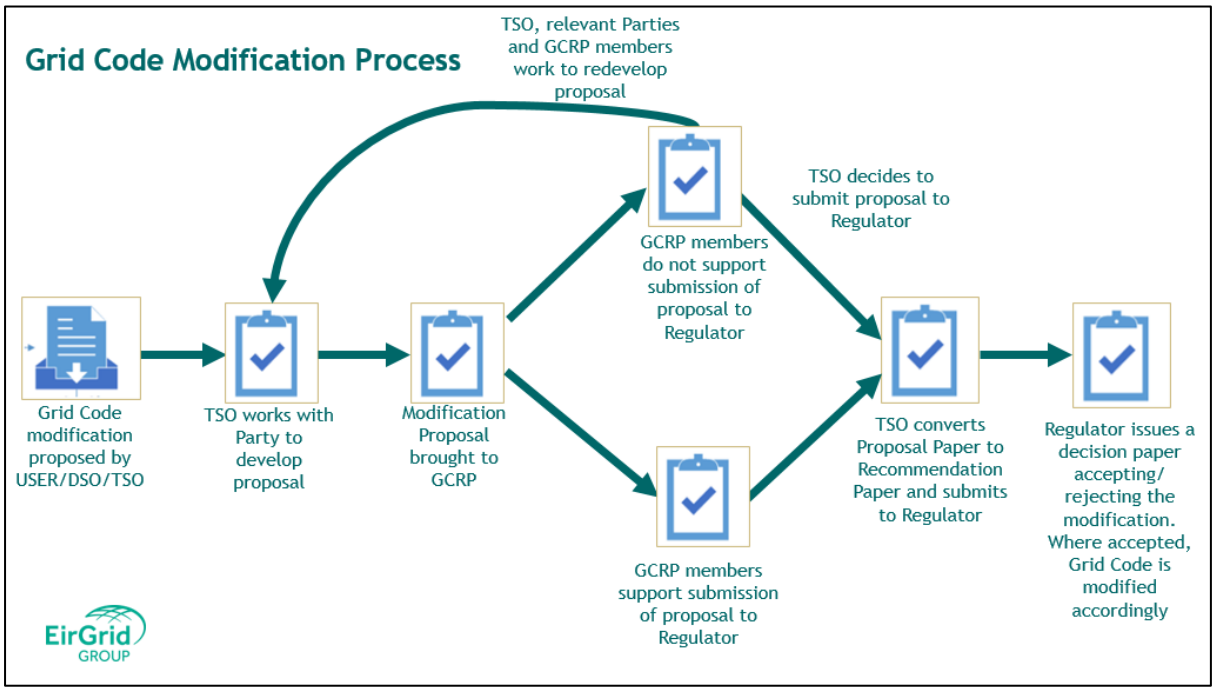
EirGrid Grid Code
SONI Grid Code
ESB Networks Distribution Code
NIE Networks Distribution Code



Examples of Standards

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Examples of Standards

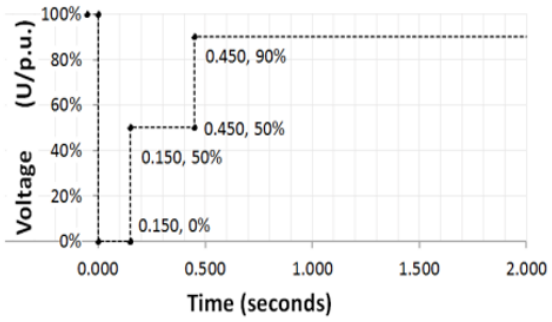
In the following slides we present examples of fault ride-through standards from:

1. EirGrid Grid Code (RfG Type D Generators)
2. ENTSO-E (European TSO Representative body) Data Centre Fault Ride Through Requirements Proposal
3. ERCOT (TSO in Texas) - Large Load Voltage Ride Through Standard Proposal
4. RTE (TSO in France) - Data Centre Fault Ride Through Requirements

Example 1: EirGrid Grid Code Fault Ride Through Capability of RfG Type D Generators

The figure illustrates fault ride-through (FRT) capability requirements for RfG type D generators as specified in the grid code. It indicates that the units must remain connected during voltage sags on the high-voltage (HV) terminals of the grid-connected transformer.

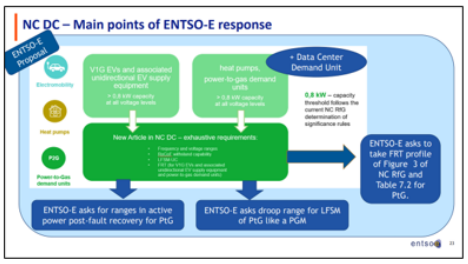
The voltage sag should be within the range of 0% to 90% of nominal voltage, and the duration should comply with the specified time profile.

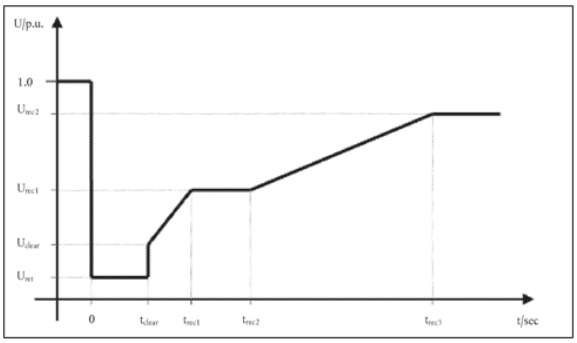


Source: Grid Code Version 14.1 (eirgrid.ie)

Example 2: The European Network of Transmission System Operators for Electricity (ENTSO-E) Proposal

The European Network of Transmission System Operators for Electricity (ENTSO-E) proposed to the European Union Agency for the Cooperation of Energy Regulators (ACER) to include a new data centre demand category (110 kV and above) requirements in to Network Code on Demand Connection (DCC 2.0) and apply Fault Ride-Through, RoCoF and Limited Frequency Response, among others.





Voltage parameters (pu)		Time parameters (seconds)	
U_{ret}:	0	t_{clear}:	0,14-0,15 (or 0,14-0,25 if system protection and secure operation so require)
U_{clear}:	U_{ret}	t_{rec1}:	t_{clear}
U_{rec1}:	U_{clear}	t_{rec2}:	t_{rec1}
U_{rec2}:	0,85	t_{rec3}:	1,5-3,0

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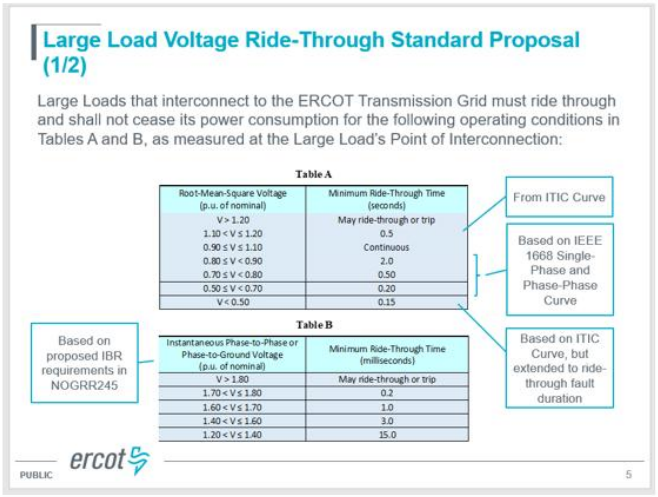
Source: ENSTO-E proposal

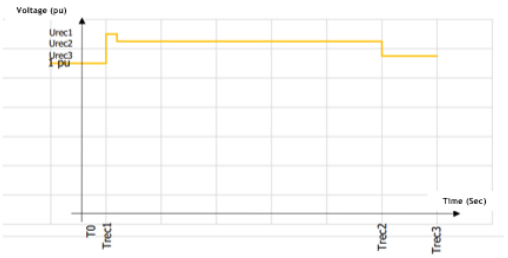
Example 3: Electric Reliability Council of Texas (ERCOT) Proposal



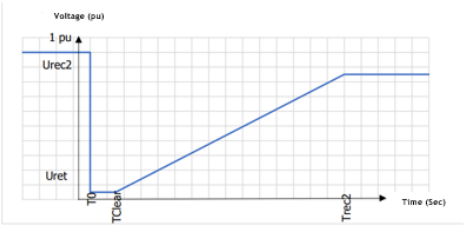
EirGrid GROUP

Source: Electric Reliability Council of Texas (ERCOT), USA

Example 4: Réseau de Transport d'Électricité (RTE - France) Proposal



Voltage parameters (pu)		Time parameter (seconds)	
Uret1	1.3	T0	0
Uret1	1.3	Tret1	0.1
Uret2	1.25	Tret2	2.5
Uret3	1.15 (and 1.1 for 400Kv)	Tret3	30



Voltage parameters (pu)		Time parameter (seconds)	
Uret	0.05	T0	0
Uret	0.05	Tclear	0.15
Uret2	0.9	Tret2	1.15

Source: RTE, France's Transmission System Operator

Next Steps

1. EirGrid will circulate meeting minutes from this Task Force meeting.
2. Joint Grid Code Review Panel meeting in September 2024 - EirGrid will present a draft Grid Code Modification Proposal for review by the JGCRP.
3. Joint Grid Code Review Panel meeting in December 2024 - subject to feedback on the draft, EirGrid will seek approval of the final Grid Code Modification Proposal.
4. Agree dates for the next meetings of this Task Force.

Open Discussion

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Part 3 – Presentation from 2nd Task Force meeting on 27 August 2024:

Transmission / Distribution System Operator and Data Centre Industry Task Force on Fault Response

Meeting 2, 27 August 2024

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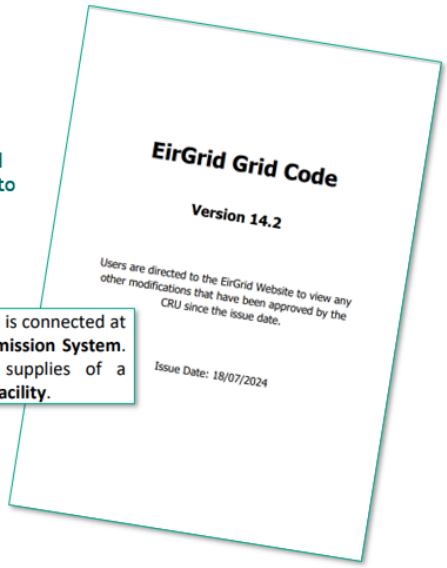
Agenda

1. Presentation of the Working Draft Grid Code modification.
2. Next steps and A.O.B.

EirGrid Grid Code

Proposal is to add the requirement to the Connection Conditions of the Grid Code. CC7 - Specific Design and Performance Standards that are applicable to Demand Facilities



Demand Facility(ies)	A facility which consumes electrical energy and is connected at one or more **Connection Points** to the **Transmission System**. The **Distribution System** and/or auxiliary supplies of a **Generation Unit** do not constitute a **Demand Facility**.

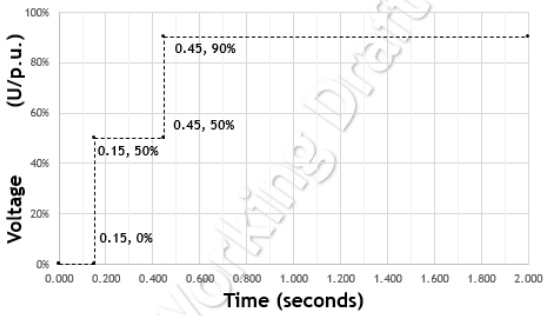
EirGrid Grid Code Version 14.2.

Working Draft of Fault Ride Through Grid Code Requirement

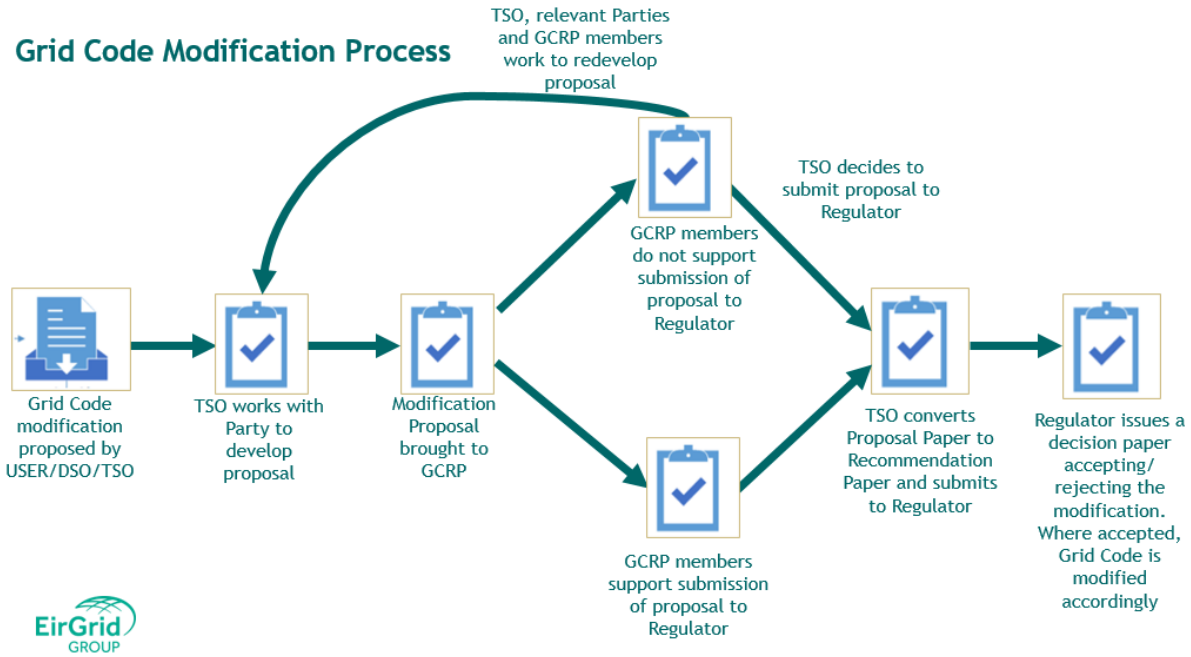
Demand Facilities shall remain connected to the Transmission System and continue to operate stably during and following any Fault Disturbance on the Power System which results in a Voltage deviation which remains on or above the voltage-against-time profile specified in the figure at the Connection Point.

Following clearance of the Fault Disturbance, the Demand Facility should return to prefault conditions and maintain its Demand above 95% of prefault value unless otherwise agreed with the TSO.

The voltage-against-time profile specifies the required capability as a function of voltage and Fault Ride-Through Time at the Connection Point before, during and after the Fault Disturbance.



Grid Code Modification Process



Next Steps

1. Large Energy Users Representatives submit feedback on the Draft Grid Code proposal.
2. EirGrid will circulate meeting minutes from this Task Force meeting.
3. Joint Grid Code Review Panel meeting in September 2024 - EirGrid will present a draft Grid Code Modification Proposal for review by the JGCRP.
4. Joint Grid Code Review Panel meeting in December 2024 - subject to feedback on the draft, EirGrid will seek approval of the final Grid Code Modification Proposal.
5. Agree dates for the next meetings of this Task Force.


Open Discussion
EirGrid
GROUP
CONFIDENTIAL - Not for Onward Circulation

Part 4 – Large Energy User Fault Ride Through Discussion item from Joint Grid Code Review Panel Meeting 24 September 2024:

Fault Ride-Through Requirements for Demand Facilities

JGCRP Meeting

24 September 2024

EirGrid SONI

Summary

- Some large Demand Facilities are automatically reducing and restoring their demand in response to remote system faults.
- This behaviour is a characteristic of some new, large-scale, inverter-based demand facilities.
- The issue has the potential to exacerbate the impact of transmission system faults, leading to cascade trips and a significant system incident.
- The issue will continue to grow as this type of demand ramps up and, unless resolved, these behaviours will significantly impact on our ability to:
  a) operate the power system securely, and
  b) evolve operational policy to facilitate higher levels of renewable generation.
- The TSOs are proposing the inclusion of Demand Facility Fault Ride-Through Requirements in the Grid Codes to address this issue.

EirGrid SONI

Background

- By end of 2022, there was 734 MVA of Data Centre and new large energy user demand.
- In Ireland, there is approximately 2000 MVA of demand capacity that is contracted to data centres and other new technology loads at the transmission level, and approximately a further 300 MVA contracted at the 110 kV distribution level.
- A significant proportion of this demand is connected or expected to be connected in the Dublin area.

Current System Demand
- Peak: 7.0 GW
- Minimum: 2.5 GW

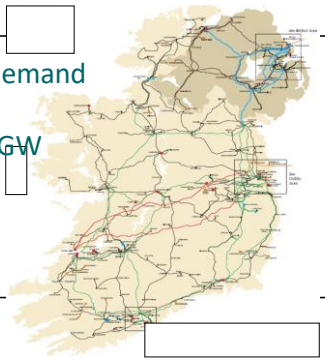


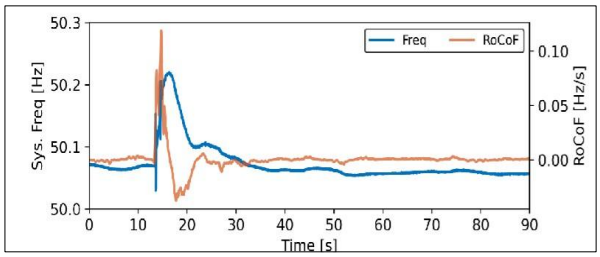
Table 1: Data centre and new large energy users demand, additional to the 734 MVA of existing demand by the end of 2022

Forecast scenario	Growth from 2022–2032 (MVA)	2032 demand (MVA)
Low	304	1,038
Median	810	1,543
High	1,276	2,010

Source: EirGrid & SONI Generation Capacity Statement 2023-2032

Example of Observed Response

- Following a transmission system fault that causes a transient voltage dip on the power system, data centre demand has been observed to reduce for a prolonged period before being automatically restored.
- This demand reduction causes a significant imbalance on the power system leading to a positive RoCoF and frequency rise.
- Similar responses have been observed by other TSOs in Europe and the USA.



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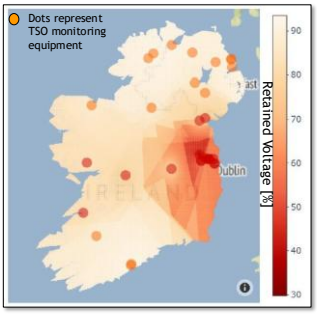
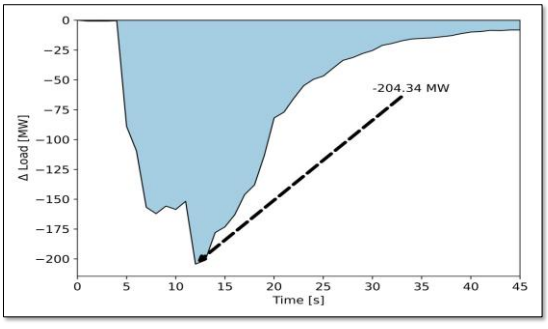
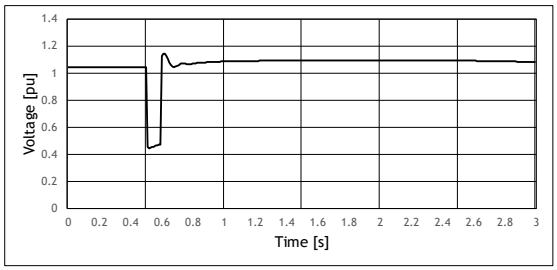




2025 Scenario

- The example presented here is based on simulation of a 2025 scenario with additional data centre demand with performance characteristics reflective of existing behaviour.
- The impact of a three-phase fault on the Dublin transmission system was modelled in our power system dynamic simulation tool.
- The fault results in a voltage dip that triggers a high level of demand reduction at data centres causing a significant power imbalance and high frequency. In the model approximately 800 MW of data centre demand reduction was observed which triggered an equivalent 900 MW tripping of wind generation to maintain stability.
- Additional data centre demand with similar performance characteristics will further exacerbate this issue.



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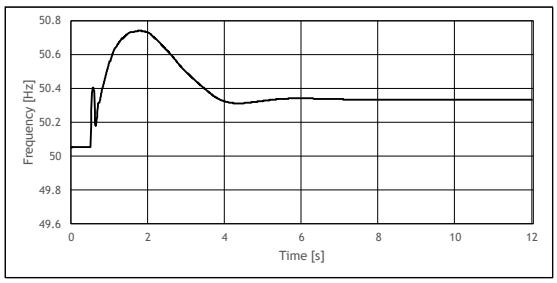

System Frequency following a three-phase fault in Dublin based on a 2025 Scenario.

Working Draft of the TSOs' Proposal

Demand Facilities shall remain connected to the Transmission System and continue to operate stably 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 the figure at the Connection Point.

Following clearance of the Fault Disturbance, the Demand Facility should return to prefault conditions and maintain its Demand above 95% of prefault value unless otherwise agreed with the TSO.

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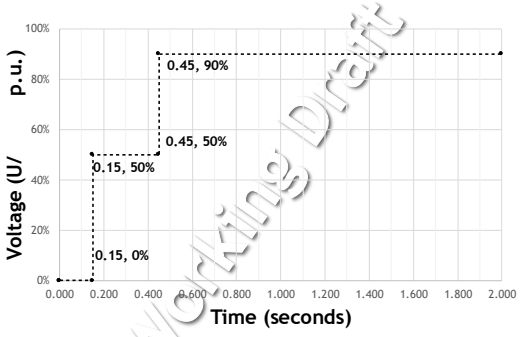

Next Steps

- The TSOs are proposing to host an online industry webinar on this proposal.
    - **Date/Time: Tuesday 22 October 2024, 10:00 to 12:00**
- The TSOs intend to return to the December 2024 JGCRP, and individualEirGrid and SONI GC panels, to seek recommendations for the proposal.

EirGrid SONI

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Open Discussion
EirGrid
SONI

Part 5 – Extract from approved meeting minutes from Joint Grid Code Review Panel Meeting 24 September 2024 for Large Energy User Fault Ride Through Discussion item:

Large Energy Users Fault-ride-through

a) Simon Tweed & Saif Aldahmor from Future Operations (EirGrid) provided a presentation on the introduction of FRT requirements for Large Energy Users.

b) Following a query from Hariram Subramanian (Solar Generation - EirGrid) on Reactive Support, Saif Aldahmor (EirGrid) confirmed that the TSO is seeking to introduce FRT requirements only, and they are not seeking reactive support.

c) Mostafa Bakhtvar (Fast Acting Peaking Generators - EirGrid) noted that the Demand Users switch to UPS for voltage dips. *Comment received from Mostafa Bakhtvar, 9/10/2024: Mostafa asked whether there is a plan to introduce a constraint on ramp rate of UPS demand during load recovery. Saif responded that EirGrid has proposed voltage ride through requirements for UPS so that the UPS demand doesn't drop during faults in the first place, and therefore negating the need for constraining the load recovery ramp rate. Mostafa noted that this is in contrary to the nature of UPS which is to switch to battery in low voltage events.*

a) Saif Aldahmor (EirGrid) said the TSO recommends a short time delay in switching to UPS to see if the voltage will recover.

b) Paraic Higgins (Pumped Storage Generators) asked if this FRT requirement is not introduced, is there a potential to develop a new system services product for negative reserve?

c) Gavin McClean (Demand Customers - EirGrid) noted that the UPS protects critical loads against voltage sags and expressed his concern in applying this proposed modification retrospectively due to the high cost to existing customers. He understands the challenge, but the retrospective part of this requirement will be very costly.

d) Paul Troughton (DSU - EirGrid) agreed with Gavin and stated that retrospection is a bold move. He went on to encourage EirGrid members to engage directly with UPS manufactures to find out what they can do and what are their limits.

e) EirGrid members have not met with OEMs, but they have met with other TSOs, and it is a challenge for the other TSOs who are also experiencing this issue.

f) Miriam Ryan (EirGrid Chairperson) noted that the EirGrid Grid Code is retrospectively applied. Sam Matthews (JGCRP Chairperson – SONI) further advised that users can apply for a derogation.

The next industry webinar on this proposal will take **Tuesday 22 October 2024, 10:00 to 12:00.**

Part 6 – Presentation from 2nd Industry Webinar on 22 October 2024:

Fault Ride-Through Requirements for Demand Facilities

Industry Webinar

22 October 2024

EirGrid SONI

Summary

- Some large Demand Facilities are automatically reducing and restoring their demand in response to remote system faults.
- This behaviour has been observed from some new, large-scale, inverter-based demand facilities, which now make up approximately 70% of all transmission connected demand.
- The issue has the potential to exacerbate the impact of transmission system faults, leading to cascade trips and a significant system incident.
- The issue will continue to grow as this type of demand ramps up and, unless resolved, these behaviours will significantly impact on our ability to:
  a) operate the power system securely, and
  b) evolve operational policy to facilitate higher levels of renewable generation.
- The TSOs are proposing the inclusion of Demand Facility Fault Ride-Through Requirements in the Grid Codes to address this issue.

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Agenda

1. Power System Background and Transmission Connected Demand
2. Fault Ride Through behaviour and the impact on the Power System
   a) Actual System Events
   b) Potential Future Events
3. International Experience
4. Presentation of the Working Draft Grid Code Modification.
5. Next Steps and Open Discussion

Background

- By end of 2022, there was 734 MVA of Data Centre and new large energy user demand connected.
- In Ireland, there is approximately 2000 MVA of demand capacity that is contracted to data centres and other new technology loads at the transmission level, and approximately a further 300 MVA contracted at the 110 kV distribution level.
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Current System Demand
- Peak: 7.0 GW
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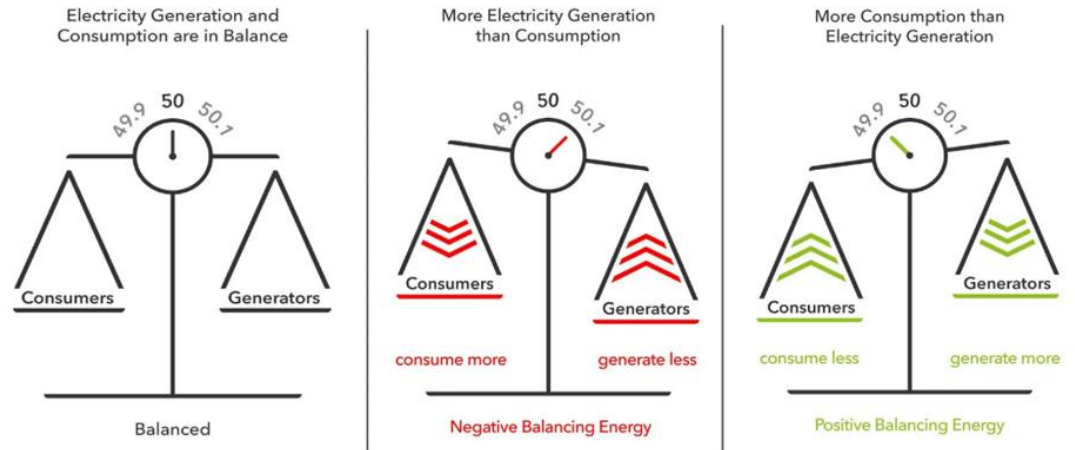
Frequency in Power Systems



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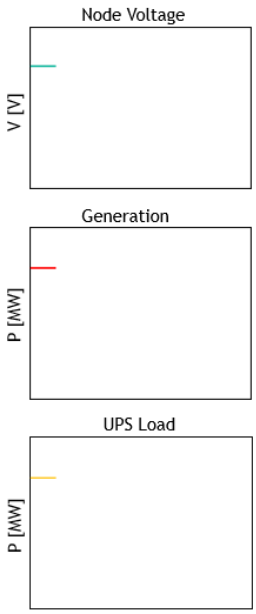
Source: Next Kraftwerke

Voltage Induced Frequency Rise - Step Through

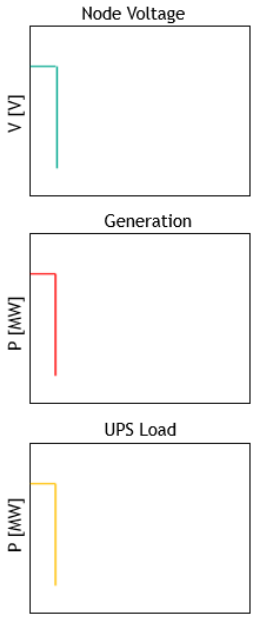
Severe System Fault



Voltage Induced Frequency Rise - Step Through

Severe System Fault

Voltage Dip

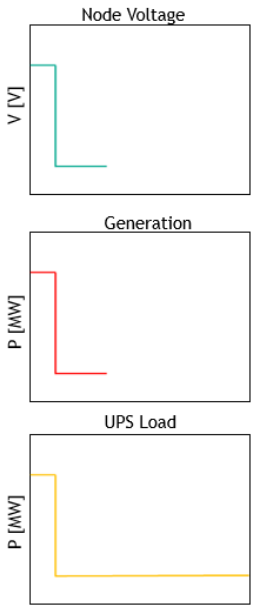


Voltage Induced Frequency Rise - Step Through

Severe System Fault

Voltage Dip

G - Reduction temporarily
UPS Load - Reduction permeant



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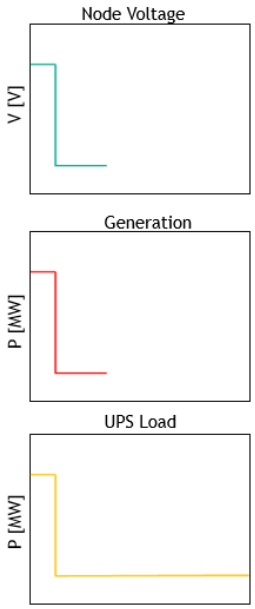

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9

Voltage Induced Frequency Rise - Step Through

Transmission System Fault

↓

Voltage Dip

↓

Initial Generation and UPS Load Reduction

↓

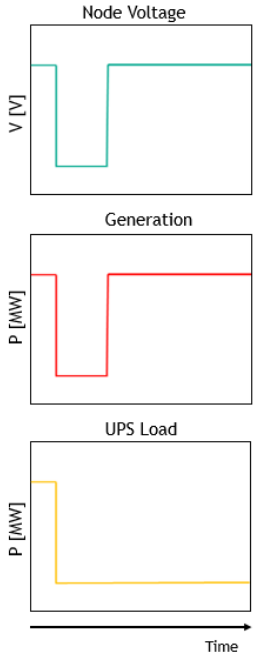
Fault Cleared

↓

Generation Output Recovers UPS Load Reduction Sustained

↓

Power Imbalances Causes Frequency to Rise



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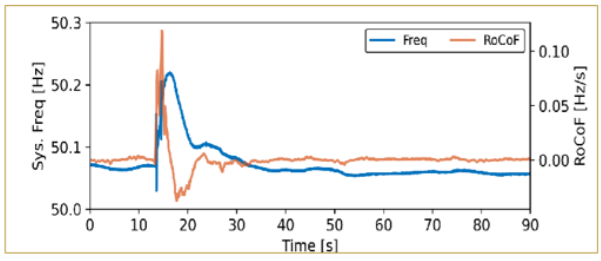

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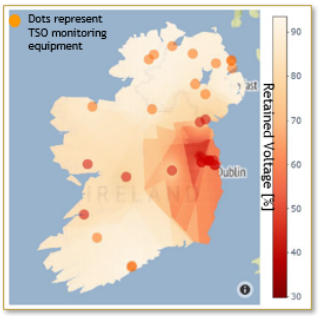

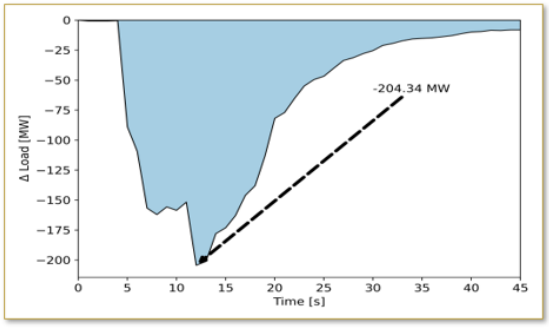

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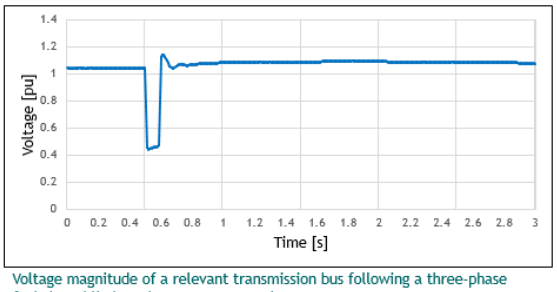

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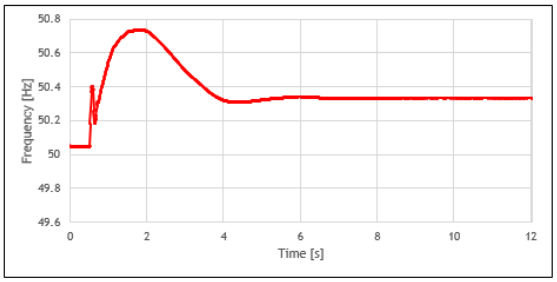


System Frequency following a three-phase fault in Dublin based on a 2025 Scenario.

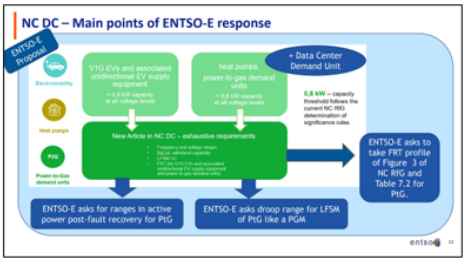
Examples of Standards

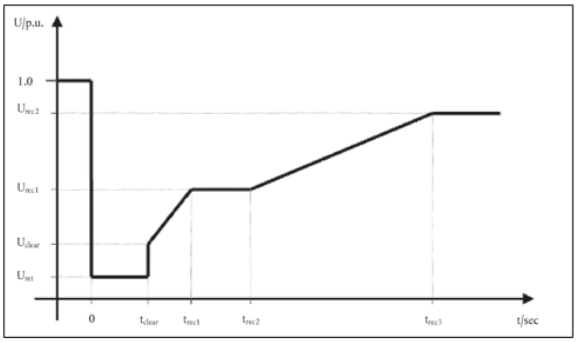
In the following slides we present examples of fault ride-through standards from:

1. ENTSO-E (European TSO Representative body) Data Centre Fault Ride Through Requirements Proposal
2. ERCOT (TSO in Texas) - Large Load Voltage Ride Through Standard Proposal
3. RTE (TSO in France) - Data Centre Fault Ride Through Requirements

Example 2: The European Network of Transmission System Operators for Electricity (ENTSO-E) Proposal

The European Network of Transmission System Operators for Electricity (ENTSO-E) proposed to the European Union Agency for the Cooperation of Energy Regulators (ACER) to include a new data centre demand category (110 kV and above) requirements in to Network Code on Demand Connection (DCC 2.0) and apply Fault Ride-Through, RoCoF and Limited Frequency Response, among others.





Voltage parameters (pu)		Time parameters (seconds)	
U_{ret}:	0	t_{clear}:	0,14-0,15 (or 0,14-0,25 if system protection and secure operation so require)
U_{clear}:	U_{ret}	t_{rec1}:	t_{clear}
U_{rec1}:	U_{clear}	t_{rec2}:	t_{rec1}
U_{rec2}:	0,85	t_{rec3}:	1,5-3,0

Source: ENSTO-E proposal

Example 3: Electric Reliability Council of Texas (ERCOT) Proposal

Large Load Voltage Ride-Through Standard Proposal (1/2)

Large Loads that interconnect to the ERCOT Transmission Grid must ride through and shall not cease its power consumption for the following operating conditions in Tables A and B, as measured at the Large Load's Point of Interconnection:

Table A

Root-Mean-Square Voltage (p.u. of nominal)	Minimum Ride-Through Time (seconds)
V > 1.20	May ride-through or trip
1.10 < V ≤ 1.20	0.5
0.90 ≤ V ≤ 1.10	Continuous
0.80 ≤ V < 0.90	2.0
0.70 ≤ V < 0.80	0.50
0.50 ≤ V < 0.70	0.20
V < 0.50	0.15

From ITIC Curve

Based on IEEE 1668 Single-Phase and Phase-Phase Curve

Based on ITIC Curve, but extended to ride-through fault duration

Table B

Based on proposed IBR requirements in NOGRR245

Instantaneous Phase-to-Phase or Phase-to-Ground Voltage (p.u. of nominal)	Minimum Ride-Through Time (milliseconds)
V > 1.80	May ride-through or trip
1.70 < V ≤ 1.80	0.2
1.60 < V ≤ 1.70	1.0
1.40 < V ≤ 1.60	3.0
1.20 < V ≤ 1.40	15.0

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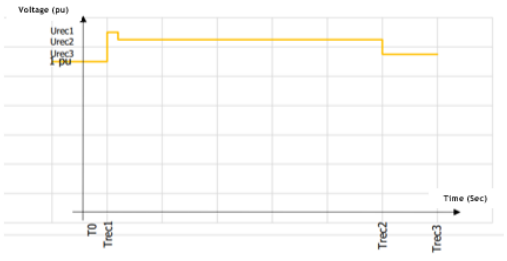
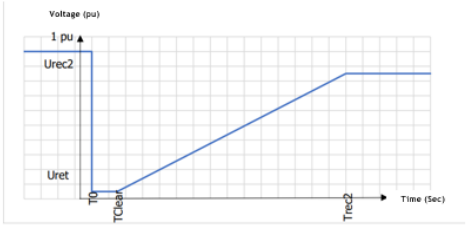
Source: Electric Reliability Council of Texas (ERCOT), USA

Example 4: Réseau de Transport d'Électricité (RTE - France) Proposal



Voltage parameters (pu)		Time parameter (seconds)	
Uret1	1.3	T0	0
Uret1	1.3	Tret1	0.1
Uret2	1.25	Tret2	2.5
Uret3	1.15 (and 1.1 for 400Kv)	Tret3	30



Voltage parameters (pu)		Time parameter (seconds)	
Uret	0.05	T0	0
Uret	0.05	Tclear	0.15
Uret2	0.9	Tret2	1.15

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Source: RTE, France's Transmission System Operator

Working Draft of Grid Code Modifications

Fault Ride-Through Requirements for System Users

Grid Codes		Network Codes (RfG, DCC, HVDC)
✓	Generators	✓
✓	Power Park Modules (PPMs)	✓
✓	Interconnectors	✓
✗	Demand Facilities	✗
✗	Power to Gas Facilities	✓[1]
✗	Electric Vehicles	✓[1]

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[1] ACER Recommendation on proposal for amendments to the network code on requirements for demand connection [Source]

Grid Codes

EirGrid Grid Code Version 14.2.

EirGrid Grid Code: Proposal is to add the requirement to the **Connection Conditions**. CC7 - Specific Design and Performance Standards that are applicable to Demand Facilities.

Demand Facility(ies)	A facility which consumes electrical energy and is connected at one or more **Connection Points** to the **Transmission System**. The **Distribution System** and/or auxiliary supplies of a **Generation Unit** do not constitute a **Demand Facility**.

SONI Grid Code: Proposal is to develop a new Demand Facility definition and add the requirement to a new Connection Condition schedule.

SONI_GridCode_Jun_2024.pdf

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Working Draft of the TSOs' Fault Ride Through Proposal

Demand Facilities shall remain connected to the Transmission System and continue to operate stably 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 the figure at the Connection Point.

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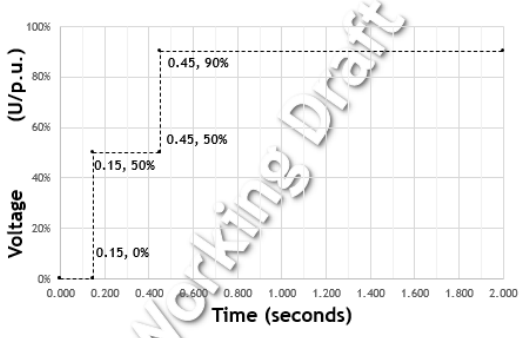

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Other Existing Requirements and Gaps in these Requirements

There are existing Grid Code requirements for some Demand Facilities (those defined as 'Demand Connection Code Units' (DCC Units)) related to frequency and voltage range standards.

These standards do not currently apply to 'Non-DCC Units' and do not include the application of the Rate of Change of Frequency (RoCoF) standard for the Ireland and Northern Ireland power systems (+/- 1.0 Hz/s).

The implications of these gaps are under consideration by the TSOs.

CC.7.4.2 **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** shall:

CC.7.4.2.1 Remain synchronised to the **Transmission System** and operate within the frequency ranges and time periods specified in *Table CC.7.4.2.1*.

*Table CC.7.4.2.1: Minimum Time Periods for **Demand Facilities**, **Closed Distribution Systems** and **Distribution Systems** to Remain Operational without Disconnecting*

Frequency Range	Time Period
47 – 47.5 Hz	20 seconds
47.5 – 48.5 Hz	90 minutes
48.5 – 49 Hz	90 minutes
49 – 51 Hz	Unlimited
51 – 51.5 Hz	90 minutes
51.5 – 52 Hz	60 minutes

CC.7.4.2.2 Remain synchronised to the **Transmission System** and operate within the ranges of the **Transmission System Voltage** at the connection point, for an unlimited time period, as specified below:

(i) 400 kV system: 360 kV to 420 kV (0.9 p.u. – 1.05 p.u.)

(ii) 220 kV system: 198 kV to 245 kV (0.9 p.u. – 1.114 p.u.)

(iii) 110 kV system: 99 kV to 123 kV (0.9 p.u. – 1.118 p.u.)

EirGrid Grid Code - 'DCC Unit' Standards

Next Steps

- Feedback on the draft Grid Code proposal may be provided to:

  EirGrid Grid Code team: GridCode@eirgrid.com

  Demand Customer Representatives on the EirGrid Grid Code Representative Panel:
  Thomas O'Sullivan, thomas.osullivan@augh.com
  Gavin McClean, gavinmcc@meta.com.

  SONI Grid Code team: gridcode@soni.ltd.uk.

- The TSOs intend to return to the December 2024 Joint Grid Code Review Panel (JGCRP), and individual EirGrid and SONI Grid Code panels, to seek recommendations for the proposal.

Open Discussion

Part 7 Fault-ride-through requirements for Demand Facilities Discussion item from Joint Grid Code Review Panel Meeting 04 December 2024:

3. Discussion: 15 minutes

Fault Ride-Through Requirements for Demand Facilities

JGCRP Meeting
04 December 2024

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Fault Ride-Through Requirements for Demand Facilities

- The TSOs are proposing the inclusion of Demand Facility Fault Ride-Through Requirements in the Grid Codes to address the issue with some Demand Facilities reducing and restoring their demand in response to remote system faults.
- A draft modification proposal was originally presented as a discussion item to the JGCRP on 24th September 2024. The TSOs were aiming to submit a draft modification to members at the December 2024 JGCRP/GCRPs.
- The TSOs hosted an industry webinar on October 22nd to discuss our draft proposal and seek feedback. Based on the feedback we have received, and requests to provide more time for consideration of the issues, we have decided to delay bringing forward our Grid Code modification proposal to facilitate further engagement with industry.
- We will hold a further Industry Webinar on December 10th to provide an update on our proposal and next steps. There will also be an opportunity for any Demand Facility customer to present on work they are undertaking to address this issue.
- The TSOs are aiming to complete this engagement and submit a revised draft modification to members at the March 2025 JGCRP/GCRPs.

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Further Consideration for Grid Code Amendments

Frequency and Voltage range standards	Rate of Change of Frequency	Active Power Recovery
• These standards are now only applied on DCC units. • Also apply these standards to Non-DCC units.	• Include the application of the Rate of Change of Frequency (RoCoF) standard for Ireland and NI power systems (+/- 1.0 Hz/s)	• Add requirements for the recovery of the Demand Facilities' load following system fault. • Define recovery timeframes

CC.7.4.2 **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** shall:

CC.7.4.2.1 Remain synchronised to the **Transmission System** and operate within the frequency ranges and time periods specified in *Table CC.7.4.2.1.*

Table CC.7.4.2.1: Minimum Time Periods for ***Demand Facilities,*** **Closed Distribution Systems** and **Distribution Systems** *to Remain Operational without Disconnecting*

Frequency Range	Time Period
47 – 47.5 Hz	20 seconds
47.5 – 48.5 Hz	90 minutes
48.5 – 49 Hz	90 minutes
49 – 51 Hz	Unlimited
51 – 51.5 Hz	90 minutes
51.5 – 52 Hz	60 minutes

CC.7.4.2.2 Remain synchronised to the **Transmission System** and operate within the ranges of the **Transmission System Voltage** at the connection point, for an unlimited time period, as specified below:

(i) 400 kV system: 360 kV to 420 kV (0.9 p.u. – 1.05 p.u.)
(ii) 220 kV system: 198 kV to 245 kV (0.9 p.u. – 1.114 p.u.)
(iii) 110 kV system: 99 kV to 123 kV (0.9 p.u. – 1.118 p.u.)

EirGrid Grid Code - 'DCC Unit' Standards

Further Consideration for Grid Code Amendments

- ENTSO-E published a position paper recommending an implementation of connection requirements for Power-to-Gas demand facilities.
- "A large number of new power-to-gas units will likely be connected to the system before the new network code provisions are normally nationally implemented. The connection of these units without appropriate and coordinated technical requirements may therefore create an important risk for system robustness".
- The position paper recommends TSOs establish minimum technical requirements for Power to Gas demand facilities to ensure grid resilience, including fault ride through requirements, RoCoF robustness, and post fault active power recovery.

ENTSO-E Position on Urgent Connection Requirements for Power-to-Gas Demand Facilities

Approved | 17 September 2024

From: System Development Committee

Position Paper on Connection Requirements for Power to Gas Demand Facilities

Next Steps

- The TSOs are hosting a second online industry webinar on the Demand Facility Fault Ride Through proposal.
    - **Date/Time: Tuesday 10 December 2024, 10:00 to 12:00**
- The TSOs intend to return to the March 2025 JGCRP, and individual EirGrid and SONI GC panels, to seek recommendations for the proposal.

Part 8 – Extract from approved meeting minutes from Joint Grid Code Review Panel Meeting 04 December 2024 regarding the Fault Ride Through requirements for Demand Facilities Discussion item:

Discussion Item - Fault Ride-Through Requirements for Demand Facilities

a) Saif Aldahmor (TSO Presenter) presented this discussion item to the panel members.
b) Gavin McClean (Demand Customers) and Thomas O'Sullivan (Demand Customers) raised several concerns:
    a) Frequency changes and active power recovery should be further discussed at the webinar.
    b) The March GCRP meeting appears to be very premature to bring forward a Grid Code modification. Will all the studies be complete by then?
    c) Requirements that need a 100% derogation shouldn't be implemented.
    d) The full weight of this requirement falls on Gavin and Thomas. A substantial economic weight. They would like the TSO to consider a public consultation.
c) Saif Aldahmor (TSO Presenter) noted that the TSOs understand the challenges and will continue to work with industry.
d) Thomas O'Sullivan (Demand Customers) requested a public consultation.
e) Miriam Ryan (JGCRP Chairperson) noted that a public consultation is not a required under the EirGrid Grid Code but it can be facilitated under exceptional circumstances.
f) ACTIONS: The TSOs will consider the request for a full public consultation.
g) Thomas O'Sullivan (Demand Customers) extended an invitation to the TSO representatives to visit Aughinish Alumina to discuss the issues raised by Demand Customer representatives.
h) Patrick Liddy (DSU) asked the question if the implications of a high frequency low voltage event is like the interconnector tripping while in export mode. Are these events comparable?
i) Saif Aldahmor (TSO Presenter) talked through a worst-case scenario of a fault near the interconnector with the loss of 500 MW of demand and EWIC trips, in the Dublin area where there is a large proportion of demand energy users this will result in demand reduction. How do we best right the system when we are facing demand reduction from demand facilities?
j) Patrick Liddy (DSU) queried if an upward frequency system services product could serve to reduce this problem, as in procuring system services to manage the imbalance is an option.
k) Saif Aldahmor (TSO Presenter) advised that it is very difficult for any TSO to manage this imbalance even with high system services. He also clarified that there is a FRT requirement for interconnectors.
l) Gavin McClean (Demand Customer) noted that industry want to work with EirGrid but what is bring proposed is not achievable.
m) An industry webinar, hosted by the TSOs will take place Tuesday, 10 December 2024.

Part 9 – Presentation from 3rd Industry Webinar on 10 December 2024:

Fault Ride-Through Requirements for Demand Facilities

Industry Webinar
10 December 2024

EirGrid SONI

Agenda

1. Power System Background and Transmission Connected Demand
2. Fault Ride Through behaviour and the impact on the Power System
   a) Actual System Events
   b) Future Scenario
3. Grid Code Proposal Updates
4. ENTSO-E Position on Connection Requirements for Power to Gas Demand Facilities.
3. Next Steps and Open Discussion

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Engagement Since 22 October 2024 Industry Webinar

1. Joint Grid Code Review Panel (JGCRP) presentation
2. Bilaterals with several demand customers
3. IBEC engagement
4. Briefings to other key stakeholders such as Department of Environment, Climate and Communications (DECC), Commission for Regulation of Utilities (CRU) and Utility Regulator (UR)

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Background

- By end of 2022, there was 734 MVA of Data Centre and new large energy user demand connected.
- In Ireland, there is approximately 2000 MVA of demand capacity that is contracted to data centres and other new technology loads at the transmission level, and approximately a further 300 MVA contracted at the 110 kV distribution level.
- A significant proportion of this demand is connected, or expected to be connected, in the Dublin area.

Current System Demand
- Peak: 7 GW
- Minimum: 3 GW

Table 1: Data centre and new large energy users demand, additional to the 734 MVA of existing demand by the end of 2022

Forecast scenario	Growth from 2022–2032 (MVA)	2032 demand (MVA)
Low	304	1,038
Median	810	1,543
High	1,276	2,010

Source: EirGrid & SONI Generation Capacity Statement 2023-2032

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Fault Ride Through Behaviour of Large Energy Users and Impact on the Power System

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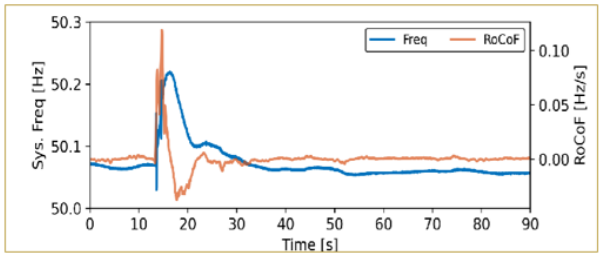
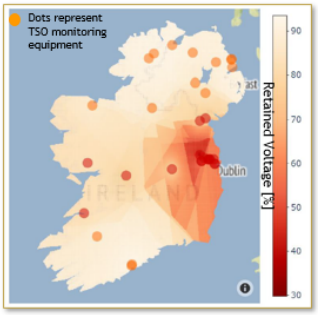
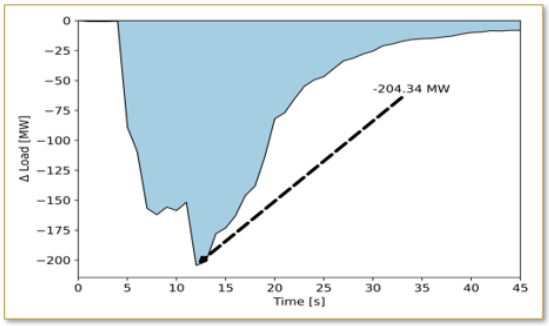
Example of Observed Response

- Following a transmission system fault that causes a transient voltage dip on the power system, data centre demand has been observed to reduce for a prolonged period before being automatically restored.
- This demand reduction causes a significant imbalance on the power system leading to a positive RoCoF and frequency rise.
- Similar responses have been observed by other TSOs in Europe and the USA.



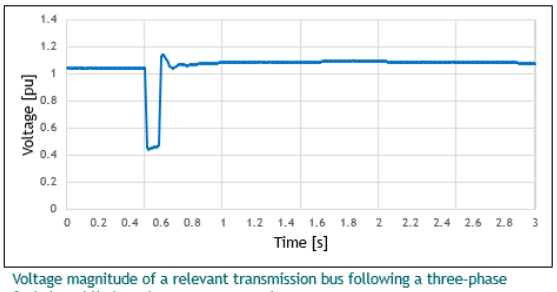
Disturbance propagation (contour map) and collective Data Centre Response (13 Dec. 2022, 220 kV fault in Dublin



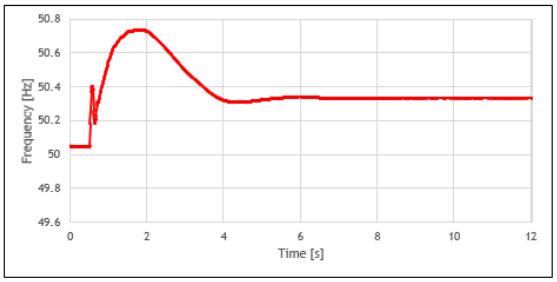


2025 Scenario

- The example presented here is based on simulation of a 2025 scenario with additional data centre demand with performance characteristics reflective of existing behaviour.
- The impact of a three-phase fault on the Dublin transmission system was modelled in our power system dynamic simulation tool.
- The fault results in a voltage dip that triggers a high level of demand reduction at data centres causing a significant power imbalance and high frequency. In the model approximately 800 MW of data centre demand reduction was observed which triggered an equivalent 900 MW tripping of wind generation to maintain stability.
- Additional data centre demand with similar performance characteristics will further exacerbate this issue.



Voltage magnitude of a relevant transmission bus following a three-phase fault in Dublin based on a 2025 Scenario.



System Frequency following a three-phase fault in Dublin based on a 2025 Scenario.

Impact on the Ireland and Northern Ireland power system

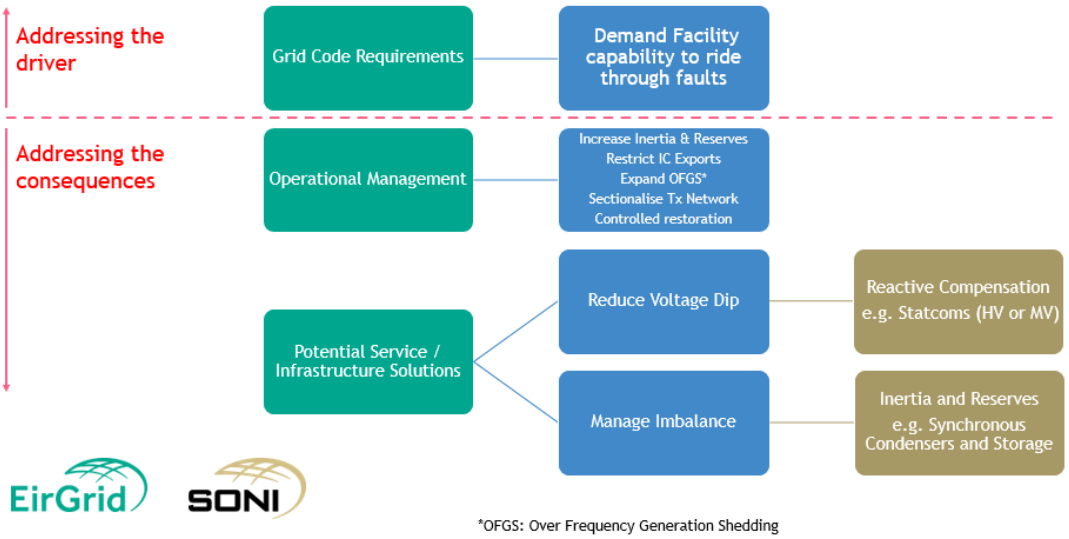
- Historically our largest imbalance has been in the order of 500 MW e.g. interconnector trip.
- Relative to other power systems, this is high (as a percentage of system demand) and managing system stability for such an event has been a focus for EirGrid and SONI.
- While reserve requirements and operational policy have been designed to manage this scale of imbalance, the scale of the potential imbalances as a consequence of demand reductions is now significantly increased and will potentially be multiples of the historic largest imbalance if solutions are not implemented.
- This scale of imbalance would be unprecedented from an international power system perspective and presents challenges for the security of the power system and all system users.

Continental Europe
1.5%
Imbalance: 3000
Minimum Demand: 200,000 MW

Great Britain
5%
Imbalance: 1300
Minimum Demand: 25,000 MW

Ireland and Northern Ireland
>30%
Imbalance: >1000 MW
Minimum Demand: 3000 MW

Approach to Tackling the Issue



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*OFGS: Over Frequency Generation Shedding

Working Draft of Grid Code Modifications

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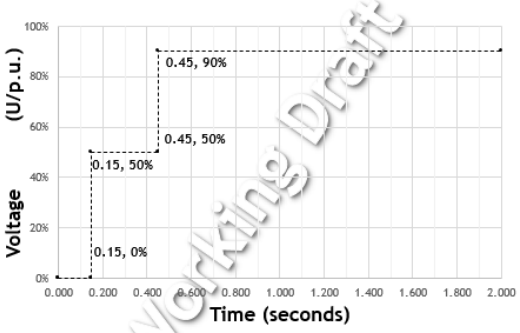
Working Draft of the TSOs' Fault Ride Through Proposal

Demand Facilities shall remain connected to the Transmission System and continue to operate stably 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 the figure at the Connection Point.

Following clearance of the Fault/Disturbance, the Demand Facility should return to prefault conditions and maintain its Demand above 95% of prefault value unless otherwise agreed with the TSO.

The voltage-against-time profile specifies the required capability as a function of voltage and Fault Ride-Through Time at the Connection Point before, during and after the Fault Disturbance.



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Updates on the Proposed Grid Code Modification

Frequency and Voltage range standards

- These standards are now only applied on DCC units.
- Propose to also apply these standards to Non-DCC units.

Rate of Change of Frequency

- Include the application of the Rate of Change of Frequency (RoCoF) standard for Ireland and NI power systems (+/- 1.0 Hz/s)

Active Power Recovery

- Add requirements for the recovery of the Demand Facilities' load following system fault.
- Define recovery timeframes

CC.7.4.2 **Demand Facilities, Closed Distribution Systems** and **Distribution Systems** shall:

CC.7.4.2.1 Remain synchronised to the **Transmission System** and operate within the frequency ranges and time periods specified in *Table CC.7.4.2.1.*

*Table CC.7.4.2.1: Minimum Time Periods for **Demand Facilities**, **Closed Distribution Systems** and **Distribution Systems** to Remain Operational without Disconnecting*

Frequency Range	Time Period
47 – 47.5 Hz	20 seconds
47.5 – 48.5 Hz	90 minutes
48.5 – 49 Hz	90 minutes
49 – 51 Hz	Unlimited
51 – 51.5 Hz	90 minutes
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CC.7.4.2.2 Remain synchronised to the **Transmission System** and operate within the ranges of the **Transmission System Voltage** at the connection point, for an unlimited time period, as specified below:

(i) 400 kV system: 360 kV to 420 kV (0.9 p.u. – 1.05 p.u.)
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EirGrid Grid Code - 'DCC Unit' Standards

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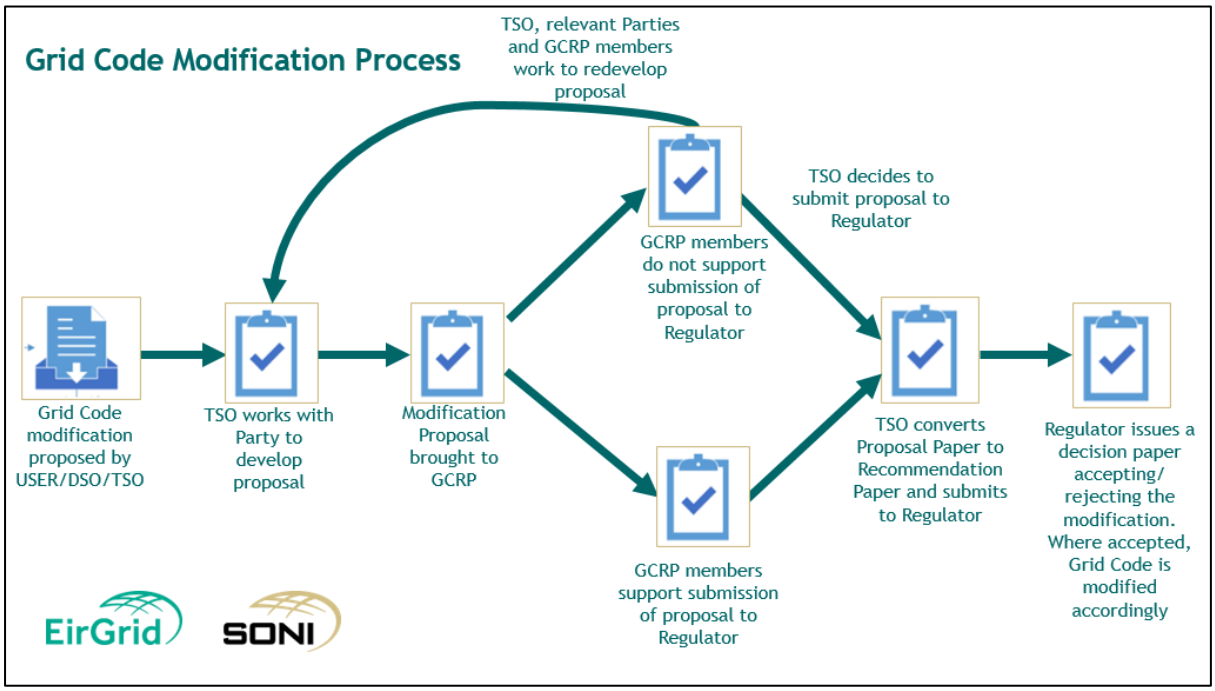

Grid Code Modification Process
TSO, relevant Parties and GCRP members work to redevelop proposal
Grid Code modification proposed by USER/DSO/TSO
TSO works with Party to develop proposal
Modification Proposal brought to GCRP
GCRP members do not support submission of proposal to Regulator
GCRP members support submission of proposal to Regulator
TSO decides to submit proposal to Regulator
TSO converts Proposal Paper to Recommendation Paper and submits to Regulator
Regulator issues a decision paper accepting/ rejecting the modification. Where accepted, Grid Code is modified accordingly
EirGrid
SONI

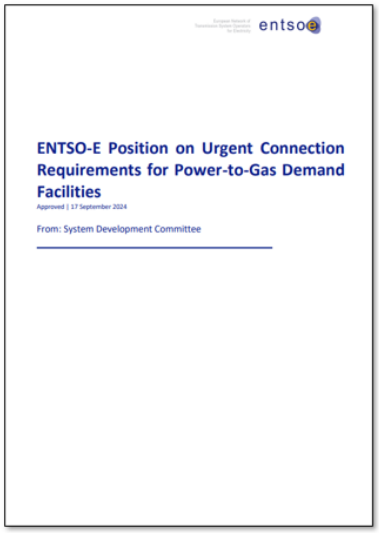

Other related developments
EirGrid
SONI

Connection Requirements for Power to Gas Facilities- ENTSO-E

ENTSO-E PUBLISHED A POSITION PAPER RECOMMENDING AN IMPLEMENTATION OF CONNECTION REQUIREMENTS FOR POWER-TO-GAS DEMAND FACILITIES.

"A LARGE NUMBER OF NEW POWER-TO-GAS UNITS WILL LIKELY BE CONNECTED TO THE SYSTEM BEFORE THE NEW NETWORK CODE PROVISIONS ARE NORMALLY NATIONALLY IMPLEMENTED. THE CONNECTION OF THESE UNITS WITHOUT APPROPRIATE AND COORDINATED TECHNICAL REQUIREMENTS MAY THEREFORE CREATE AN IMPORTANT RISK FOR SYSTEM ROBUSTNESS".

THE POSITION PAPER RECOMMENDS TSOS ESTABLISH MINIMUM TECHNICAL REQUIREMENTS FOR POWER TO GAS DEMAND FACILITIES TO ENSURE GRID RESILIENCE, INCLUDING FAULT RIDE THROUGH REQUIREMENTS, ROCOF ROBUSTNESS, AND POST FAULT ACTIVE POWER RECOVERY.


entsoe

ENTSO-E Position on Urgent Connection Requirements for Power-to-Gas Demand Facilities

Approved | 17 September 2024

From: System Development Committee

Position Paper on Connection Requirements for Power to Gas Demand Facilities

Data Centre Modelling

- EirGrid (and ESBN) previously surveyed data centre customers to gather technical settings (e.g. voltage, frequency and RoCoF settings) to enable development of dynamic models.
- Each data centre is modelled in the TSOs' on-line Look-Ahead Security Assessment Tool (LSAT) which assesses the expected response of data centres to faults on the transmission system. These models are also used in future scenario analysis.
- Through ongoing validation checks (actual versus expected response) we know that there are inaccuracies in some of these models.
- We will be looking to engage with data centre owners in the New Year to address these modelling issues.

Next Steps

- Feedback on the current draft Grid Code proposal (including the additional requirements highlighted in this presentation) may be provided to:

  EirGrid Grid Code team: GridCode@eirgrid.com

  Demand Customer Representatives on the EirGrid Grid Code Representative Panel:
  Thomas O'Sullivan, thomas.osullivan@augh.com
  Gavin McClean, gavinmcc@meta.com.

  SONI Grid Code team: gridcode@soni.ltd.uk.

- The TSOs will maintain ongoing engagement with customers to refine and validate existing models and understand potential solutions.

- The TSOs intend to share an updated draft of the Grid Code proposal in February 2025 ahead of returning to the March 2025 Joint Grid Code Review Panel (JGCRP), and individual EirGrid and SONI Grid Code panels, to seek recommendations for the final proposal.

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Open Discussion

Fault Ride-Through Requirements for System Users

Grid Codes		Network Codes (RfG, DCC, HVDC)
✓	Generators	✓
✓	Power Park Modules (PPMs)	✓
✓	Interconnectors	✓
✗	Demand Facilities	✗
✗	Power to Gas Facilities	✓[1]
✗	Electric Vehicles	✓[1]

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[1] ACER Recommendation on proposal for amendments to the network code on requirements for demand connection [Source]

Grid Codes

EirGrid Grid Code Version 14.2.

EirGrid Grid Code: Proposal is to add the requirement to the **Connection Conditions**. CC7 - Specific Design and Performance Standards that are applicable to **Demand Facilities**.

Demand Facility(ies)	A facility which consumes electrical energy and is connected at one or more **Connection Points** to the **Transmission System**. The **Distribution System** and/or auxiliary supplies of a **Generation Unit** do not constitute a **Demand Facility**.

SONI Grid Code: Proposal is to develop a new Demand Facility definition and add the requirement to a new Connection Condition schedule.

SONI_GridCode_Jun_2024.pdf

EirGrid SONI

Part 10 – Extract from approved meeting minutes from Joint Grid Code Review Panel Meeting 24 June 25 regarding the verbal update provided by the EirGrid Grid Code Review Panel chairperson:

Fault-ride-through requirements for Demand Facilities

a. Miriam Ryan (Chairperson) provided an update on behalf of the Future Operations team – "These requirements are still under consideration by the two TSOs. Further industry communication will take place in due course."

b. There was no comment from members.

Part 11 Fault-ride-through requirements for Demand Facilities Discussion item from Joint Grid Code Review Panel Meeting 25 September 2025:

25/09/2025

Proposed Fault Ride-Through Requirements for Demand Facilities

September 2025 JGCRP Meeting

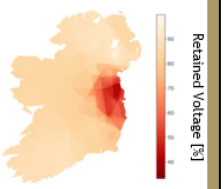
EirGrid SONI

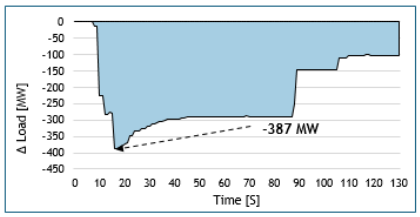
Data Centre Fault Response - Actual Events

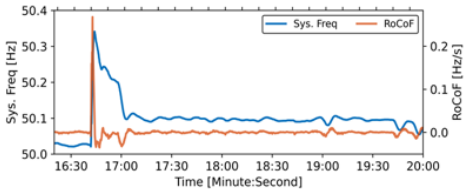
- A number of significant data centre demand reduction events have been observed on the power system.
- The level of fault-initiated reduction in data centre demand has increased as data centre demand increases.

Date	Transmission System Contingency	Data Centre Demand Reduction	Percentage of Total Data Centre Demand
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%

Disturbance propagation (contour map) and collective Data Centre Response (08 May 2025, 220 kV fault in Dublin)







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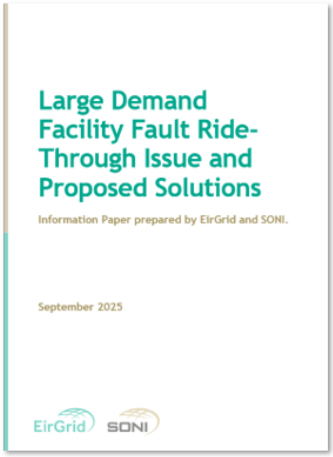
Information Paper for Stakeholder Review

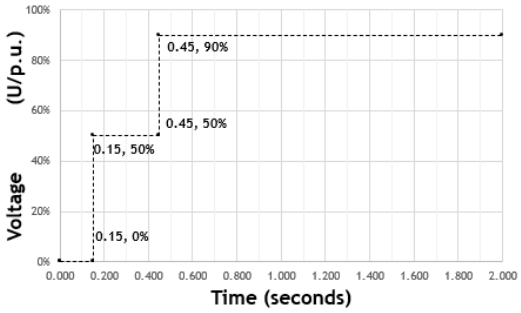
Contents



Existing and Proposed New Grid Code Requirements

Requirement	Non DCC	DCC
Requirements for different Voltage ranges	NEW: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)	EXISTING: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)
Requirements for Frequency range and operational time Frequency	NEW: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes	EXISTING: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes
ROCOF requirement	NEW: 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 milli-second 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 (Reference TBC) supersedes this clause (Reference TBC)	
FRT requirement	NEW: 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 (EirGrid/SONI Grid Code Reference TBC) at the Connection Point.	
Active Power Recovery Requirement	NEW: Following clearance of the Fault Disturbance, the Demand Facility should return to at least 95% of its pre-fault 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.	

Proposed Grid Code Requirements



Required Voltage against time profile as proposed as part of forthcoming EirGrid/SONI code modification proposal

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 (EirGrid/SONI Grid Code Reference Figure TBC) at the Connection Point.

Following clearance of the Fault Disturbance, the Demand Facility should return to at least 95% of its pre-fault 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.

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Next Steps

Progress the Fault Ride-Through Grid Code modification proposals supported by publication of an industry information paper and hosting of an industry webinar.

- Publication of industry information paper, September 2025
- Feedback on the Grid Code proposals (and the information paper) may be provided to:

  EirGrid Grid Code team: GridCode@eirgrid.com
  SONI Grid Code team: GridCode@soni.ltd.uk

- EirGrid and SONI hosted industry webinar, stakeholder participation invited, October 2025
- Bring the proposed modification to the Grid Code Panel for support, December 2025

EirGrid SONI

Part 12 – Extract from approved meeting minutes from Joint Grid Code Review Panel Meeting 25 September 2025 regarding the Fault Ride Through requirements for Demand Facilities Discussion item:

5. Fault Ride Through for Demand Facilities

a. Saif Aldahmor (TSO) presented this discussion item to panel members, please see slide numbers 51 to 56.

b. The TSOs intend to bring a proposed modification to the December 2025 JGCRP meeting.

c. Gavin McClean (Demand Customers) noted new information (e.g., Active Power Recovery) hasn't been shared with those he and Thomas O'Sullivan (Demand Customers) represent, and he raised a concern regarding the December timeline and lack of market solutions.

d. Saif acknowledged challenges and committed to continued engagement; the TSO understands difficulty of retrospective application.

e. Gavin warned that all parties will be non-compliant if implemented in December and called for more engagement before decisions.

f. Saif suggested further discussion in an offline meeting.

g. Gavin reiterated that Active Power Recovery (500 ms) is new and needs time for internal evaluation.

h. Miriam Ryan (Chairperson – EirGrid TSO) noted similar challenges occurred with RoCoF changes; it was put in place in principle as they worked with customers case by case. She noted that there are 2 elements; (1) What do we need in the Grid Code to secure the system and (2) working with users to ensure it is implementable. She ensures that the Grid Code requirements will not go through in December if it is unachievable.

i. **ACTION: All to review the information paper to help shape proposals and timing.**

j. Thomas O'Sullivan (Demand Customers) echoed Gavin's concerns; he welcomes engagement but warned of difficulty communicating changes if feedback isn't considered.

k. Miriam stated that any Grid Code modification must meet specific criteria (justifiable, appropriate, proportionate and achievable).

l. Saif noted that the paper includes justifications and proposed requirements from other TSOs. Saif also highlighted that, based on presentations from various OEMs, there appear to be promising solutions emerging from the OEM side. Thomas agreed on the need for a secure grid; current power delivery is imperfect.

m. Reference made to "Shaping Our Electricity Future"; noted burden on consumers not previously involved.

n. **ACTION: The TSO to send link to Information paper to members. (Update: The publication of the information paper has been delayed, with the aim to release it within the next few weeks. Once published, the TSO will share the link with all members.**

o. William Carr (PSG) raised concerns about retrospective application; noted variability in OEM guarantees post-sale.

p. Saif noted other TSOs are facing similar challenges.

q. Patrick Liddy (DSU) asked how requirements will be tested – during CA, via existing providers, or DSU sites.

r. Miriam clarified testing will be study-based, not fault-injected; typically done prior to energisation, with retrospective agreements as needed.

s. Patrick expressed concern that requirements might apply to DSUs only. Clarification provided: Applies only to transmission-connected demand facilities, not just DSUs.

t. Paul Troughton (DSU) asked if other TSOs have similar requirements; noted he hasn't seen Active Power Recovery elsewhere. It was clarified that several TSOs have proposed Post Fault Active Power Recovery requirements, details are provided in the Information paper.

u. Thomas asked whether the DSO would need to comply with Grid Code rules.

v. Tony Hearne (DSO) noted that if Grid Code modification is approved, similar change will be needed for Distribution Code; MW threshold to be developed. DSO assets may be used in studies.

w. Gavin noted other TSOs do not apply changes retrospectively and offer longer timelines.

x. Saif explained retrospective application is justified due to high data centre demand (>25%); past events saw >50% loss. (Others 2-3%)

y. Gavin stated retrospective implementation is costly and time-consuming.

z. **ACTION: TSOs to share document link (North and South); feedback encouraged with a Workshop to be scheduled**

Part 13 – Presentation from the 4th Industry Webinar on 03 November 2025:

November 2025

Demand Facility Fault Ride Through Industry Webinar

EirGrid SONI

Purpose of this webinar

- To provide an overview of the 'Large Demand Facility Fault Ride-Through Issue and Proposed Solutions' Information paper issued by EirGrid and SONI on 17 October 2025.
- Set out next steps to bringing forward the proposed Fault Ride-Through Grid Code Modifications.
- To have an open Q&A session on the Information Paper and proposed Grid Code modification.

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This Webinar

Invited to this webinar:

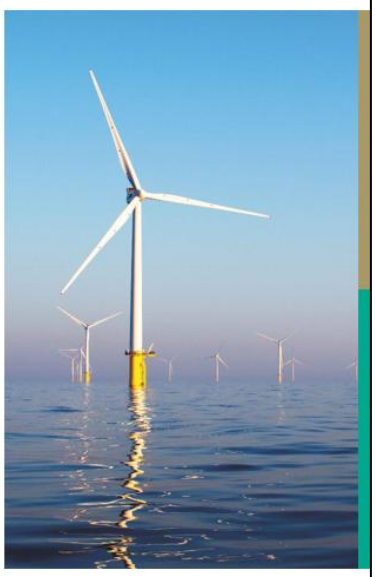
- Large demand facility owners / developers
- Members of the SONI and EirGrid Grid Code Panels

Slides will be shared after the webinar. We request that these slides are not circulated outside of the attending organisations.

Please save questions for the open Q&A session

Agenda

No.	Items	Timings
1.	Introduction	5 Mins
2.	Overview and Context	15 Mins
3.	Fault Ride Through Behaviour and Impact on the Power System A) Actual System Events B) Study Results of Current and Future Scenarios	15 Mins
4.	Mitigation & Solutions	10 Mins
5.	Comparison of Proposals from Other TSOs	10 Mins
6.	Next steps	5 Mins
7.	Q&A Session	30 Mins



All-Island Power System Overview

System

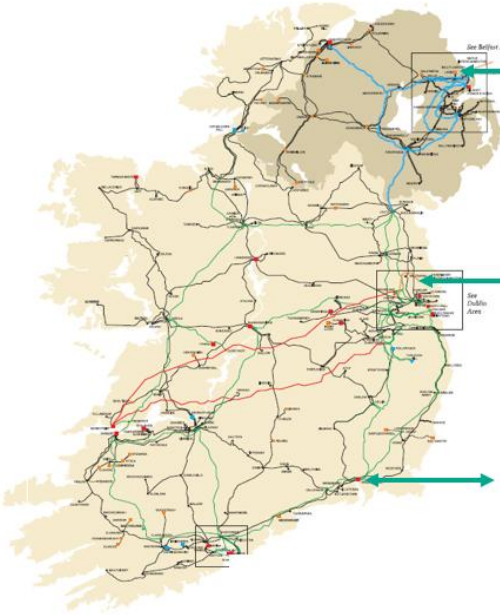
Two Jurisdictions
EirGrid is the TSO in Ireland
SONI is the TSO in N.Ireland
Single Synchronous Area & Market
Transmission: 110/220/275/400 kV
Jurisdictional Transmission Control
All-Island Scheduling and Dispatch

Demand

Peak Demand: 7.5 GW
Minimum Demand: 3.1 GW

Generation

Installed Wind: c. 6.3 GW
Solar growing rapidly: c. 2 GW



Moyle
+/- 500 MW
HVDC (LCC)
to Great Britain

EWIC
+/- 500 MW
HVDC (VSC)
to Great Britain

GreenLink
+/- 500 MW
HVDC (VSC)
to Great Britain

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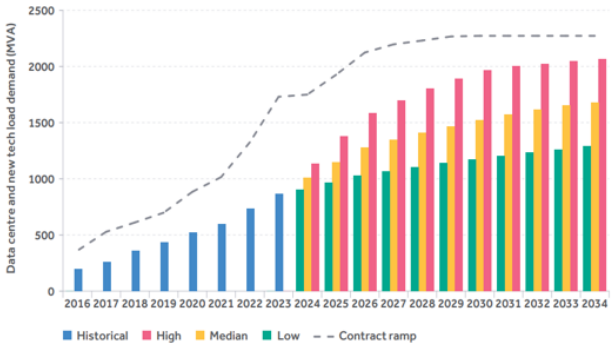
Confidential & Commercially Sensitive
Not for Onward Circulation

Current Data Centres and New Technology Loads and Forecast Growth

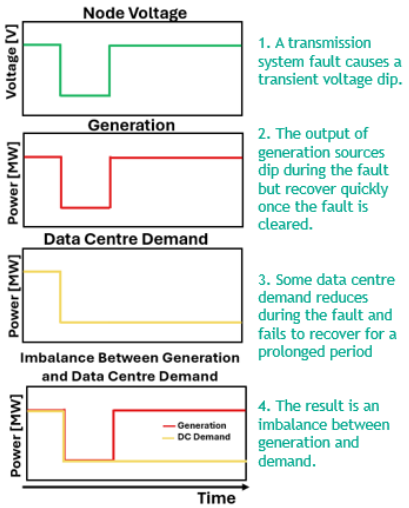
- The highest monthly average data centre demand to date is approximately 800 MVA.
- Most data centres are connected on the transmission system but a significant proportion is also connected to the distribution network. Most are located in the greater Dublin area.
- There is approximately 2000 MVA of demand capacity that is contracted to data centres and other new technology loads at the transmission level, and approximately a further 300 MVA contracted at the 110 kV distribution level.



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

Data Centre Fault Response

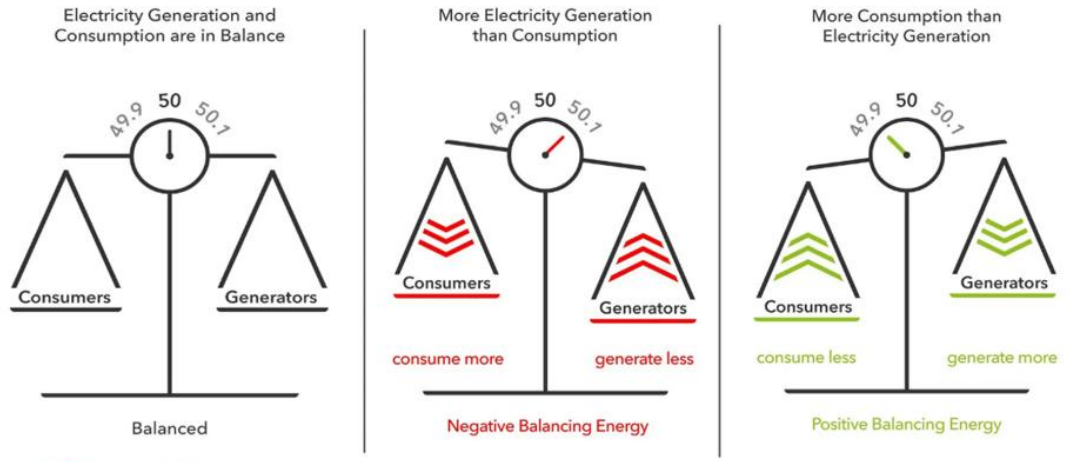
- Following a transmission system fault that causes a transient voltage dip on the power system, some data centre demand has been observed to reduce for a prolonged period before being automatically restored.
- This demand reduction arises as data centres automatically switch their consumption from the grid to their own back-up Uninterruptible Power Supply (UPS) systems.
- This response happens within milliseconds and is done to protect IT equipment within the data centre.
- The sensitivity of data centre protection systems is such that any significant transmission fault at 220 kV can trigger this response (typically any voltage less than 0.7 to 0.8 p.u. for 20 milli-seconds triggers a switchover to UPS).
- This demand reduction causes a significant imbalance on the power system (demand << generation) which results in a positive Rate of Change of Frequency (RoCoF) and frequency rise that is seen by the whole power system.



1. A transmission system fault causes a transient voltage dip.
2. The output of generation sources dip during the fault but recover quickly once the fault is cleared.
3. Some data centre demand reduces during the fault and fails to recover for a prolonged period
4. The result is an imbalance between generation and demand.

Illustration of fault impact and grid user response

Frequency in Power Systems



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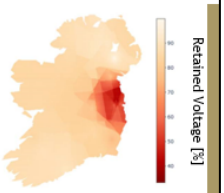
Source: Next Kraftwerke

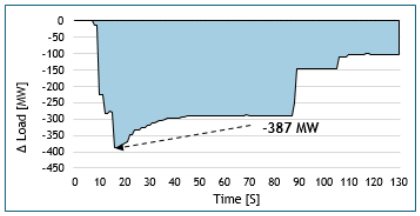
Data Centre Fault Response - Actual Events

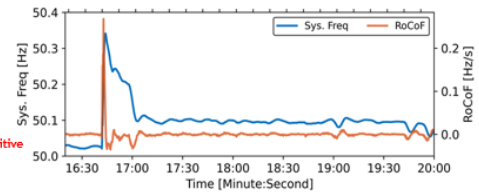
- A number of significant data centre demand reduction events have been observed on the power system.
- The level of fault-initiated reduction in data centre demand has increased as data centre demand increases.

Date	Transmission System Contingency	Data Centre Demand Reduction	Percentage of Total Data Centre Demand
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%

Disturbance propagation (contour map) and collective Data Centre Response (08 May 2025, 220 kV fault in Dublin)







Scenarios with increased Data Centre Demand - No additional mitigations

Fault
- Transmission fault close to a HVDC interconnector
- Widespread voltage disturbance across the power system for a short period

Interconnector Disconnection
- HVDC Interconnector export is lost
- Large imbalance (demand less than generation)
- Frequency increase and high RoCOF

Large Demand Reduction
- Voltage disturbance triggers reduction in demand at some large demand facilities
- Frequency and RoCoF increases are exacerbated as imbalance increases

Wind Farm Disconnections
- Special protection schemes activate to trip multiple windfarms to assist in rebalancing the power system.

DC Demand Considered (MW) / Risk	RoCoF (Hz/s)	Zenith (Hz)	DC demand tripped (A) (MW)	Interconnector export loss (B) (MW)	Overall demand reduction (A+B) (MW)	Wind Generation shed (MW)
600	0.79	50.66	491	500	991	571
800	0.89	50.74	655	500	1155	747
1000	1.09	50.81	829	500	1329	823
1200	1.07	50.90	990	500	1490	939
1500	1.24	51.06	1237	500	1737	1105
2000	1.56	51.10	1586	500	2086	1437

Violation of limits/ security standards

Scale of the Issue

- Historically our largest imbalance has been in the order of 500 MW e.g. interconnector trip.
- Relative to other power systems, this is high (as a percentage of system demand) and managing system stability for such an event has been a focus for EirGrid and SONI.
- While reserve requirements and operational policy have been designed to manage this scale of imbalance, the scale of the potential imbalances as a consequence of demand reductions is now significantly increased and will potentially be multiples of the historic largest imbalance if solutions are not implemented.
- This scale of imbalance presents risks to the security of the power system and is unprecedented from an international power system perspective.

Illustration of relative magnitude of largest potential imbalance with respect to maximum / minimum demand within each synchronous area.

Continental Europe
Largest Contingency Imbalance: 3000 MW
1% to 2% of system demand

Nordic
Largest Contingency Imbalance: 1400 MW
2% to 6% of system demand

Great Britain
Largest Contingency Imbalance: 1400 MW
3% to 7% of system demand

Ireland and Northern Ireland
Largest Contingency Imbalance: 1155 MW
17% to 39% of system demand

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Proposed Mitigation & Solutions

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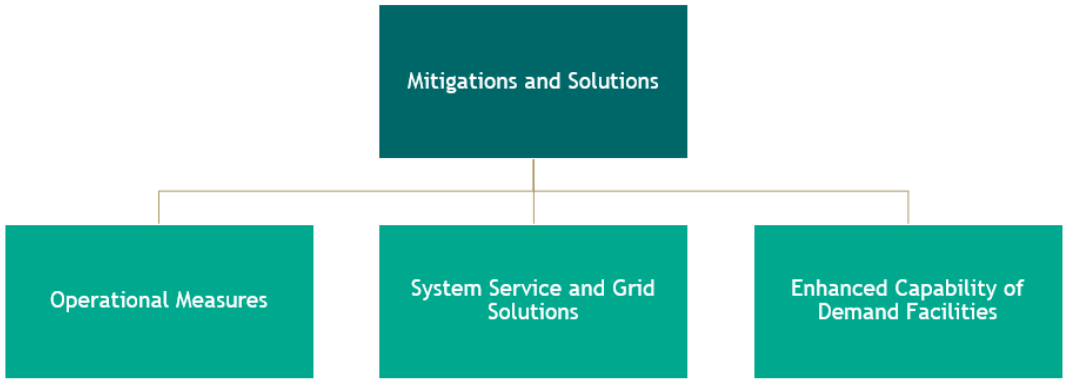
Approaches to Addressing the Issue



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Operational Measures

Active

- Wind & Solar Control - Enable active power & frequency response
- Synchronous Condensers - Provide system inertia
- Battery Storage - Manage energy storage for fast frequency support
- HVDC Interconnectors- Frequency response management
- Interconnector Export Limits - Reduce potential demand loss
- Conventional Generation Dispatch - Ensure inertia & reserves
- Operational Limits Review - MUON, SNSP, Inertia floor

Under-Review

- Expand and redesign over-frequency generation shedding scheme
- Demand Curtailment - Pre-emptive curtailment of demand facilities
- Demand Restoration - Controlled restoration of demand facilities

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System Service / Grid Solutions

Reactive Power Capability	Increasing Inertia	Increasing Frequency Response
• Installation of reactive compensation (e.g., STATCOMs, Synchronous Condensers) • Reduce voltage dip during faults • May limit demand reduction from data centres and support grid voltage stability	• Use of Synchronous Condensers to increase system inertia • Helps reduce Rate of Change of Frequency (RoCoF) during large demand loss	• Support frequency stability by deploying technologies such as Battery Energy Storage Systems (BESS), which help balance the grid during sudden changes in demand • Manages system imbalance and reduce frequency zenith

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Fault Ride-Through Requirements for System Users

Grid Codes		Network Codes (RfG, DCC, HVDC)
✓	Generators	✓
✓	Power Park Modules (PPMs)	✓
✓	Interconnectors	✓
✗	Demand Facilities	✗
✗	Power to Gas Facilities	✓[1]
✗	Electric Vehicles	✓[1]

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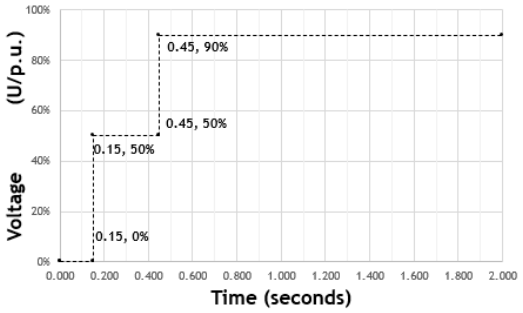
[1] ACER Recommendation on proposal for amendments to the network code on requirements for demand connection [Source]

Proposed Grid Code Requirements



Required Voltage against time profile as proposed as part of forthcoming EirGrid/SONI code modification proposal

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 (EirGrid/SONI Grid Code Reference Figure TBC) at the Connection Point.

Following clearance of the Fault Disturbance, the Demand Facility should return to at least 95% of its pre-fault 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.

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Existing and Proposed New Grid Code Requirements

Requirement	Non DCC	DCC
Requirements for different Voltage ranges	NEW: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)	EXISTING: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)
Requirements for Frequency range and operational time Frequency	NEW: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes	EXISTING: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes
ROCOF requirement	NEW: 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 milli-second 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 (Reference TBC) supersedes this clause (Reference TBC)	
FRT requirement	NEW: 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 (EirGrid/SONI Grid Code Reference TBC) at the Connection Point.	
Active Power Recovery Requirement	NEW: Following clearance of the Fault Disturbance, the Demand Facility should return to at least 95% of its pre-fault 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.	

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Overview of Power System Analysis Results

800 MW Case: 655 MW of data centre demand reduction + 500 MW EWIC trip resulting in 747 MW of wind generation shedding

Risk Level	Description
Secure	The power system remains within operational limits using standard operational and market mitigations (e.g. generation re-dispatch and activation of reserves) for credible contingencies.
Secure following reliance on activation of cross-border and/or system defence measures	Reliance on cross-border measures (such as HVDC interconnector flow restrictions and/or North-South Tie-Line restrictions) and system defence measures (such as over frequency generation shedding) are required to maintain key system metrics (such as RoCoF and frequency) within operational limits. Activation of automatic over frequency generation shedding gives rise to further operational challenges due to the loss of this generation including the voltage and frequency response services provided by these units.
Insecure	Power system is not secure due to violation of system limits for a credible contingency. High risk of major power system failure including the potential for a significant system incident.

Study Scenario	Data Centre Demand Case (MW) / Risk	Key Message
1. Base Case - No additional mitigations	600	At the existing level of data centre demand (approximately 800 MW) the potential level of imbalance is significantly above normal LSI/LSO levels and requires activation of system defence measures to mitigate. Without further significant additional mitigations, the currently contracted level of data centre demand (approximately 2000 MW) would result in power system insecurities
	800	
	1000	
	1200	
	1500	
	2000	
2. Modelling of a 1 sec demand recovery time, no additional Reserves/Inertia	600	Application of fault ride-through capability with a restoration time of 1 second (at all data centres) is insufficient to adequately secure the power system.
	800	
	1000	
	1200	
	1500	
	2000	
3. Modelling of a 500 ms demand recovery time, no additional Reserves/Inertia	600	Application of fault ride-through capability with a restoration time of 500 milli-seconds (at all data centres) significantly improves overall system security. However, System Defence Measures continue to be required and insecurities remain at higher data centre demand levels.
	800	
	1000	
	1200	
	1500	
	2000	
4. Modelling of a 500 ms demand recovery time, with additional Reserves (+600 MW) / Inertia (+ 2 x Synchronous Condensers)	N/A	Significant additional System Services / Grid solutions are needed to accommodate 2000 MW of data centre demand in addition to the implementation of fault-ride through capability. (Note only a 2000 MW data centre demand case was considered in this scenario).
	N/A	
	N/A	
	N/A	
	N/A	
	2000	

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Comparison of Proposals from Other TSOs

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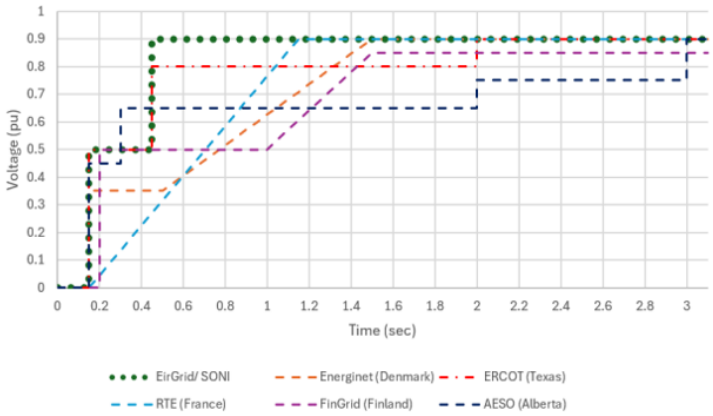
Comparison of FRT and Post-Fault Active Power Recovery Requirements Across TSOs



Proposed Post Fault Active Power Recovery Requirement	
SONI & EirGrid	500ms
ERCOT	1 second
AESO (Alberta)	1 second
FinGrid	500ms

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Next Steps

- Feedback requested, particularly on the proposed Grid Code modifications, by 7 Nov. '25.
- A further webinar to address stakeholder feedback, provide an update on the Grid Code modification proposal, processes for compliance and derogation - 26 Nov. '25.
- The proposed Grid Code modifications will be brought to the EirGrid and SONI Grid Code Review Panels in December 2025.
- The TSOs will be providing more information on Grid Code compliance / derogation processes and what will be expected from a customer perspective.
- The TSOs continue to be open to bi-lateral engagements - please contact your account manager to arrange.

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Q&A Session

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Part 14 – Presentation from the 5th Industry Webinar on 26 November 2025:

26 November 2025

Fault Ride Through Requirements Industry Webinar

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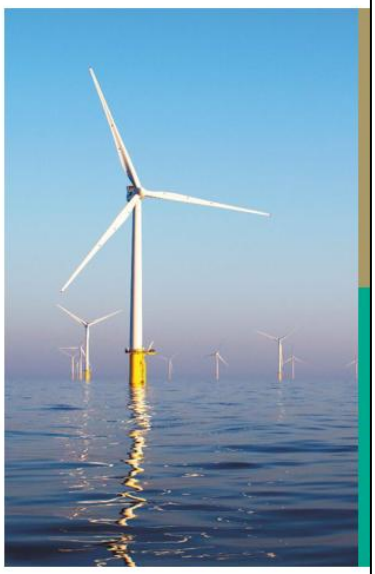
Agenda

Items		Timings
1.	Introduction	05 Mins
2.	Recent Engagements	05 Mins
3.	Industry Feedback	05 Mins
4.	Update on Proposed EirGrid/SONI Grid Code Requirements and Information Paper	10 Mins
6.	Next steps	05 Mins
7.	Open Discussion	30 Mins



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Recent Industry Engagement

- Industry Webinar held on 3 November - attended by over 50 industry representatives, CRU and DCEE.
- c.20 recent bi-lateral meetings with data centre owners/developers and other transmission connected demand customers….other customers offered meetings.
- 'Large Demand Facility Fault Ride-Through Issue and Proposed Solutions' Information paper updated and re-issued by EirGrid and SONI on 17 November 2025 along with the updated Grid Code Modification Proposal.

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Main Industry Feedback (pre-17 November proposal update)

The main areas of feedback relevant to the Grid Code modification proposal and its implementation have been categorised as follows:

- Proposed Modification
- Timelines
- Compliance / Derogation Processes

Main Industry Feedback: Proposed Modifications

Industry Feedback	Our Response
No market ready solutions that meet the proposed FRT requirements currently exist	We are aware that the data centre industry is actively engaged in development of technical solutions to the FRT issue. For example, one OEM has indicated that a technical solution could be available for commencement of roll-out during 2026.
Some suggested clarifications/changes to the modification (clarify what 'remain connected' means and challenges with achieving 95% demand recovery post fault).	TSOs clarified that "remain connected" means the facility should stay electrically connected to the transmission system. During a voltage dip, demand may switch to backup systems but should restore at least 90% of pre-fault demand within 500 ms after fault clearance and voltage recovery to 90% of nominal voltage. Based on stakeholder feedback, the recovery requirement was revised to 90%, aligning with other system users (PPMs and HVDC).

Main Industry Feedback: Proposed Modifications

Industry Feedback	Our Response
Concern that the analysis that has informed the proposed modification only considers the currently contracted data centre level (approx. 2 GW).	The proposed modification addresses key power system challenges at current, and contracted, data centre demand levels. The impact of data centre demand beyond currently contracted levels, and analysis of other technical challenges associated with the integration of new technology loads onto power systems, are subject to further consideration.
Some non-data centre customers did support the proposal from a grid security perspective.	We acknowledge and appreciate this support. The proposed modification is designed to enhance overall system resilience and maintain security of supply for all customers.

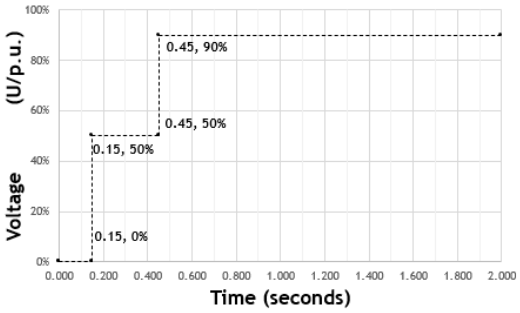
Main Industry Feedback: Timelines

Industry Feedback	Our Response
Concern with the proposed Grid Code modification timeline i.e. targeting 3 December 2025 Grid Code Panel for final presentation of the proposal.	The first draft of the modification was shared with the Joint Grid Code Panel in September 2024, and broader industry in October 2024. The modification was updated and shared at the September 2025 Joint Grid Code Panel meeting for further feedback. The final proposed modification was published on 17 November 2025 incorporating our consideration of this feedback.
Insufficient time for customers (particularly non-data centres) to assess their ability to comply.	We acknowledge this concern and will ensure it is factored into our compliance and derogation management processes, while continuing to engage with stakeholders to provide clarity and support.
Insufficient time for customers to engage with OEMs on technical solutions	We recognise this challenge and will maintain active engagement with both customers and OEMs. For example, one OEM has indicated that solutions may be available during 2026, and we will continue to facilitate discussions to support timely compliance.

Main Industry Feedback: Compliance / Derogation Processes

Industry Feedback	Our Response
A high risk of widespread non-compliance would result from application of the requirements to all existing demand facilities.	We acknowledge that there is significant concern from industry on potential non-compliance resulting from the application of the proposed grid code requirements. We are actively working on proposals for compliance/derogation processes to accompany the proposed requirements. There will be further engagement with industry over the coming weeks on this issue.
This will lead to severe reputational damage for the impacted customers and 'Ireland Inc'.	The application of the proposed requirements will strengthen grid resilience and support Ireland's reputation as a leader in sustainable energy growth. Continued collaboration with industry will help mitigate potential reputational impacts.
This is a non-standard approach when compared internationally.	The grid code modification approaches are following established grid code governance arrangements.

Proposed Grid Code FRT Requirements



Required Voltage against time profile as proposed as part of forthcoming EirGrid/SONI code modification proposal

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Full Modification Proposals

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*DCC = Demand Connection Code

Splitting of Modification Proposals

Mod 2 - Subject to separate CBA/consultation

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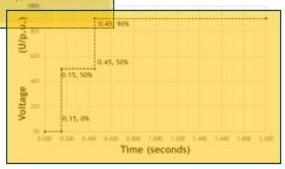
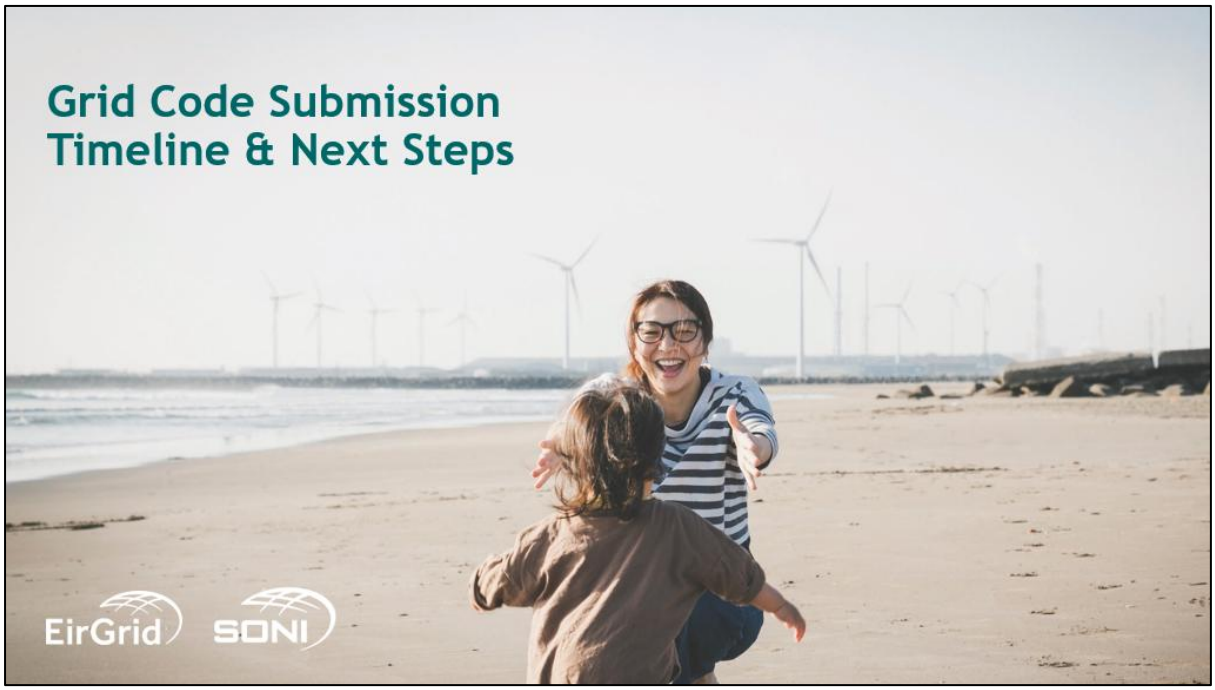
Existing Requirements - no change



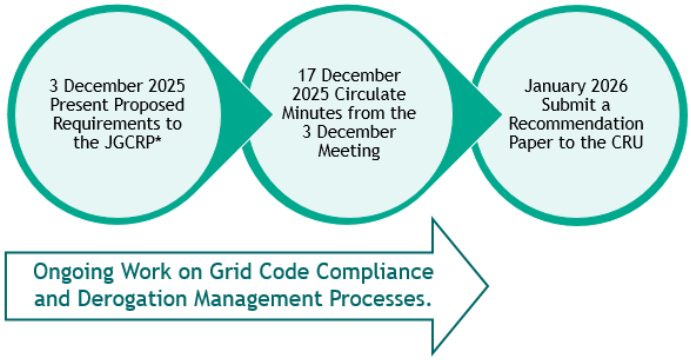
Mod 1 - Bring to December 2025 GCRP

Grid Code Submission Timeline & Next Steps



Grid Code Submission Timeline

Key milestones to progress the EirGrid Grid Code modification and submit a Recommendation Paper to CRU by January 2026.



*JGCRP: Joint (EirGrid and SONI) Grid Code Review Panel

Next Steps

Grid Code Panel Review: The proposed RoCoF/FRT/APR modification (Modification 1) will be brought to the Grid Code Review Panel on 3 December 2025. Modification 2 (Voltage and Frequency Ranges) will follow a separate process to be outlined at a later date.

EirGrid will be providing more information on Grid Code compliance / derogation processes and what will be expected from a customer perspective. We propose a further webinar in January 2026 to outline the proposed processes.

Submission of Grid Code Modification recommendation to CRU in January 2026, including:

Grid Code Panel member feedback

Proposed Grid Code compliance and derogation management processes

Open Discussion

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Part 15 - The presentation from the Joint Grid Code Review Panel meeting 03 December 2025:

03/12/2025

2. Modification: 45 minutes

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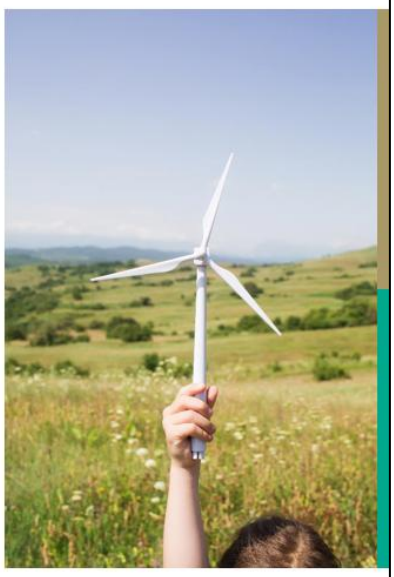
Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities



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Background

- The fault ride through issue is a significant and growing challenge to the ability of the TSOs to operate the power system securely.
- The TSOs are having to take operational actions to manage this challenge - these actions are negatively impacting on energy market outcomes, interconnector exports, some market participants and renewable generation. In addition, this issue resulted in a decision not to increase the SNSP limit from 75% to 80%.
- This is a new issue internationally and is not unique to Ireland/N.Ireland. However, we are more exposed.
- There has been significant engagement with industry on this matter including multiple industry webinars and bilateral meetings. We are grateful to industry and their representative bodies for this constructive engagement which has enabled evolution of the the fault ride through Grid Code modification proposals.
- As we work together with industry, government and regulators on this critical issue, our priority remains to ensure system stability, power quality and security of supply for all users of the power system.

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Modification Timeline

Sept. 2024	JGCRP - Discussion Item
Oct. 2024	Industry Webinar 1
Dec. 2024	Industry Webinar 2
Dec. 2024	JGCRP - Discussion Item
Sept. 2025	JGCRP - Discussion Item
Nov. 2025	Industry Webinar 3
Nov. 2025	Industry Webinar 4
Dec. 2025	JGCRP - Final Modification Proposal

Bi-lateral Mtgs

Updates:

Initial FRT Proposal

↓

Active Power Recovery Time Defined
RoCoF, Voltage and Frequency Ranges

↓

Response during fault clarified
Recovery Threshold Updated
Modification Split (Non-DCC)

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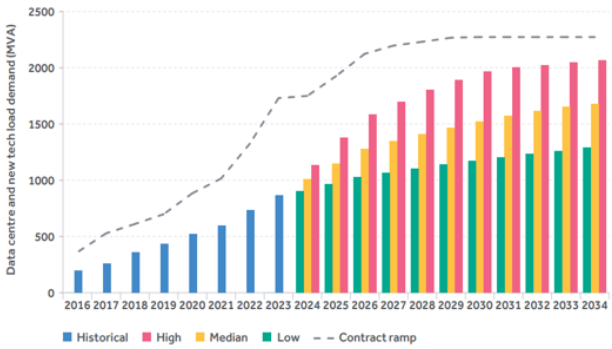
Current Data Centres and New Technology Loads and Forecast Growth

- The highest monthly average data centre demand to date is approximately 800 MVA.
- Most data centres are connected on the transmission system but a significant proportion is also connected to the distribution network. Most are located in the greater Dublin area.
- There is approximately 2000 MVA of demand capacity that is contracted to data centres and other new technology loads at the transmission level, and approximately a further 300 MVA contracted at the 110 kV distribution level.



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

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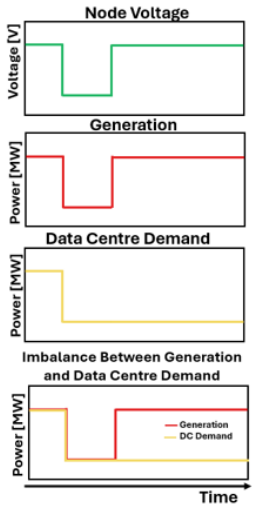
Data Centre Fault Response

- Following a transmission system fault that causes a transient voltage dip on the power system, some data centre demand has been observed to reduce for a prolonged period before being automatically restored.
- This demand reduction arises as data centres automatically switch their consumption from the grid to their own back-up Uninterruptible Power Supply (UPS) systems.
- This response happens within milliseconds and is done to protect IT equipment within the data centre.
- The sensitivity of data centre protection systems is such that any significant transmission fault at 220 kV can trigger this response (typically any voltage less than 0.7 to 0.8 p.u. for 20 milli-seconds triggers a switchover to UPS).
- This demand reduction causes a significant imbalance on the power system (demand << generation) which results in a positive Rate of Change of Frequency (RoCoF) and frequency rise that is seen by the whole power system.



1. A transmission system fault causes a transient voltage dip.

2. The output of generation sources dip during the fault but recover quickly once the fault is cleared.

3. Some data centre demand reduces during the fault and fails to recover for a prolonged period

4. The result is an imbalance between generation and demand.

Illustration of fault impact and grid user response

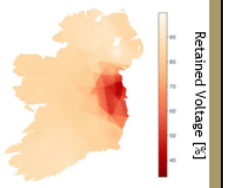
Data Centre Fault Response - Actual Events

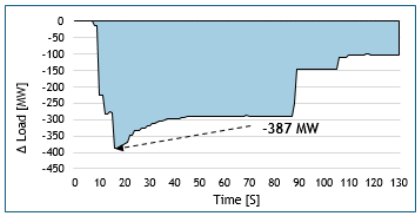
- A number of significant data centre demand reduction events have been observed on the power system.
- The level of fault-initiated reduction in data centre demand has increased as data centre demand increases.

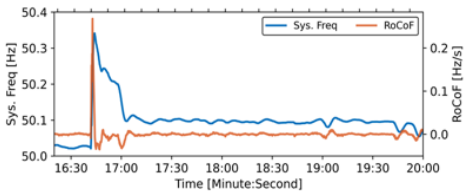
Date	Transmission System Contingency	Data Centre Demand Reduction	Percentage of Total Data Centre Demand
7 Jan 2022	Limerick: Killonan-Kilpaddoge 220 kV Fault	74 MW	16%
13 Dec 2022	Dublin: Kellystown-Woodland 220 kV Fault	204 MW	34%
26 Jan 2025	Dublin: Poolbeg 220 kV Reactor Fault	321 MW	44%
8 May 2025	Dublin: North Wall - Poolbeg 220 kV Fault	387 MW	52%

All of the contingency events observed to date were single-phase faults. For a three-phase fault, significantly higher demand reductions would be observed.

Disturbance propagation (contour map) and collective Data Centre Response (08 May 2025, 220 kV fault in Dublin)







Scenarios with increased Data Centre Demand – No additional mitigations

Fault
- Transmission fault close to a HVDC interconnector
- Widespread voltage disturbance across the power system for a short period

Interconnector Disconnection
- HVDC Interconnector export is lost
- Large imbalance (demand less than generation)
- Frequency increase and high RoCOF

Large Demand Reduction
- Voltage disturbance triggers reduction in demand at some large demand facilities
- Frequency and RoCoF increases are exacerbated as imbalance increases

Wind Farm Disconnections
- Special protection schemes activate to trip multiple windfarms to assist in rebalancing the power system.

DC Demand Considered (MW) / Risk	RoCoF (Hz/s)	Zenith (Hz)	DC demand tripped (A) (MW)	Interconnector export loss (B) (MW)	Overall demand reduction (A+B) (MW)	Wind Generation shed (MW)
600	0.79	50.66	491	500	991	571
800	0.89	50.74	655	500	1155	747
1000	1.09	50.81	829	500	1329	823
1200	1.07	50.90	990	500	1490	939
1500	1.24	51.06	1237	500	1737	1105
2000	1.56	51.10	1586	500	2086	1437

Violation of limits/ security standards

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Overview of Power System Analysis Results

800 MW Case: 655 MW of data centre demand reduction + 500 MW EWIC trip resulting in 747 MW of wind generation shedding

Risk Level	Description
Secure	The power system remains within operational limits using standard operational and market mitigations (e.g. generation re-dispatch and activation of reserves) for credible contingencies.
Secure following reliance on activation of cross-border and/or system defence measures	Reliance on cross-border measures (such as HVDC interconnector flow restrictions and/or North-South Tie-Line restrictions) and system defence measures (such as over frequency generation shedding) are required to maintain key system metrics (such as RoCoF and frequency) within operational limits. Activation of automatic over frequency generation shedding gives rise to further operational challenges due to the loss of this generation including the voltage and frequency response services provided by these units.
Insecure	Power system is not secure due to violation of system limits for a credible contingency. High risk of major power system failure including the potential for a significant system incident.

Study Scenario	Data Centre Demand Case (MW) / Risk	Key Message
1. Base Case - No additional mitigations	600	At the existing level of data centre demand (approximately 800 MW) the potential level of imbalance is significantly above normal LSI/LSO levels and requires activation of system defence measures to mitigate. Without further significant additional mitigations, the currently contracted level of data centre demand (approximately 2000 MW) would result in power system insecurities
	800	
	1000	
	1200	
	1500	
	2000	
2. Modelling of a 1 sec demand recovery time, no additional Reserves/Inertia	600	Application of fault ride-through capability with a restoration time of 1 second (at all data centres) is insufficient to adequately secure the power system.
	800	
	1000	
	1200	
	1500	
	2000	
3. Modelling of a 500 ms demand recovery time, no additional Reserves/Inertia	600	Application of fault ride-through capability with a restoration time of 500 milli-seconds (at all data centres) significantly improves overall system security. However, System Defence Measures continue to be required and insecurities remain at higher data centre demand levels.
	800	
	1000	
	1200	
	1500	
	2000	
4. Modelling of a 500 ms demand recovery time, with additional Reserves (+600 MW) / Inertia (+ 2 x Synchronous Condensers)	N/A	Significant additional System Services / Grid solutions are needed to accommodate 2000 MW of data centre demand in addition to the implementation of fault-ride through capability. (Note only a 2000 MW data centre demand case was considered in this scenario).
	N/A	
	N/A	
	N/A	
	N/A	
	2000	

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Recent Industry Engagement

- Industry Webinar held on 3 November - attended by over 50 industry representatives, CRU and DCEE.
- An industry webinar was held on 26 November to provide an update on the proposed requirements, following feedback from stakeholders on the information paper and the proposed Grid Code modifications.
- c.21 recent bi-lateral meetings with data centre owners/developers and other transmission connected demand customers....other customers offered meetings.
- 'Large Demand Facility Fault Ride-Through Issue and Proposed Solutions' Information paper updated and re-issued by EirGrid and SONI on 17 November 2025 along with the updated Grid Code Modification Proposal.

Main Industry Feedback (pre-17 November proposal update)

The main areas of feedback relevant to the Grid Code modification proposal and its implementation have been categorised as follows:

- Proposed Modification
- Timelines
- Compliance / Derogation Processes

Main Industry Feedback: Proposed Modifications

Industry Feedback	Our Response
No market ready solutions that meet the proposed FRT requirements currently exist	We are aware that the data centre industry is actively engaged in development of technical solutions to the FRT issue. For example, one OEM has indicated that a technical solution could be available for commencement of roll-out during 2026.
Some suggested clarifications/changes to the modification (clarify what 'remain connected' means and challenges with achieving 95% demand recovery post fault).	TSOs clarified that "remain connected" means the facility should stay electrically connected to the transmission system. During a voltage dip, demand may switch to backup systems but should restore at least 90% of pre-fault demand within 500 ms after fault clearance and voltage recovery to 90% of nominal voltage. Based on stakeholder feedback, the recovery requirement was revised to 90%, aligning with other system users (PPMs and HVDC).

Main Industry Feedback: Proposed Modifications

Industry Feedback	Our Response
Concern that the analysis that has informed the proposed modification only considers the currently contracted data centre level (approx. 2 GW).	The proposed modification addresses key power system challenges at current, and contracted, data centre demand levels. The impact of data centre demand beyond currently contracted levels, and analysis of other technical challenges associated with the integration of new technology loads onto power systems, are subject to further consideration.
Some non-data centre customers did support the proposal from a grid security perspective.	We acknowledge and appreciate this support. The proposed modification is designed to enhance overall system resilience and maintain security of supply for all customers.

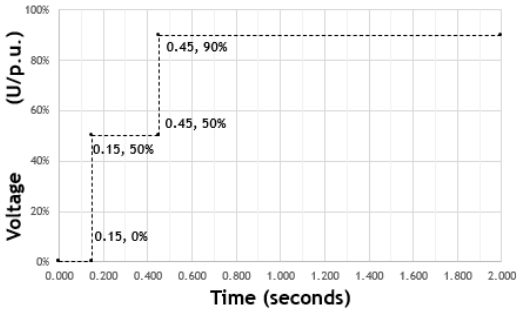
Main Industry Feedback: Timelines

Industry Feedback	Our Response
Concern with the proposed Grid Code modification timeline i.e. targeting 3 December 2025 Grid Code Panel for final presentation of the proposal.	The first draft of the modification was shared with the Joint Grid Code Panel in September 2024, and broader industry in October 2024. The modification was updated and shared at the September 2025 Joint Grid Code Panel meeting for further feedback. The final proposed modification was published on 17 November 2025 incorporating our consideration of this feedback.
Insufficient time for customers (particularly non-data centres) to assess their ability to comply.	We acknowledge this concern and will ensure it is factored into our compliance and derogation management processes, while continuing to engage with stakeholders to provide clarity and support.
Insufficient time for customers to engage with OEMs on technical solutions	We recognise this challenge and will maintain active engagement with both customers and OEMs. For example, one OEM has indicated that solutions may be available during 2026, and we will continue to facilitate discussions to support timely compliance.

Main Industry Feedback: Compliance / Derogation Processes

Industry Feedback	Our Response
A high risk of widespread non-compliance would result from application of the requirements to all existing demand facilities.	We acknowledge that there is significant concern from industry on potential non-compliance resulting from the application of the proposed grid code requirements. We are actively working on proposals for compliance/derogation processes to accompany the proposed requirements. There will be further engagement with industry over the coming weeks on this issue.
This will lead to severe reputational damage for the impacted customers and 'Ireland Inc'.	The application of the proposed requirements will strengthen grid resilience and support Ireland's reputation as a leader in sustainable energy growth. Continued collaboration with industry will help mitigate potential reputational impacts.
This is a non-standard approach when compared internationally.	The grid code modification approaches are following established grid code governance arrangements.

Proposed Grid Code FRT Requirements



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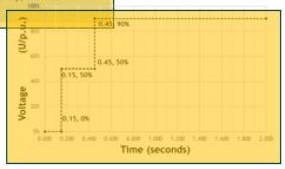
FRT requirement	NEW:Demand Facilities shall remain connected to the Transmission System during and following any Fault Disturbance on the Power System which results in a Voltage deviation which remains on or above the voltage-against-time profile specified in Figure CC.7.4.3.2 (EirGrid Grid Code reference- SONI Grid Code reference tbc) at the Connection Point. The voltage-against-time profile specifies the required capability as a function of voltage and Fault Ride-Through Time at the Connection Point before, during and after the Fault Disturbance.	
Active Power Recovery Requirement	NEW: Following clearance of the Fault Disturbance, the Demand Facility should return to at least 90% of its prefault 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.	

Existing Requirements - no change

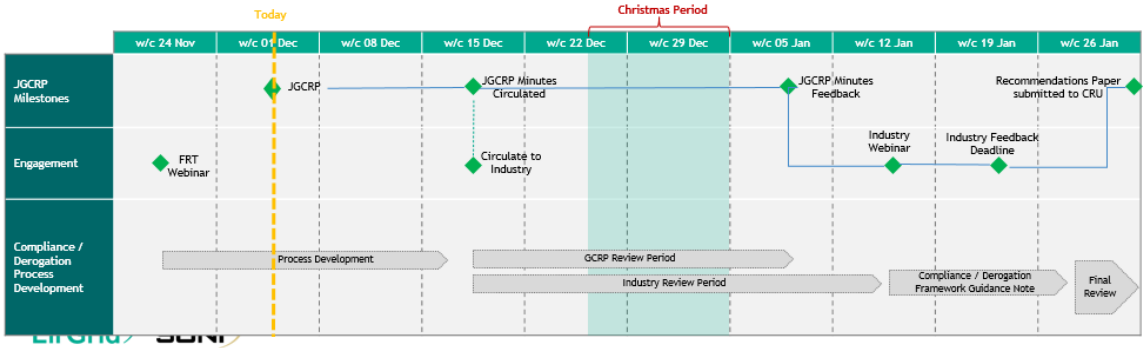


Mod 1 - Bring to December 2025 GCRP

EirGrid SONI

Next Steps – EirGrid Grid Code Modification Process

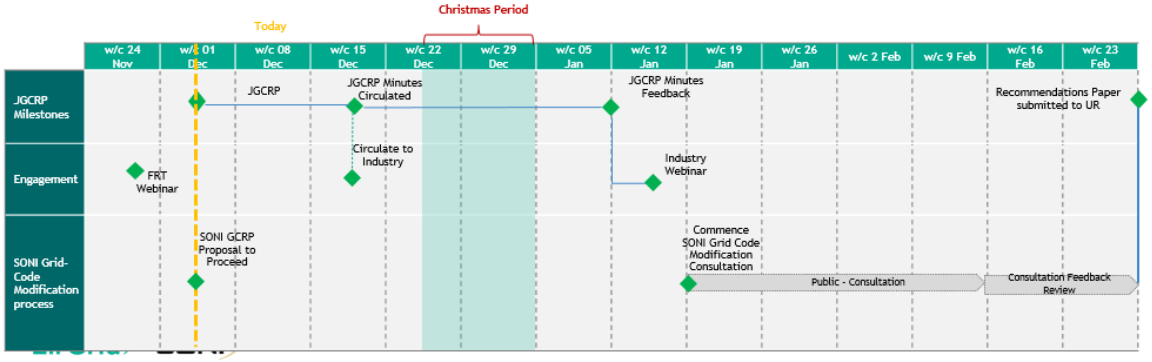
- A framework for compliance and derogation management processes is under development in line with the requirements in GC.9 of the EirGrid Grid Code. An update on this framework will be circulated to the JGCRP (and wider industry) with the JGCRP meeting minutes.
- A webinar to outline the proposed compliance / derogation framework is being planned for January 2026. Industry feedback will be invited.
- Submission of Grid Code Modification recommendation, including panel feedback and accompanied by the proposed compliance / derogation framework, will issue to CRU towards the end of January 2026.



EirGrid SONI

Next Steps - SONI Grid-code Modification Process

- 3rd December SONI Grid Code panel - Proposal Brought to SONI Grid Code Review Panel (GCRP)
- Mid January 2026 Commence Public Consultation on SONI Grid Code Modification SPID_03_2025
- SONI will review consultation feedback mid February 2026
- Submission of Grid Code Modification recommendation, including panel feedback, SONI will issue to Utility Regulator end February 2026.



03/12/2025

Thank you!

Questions?

Part 16 - The extract from the approved minutes from Joint Grid Code Review Panel meeting 03 December 2025:

5. PROPOSAL - SPID_03_2025/MPID345 Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities

a. Saif Aldahmor (EirGrid) presented slides on Modification Proposal SPID_03_2025 (SONI)/MPID345 (EirGrid) to panel members - see slide numbers 12 to 31.

b. Following a query from Paul Troughton (DSU), Saif highlighted that a three-phase voltage dip would be lower than a single-phase voltage dip and would propagate across the island, and so is more likely to cause the demand reduction response. Eoin Kennedy (EirGrid) also highlighted that despite different protection systems used by different companies, 3-phase faults have more of a severe impact in comparison to 1-phase faults.

c. Saif Aldahmor (EirGrid) noted that the TSOs are developing a compliance and derogation framework. The TSOs are aiming to present this to industry, at a webinar, week commencing 12 January 2026. 19 January 2026 has been set as the deadline date for comment from industry before the TSOs issue their recommendations to the Regulators.

d. David McGowan (SONI) provided the next steps for the SONI modification process – see slide 30. The opportunity for industry to attend the webinar 12 January, fits into the timeframe for the SONI Grid Code Modification Process.

e. Following a query from William Carr (Pumped Storage) on the Modification Timeline (slide 14) the TSOs agreed to change the 'Timeline' to note that up to today's meeting this item was only ever presented as a discussion item. Today is the first time it has been presented as a modification proposal to the joint panel. **ACTION: The TSOs agreed with William's observation and agreed to change the slides in advance of publication.** POST MEETING NOTE: This action is complete.

f. William Carr (Pumped Storage) also queried if the system modelling addressed other potential mitigations, such as increased response and inertia to the system. Saif Aldahmor (EirGrid) indicated that, given the level of demand reduction compared to the total system demand, and the nature of the power system, studies show a loss of 17 – 39% of demand for an N-1 scenario. The TSOs are undertaking further analysis of the impact of additional inertia and reserves but are strongly of the view that these may only serve as part mitigations to support fault ride through / recovery capability. We are not aware of any major power system globally that is able to withstand the large imbalances indicated in the analysis that would occur if this issue were not addressed by fault ride through / recovery capability.

g. Simon Tweed (EirGrid) noted that the TSOs continue to look at more system services such as faster frequency response from batteries and more inertia being available to support the system, and these supports are needed, but they are not sufficient on their own to manage the potential demand loss. The TSOs do not see system service grid solutions solving this problem on their own. The TSOs are procuring additional low carbon inertia services and designing new frequency reserve products to help support the system, but the magnitude of this issue means that the proposed requirements for demand facilities are fundamental to resolving the issue.

h. William Carr (Pumped Storage) queried the data displayed in slide 18 – is the loss of an interconnector at full export uniquely impactful to trigger a 39% demand loss, or is that just the tip of the spear and other events could be equally impactful?

i. Saif Aldahmor (EirGrid) indicated that such a scenario is one of the most critical, as a fault close to EWIC would result in loss of the HVDC export, with the voltage dip from the fault also resulting in a high loss of demand, as most of the relevant demand is connected in Dublin. However, many transmission faults, especially a fault on the transmission network around Dublin, will cause a significant reduction in demand. This level of demand reduction will increase as future non FRT capable demand increases.

j. Gavin McClean (Demand Customers) echoed William's feedback on the timelines and reiterated that up to now this topic has been a discussion item only, and that industry only received the final technical details of the modification proposal in September 2025. Gavin requested more time to review the proposed modification as presented today and also added that a technical solution is not currently available. Gavin queried the value in putting requirements into the Grid Code when the technology is not available to allow Demand Facilities to comply with the requirements. Gavin stated that one OEM has stated that they may have a possible solution, but this is not a one size fits all. The other issue with the proposed modification is that the requirements are retrospectively applied.

k. Alan Kennedy (SONI JGCRP Chairperson) explained that SONI will not be applying this requirement retrospectively, noting that SONI do not currently have any transmission-connected customers.

l. Miriam Ryan (EirGrid GCRP Chairperson) further added that retrospection is not unique to this modification proposal and applies to all EirGrid Grid Code modifications. Miriam further noted that, given the level of issues that the system is currently experiencing with Demand Facilities, retrospective application of the proposed Grid Code requirements is critical to system security.

m. Gavin McClean (Demand Customers) pointed out that EirGrid is the outlier in comparison to other TSOs from around the world. Gavin stated that the application of this requirement will lead to mass non-compliance given that only one OEM is close to a solution, but this fix cannot be applied to all facilities.

n. Saif Aldahmor (EirGrid) commented that engagement with industry showed that demand facilities must transfer to their backup systems to protect sensitive IT equipment from voltage dips longer than 20 ms, as indicated by the ITIC standard. This feedback highlighted the need for demand to be restored only after fault clearance, leading to the introduction of a postfault active power recovery requirement. The TSOs took that feedback on board and proposed that Demand Facilities return at least 90% of their pre-fault Demand within 500 milliseconds of the Transmission System Voltage recovering to 90% of the nominal Voltage.

o. Gavin McClean (Demand Customers) noted that the 500 ms recovery time is the requirement that is difficult to comply with, and that this requirement was only received in September. Discussions with OEMs before September would not have included this proposed requirement.

p. Eoin Kennedy (EirGrid) reiterated that industry feedback was received during the bilateral engagement, and this feedback is acknowledged in the presentation slides. Further engagement and development of the compliance and derogation framework will also incorporate industry feedback.

q. Gavin McClean (Demand Customers) queried the status of the compliance and derogation framework, indicating that the proposed Grid Code modification should not be recommended without it.

r. Simon Tweed (EirGrid) responded that the Grid Code modification has been under development for some time, and is an urgent system need. The development of the compliance and derogation framework is underway, and the TSOs' recommendations to the Regulators will include the framework as a supporting document. The TSOs will host a webinar in January to discuss the proposed framework with industry ahead of submission of the recommendation paper and accompanying framework to the Regulators.

s. Miriam Ryan (EirGrid GCRP Chairperson) noted that the overall derogation process is detailed in the Grid Codes. The compliance and derogation framework will have to adhere to the governance as described in the Grid Codes and will align with those overarching principles.

t. Rioch Magan (Aughinish Alumina) queried the merit of pushing ahead with the proposed modification when all parties will need to seek a derogation, expressing that any site with conventional motors will require a derogation, and at least 90% active power recovery within 500 ms could harm grid stability and is neither desirable nor achievable due to protection constraints.

u. Simon Tweed (EirGrid) noted that the TSOs have engaged with many customers on the proposed requirements and both SONI and EirGrid understand the challenges ahead. The TSOs have weighed compliance with this requirement against the security of the power system. The TSOs recognise the importance of the compliance and derogation framework in understanding a customer's feasible path to compliance, and the importance of submitting the proposed framework to the CRU together with the modification recommendation. But due to the urgency in addressing this issue, the TSOs' priority is progressing the modification proposal at this JGCRP meeting.

v. Thomas O'Sullivan (Demand Customers) expressed support for comments from Gavin McClean and Rioch Magan. Thomas noted, speaking as a consumer of electricity, that running a refinery is part of the economy, and it is vitally important that Ireland has a world class grid to support the economy and future growth and to attract new business. Thomas supports EirGrid and SONI in highlighting this issue and developing solutions. However, Thomas further noted that based on the evidence, the proposed Grid Code requirements are not technically achievable and so are not a rational way to progress.

w. Miriam Ryan (EirGrid GCRP Chairperson) noted that EirGrid will ask members if they recommend or do not recommend the proposed modification. Miriam reiterated that this issue is of critical importance to system security, requiring the TSOs to progress with recommending the modification to the Regulators for approval, but reassured members that their views and concerns will be captured in the recommendation papers.

x. Thomas O'Sullivan (Demand Customers) expressed that other options merit consideration, and that although the intention is to gather recommendations, there are other potential solutions to be explored. Thomas also noted that the TSOs should consider the reputational damage associated with non-compliance.

y. Miriam Ryan (EirGrid GCRP Chairperson) noted that the TSOs work very closely with existing customers to achieve compliance and SONI and EirGrid are committed to continue working with all users to mitigate non-compliance.

z. Alan Kennedy (SONI JGCRP Chairperson) clarified that from a SONI process point of view, the proposed modification will go to public consultation, and all consultation responses will be passed to the UR.

aa. William Carr (Pumped Storage) queried the retrospective requirement of the EirGrid Grid Code, asking if the TSOs can choose not to retrospectively apply the proposed requirements.

bb. Miriam Ryan (EirGrid GCRP Chairperson) noted that the European Connection Codes are not retrospectively applied with exception, if a user modernises or refurbishes existing plant. Melissa Dunne (TSO) also noted that retrospective application of the EirGrid Grid Code is captured in a user's connection agreement.

cc. William Carr (Pumped Storage) noted that the original proposed modification for discussion has been split into two modification proposals, one for the DCC requirements and one for the Non-DCC requirements, and that applying the Non-DCC requirements will not require a CBA. William queried the CRU on whether it would have all the necessary information to make a decision if the modification proposal has been split up, and with no requirement for a CBA for the Non-DCC requirements.

dd. Deirdre O'Leary (CRU) noted that, in terms of CRU decision making, the CRU have made it clear that EirGrid will need to submit both a modification recommendation paper and an accompanying compliance and derogation framework in tandem, as it would be difficult to make a decision without both submissions. The CRU require full sight and understanding of those details before a decision can be made.

ee. Jamie Burke (PES) added that this requirement will drive costs for the TSOs too for a solution that may or may not work. Jamie recommended that the TSOs add a cost comparison analysis to the recommendation paper.

ff. Simon Tweed (EirGrid) explained that the primary driver for the proposed requirements is to maintain power system security. If this issue is not resolved, system security is at risk. Currently, mitigation measures are impacting the market, such as needing to restrict exports on Interconnectors to reduce the risk to the system. It is infrequent that the market is driving exports in recent times, so those costs may not be huge at the minute, but that could change in future. But the main driver is system security, not cost.

gg. Patrick Liddy (DSUs) agreed that energy users need a reliable and secure grid, but echoed support for William's comments on the retrospective application of the requirements. Patrick queried if there an argument for grouping all users affected into existing, contracted and not yet started to support the TSOs in achieving the necessary compliance quickly.

hh. Saif Aldahmor (EirGrid) noted that the TSOs have presented on the results of system studies, and that this issue resulted in the TSOs deciding not to increase the SNSP limit from 75% to 80%. The issue relates to the significant impact of the reduction of customer demand on grid stability, particularly concerning RoCoF (Rate of Change of Frequency), frequency limits, and overall security margins. Increases in demand that does not meet the fault ride through / power recovery requirements will further impact on the security of the grid. The system requires operational means, system services and enhanced capability from demand facilities to resolve this issue.

ii. Gill Nolan (EirGrid) also noted that connection agreements already far exceed 800 MW of demand.

jj. Eoin Kennedy (EirGrid) stated that the mitigation measures in place, such as over-frequency generation shedding (e.g. tripping of wind farms), can only get us so far in terms of managing the issue.

kk. Alan Kennedy (SONI JGCRP Chairperson) expressed that the material discussion should remain within the JGCRP meeting, and the panel recommendation process will take place at the individual GCRP meetings.

ll. Thomas O'Sullivan (Demand Customers) supports the TSOs in providing a secure grid but cannot support implementing a modification that provides a false sense of security. Thomas supports Patrick's suggestion of grouping Demand Facilities into existing and contracted.

mm. Simon Tweed (EirGrid) ended the discussion by reiterating the need for urgency in addressing this issue, and that the TSOs intend to recommend the modification proposal to the Regulators for approval. Simon noted that the modification proposal will set the standard. There has been extensive work done across industry in Ireland and abroad. This is a global issue, and OEMs are actively working on solutions to fix the problem. The TSOs recognise different customer types have different challenges and will support individual customer engagement. The TSOs are actively working on the design of the compliance and derogation framework and OEM solutions are under development.

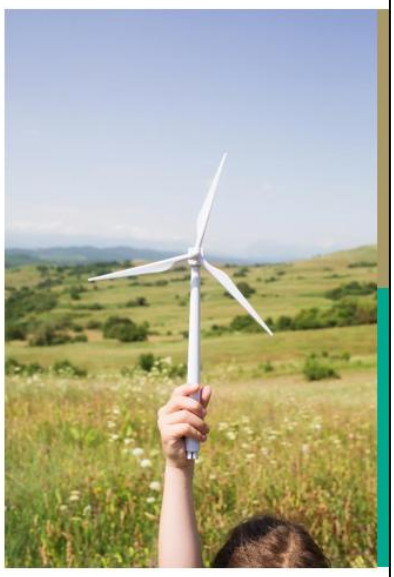
Part 16 - The presentation from the Grid Code Review Panel meeting 03 December 2025:

03/12/2025

1. Proposed Modification: 30 minutes

MPID345

Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities



EirGrid

MPID345

- This modification proposal was presented and discussed at the JGCRP.
- Do members support the submission of MPID345 to the CRU for review and decision?

EirGrid 03/12/2025

Part 18 - The extract from the draft minutes from Grid Code Review Panel meeting 03 December 2025:

NOTE: Changes to the draft minutes proposed by Peter King (Non-Synchronous Renewable Generators member) are shown in red.

3. Proposal – MPID345 Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities

a) Saif Aldahmor (EirGrid) presented this modification to panel members at the JGCRP meeting. Miriam Ryan (Chairperson) asked if any member would like to voice their position on the recommendation of the proposal.

b) Several members expressed their position, as recorded below:

1. Tony Hearne (DSO) – support the recommendation.
2. Michael Coone (TSO) – support the recommendation.
3. Peter King (Non-Synchronous Renewable Generators) – given that the SNSP increase has been delayed and that there is a threat to wind farms being disconnected. He cannot raise an objection but ~~must~~ acknowledges and understands the challenges that the demand customers face in complying with this requirement.
4. Thomas O'Sullivan (Demand Customers) – this Grid Code requirement is not achievable, and a Working Group should be established. A solution that cannot be implemented doesn't make the grid a secure one. The TSO are passing the issue to CRU to make a reasonable decision. Eoin Kennedy (EirGrid) responded to this, reiterating that the TSO has been engaging with relevant parties and are confident that a solution will be brought forward
5. Mostafa Bakhtvar (Fast Acting Peaking Generators) – support the recommendation in general, however how it is applied requires further discussion.
6. Paul Troughton (DSUs) – there may be one possible solution to fix this but that is in the pipeline, it doesn't seem like a sensible way forward given the discussion at the JGCRP meeting.
7. Jennifer Geraghty (Thermal Generators) – the proposed modification, in its current format, is not mature enough.
8. Gavin McClean (Demand Customer) – the proposed modification is not mature enough to go forward. Industry wants to work with EirGrid to resolve this. Technical analysis must be done, and further work needs to be done with the OEMs. One solution from one OEM will not work for all demand facilities.
9. William Carr (Pumped Storage) – re-highlighted several of the points and concerns he raised at the JGCRP meeting and at previous GCRP meetings. He also queried:
    i. the implications of approving or not approving the modification
    ii. would there be a moratorium on wind generation (SNSP)
    iii. what actions would EirGrid need to take if users cannot comply with the requirements.

c) Simon Tweed (EirGrid) noted that regarding the maturity of the modification, it had been shared with all GCRP members and feedback invited. EirGrid took on board this feedback in making an update to, and clarifications of, the modification proposal.

d) Miriam Ryan (Chairperson) noted that the predominant issue is the safety and resilience of the grid. This requirement is in the best interest of all users including Demand and Generation. The TSO is close to breaching their security standards and those standards are there for the security of the system. The TSO understands and appreciates the challenges that Demand Customers face but the TSO will be recommending this requirement for approval to the CRU. Miriam confirmed that all views will feed into the recommendation paper. All comments and concerns will be noted in the meeting minutes.

e) Eoin Kennedy (EirGrid) clarified that the TSO has had a significant level of engagement with individual parties and the TSO is confident there will be solutions brought forward. Eoin further added that if this requirement is not implemented then there will be a significant operational security risk to the grid. It is a growing risk, and we need this capability from Demand Customers.

f) Tony Hearne (DSO) added that the DSO will bring forward a similar modification to the Distribution Code. The DSO will need to consider a MW threshold otherwise the DSO will be swamped with derogation applications given the level of connections.

g) **ACTION:**

1. **By COB, 17 December 2025: the TSO will issue meeting minutes, along with a draft of the compliance and derogation framework.**
2. **By COB, 09 January 2026: members can provide comment to the minutes.**
3. **Week commencing 12 January 2026: the TSOs will host a webinar on the compliance and derogation framework.**
4. **Week commencing 19 January 2026: the TSO will issue a recommendation paper (including all views and concerns) to the CRU. The TSO will also issue the derogation and compliance framework to the CRU.**

Part 19 – Presentation from the 6th Industry Webinar on 14th January 2026:

14/01/2026

Fault Ride Through Grid Code Modification (MPID345)

Industry Webinar on the Proposed Compliance and Derogation Framework

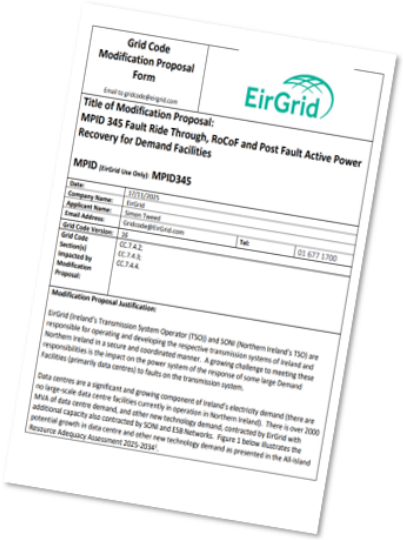
EirGrid

Introduction

Following a period of extensive consultation with industry, EirGrid and SONI presented the proposed Demand Facility Fault Ride Through (FRT), Active Power Recovery (APR) and Rate of Change of Frequency (RoCoF) Modifications (MPID345) to the 3 December 2025 Joint (EirGrid and SONI) Grid Code Review Panel (JGCRP).

This presentation sets out EirGrid's proposal for an associated Compliance and Derogation Framework for this proposed Grid Code modification.

We also set out a recent updates to the operational measures being taken to manage this issue which highlight the urgency of progressing the modification and compliance/derogation framework.



Grid Code Modification Proposal Form

EirGrid

Title of Modification Proposal:
MPID 345 Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities

MPID (EirGrid Use Only): MPID345

Grid Code Modification Proposal Form

Grid Code Section(s) Impacted by Modification Proposal: CC.7.4.2, CC.7.4.3, CC.7.4.4.

Modification Proposal Justification:

EirGrid (Ireland's Transmission System Operator (TSO)) and SONI (Northern Ireland's 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.

Grid Code Modifications | The Grid Code | EirGrid

EirGrid

Agenda

Topic	Times
Introduction	10:00 - 10:05
Part 1	
Operational Measures Update	10:05 - 10:10
Q&A	10:10 - 10:15
Part 2	
Recap on MPID345	10:15 - 10:25
Compliance / Derogation Framework Proposal Overview	10:25 - 10:40
Focus on Demand Utilisation Cap	10:40 - 10:45
Focus on Group Derogation Process	10:45 - 10:50
Focus on Compliance Process	10:50 - 10:55
Next Steps	10:55 - 11:00
Q&A	11:00 - 11:30

Part 1
Operational Measures Update

Operational Measures - Introduction

- An extensive list of operational measures being taken to manage the FRT issue was set out in EirGrid and SONI's MPID345-Large-Demand-Facility-Fault-Ride-Through-Issue-and-Proposed-Solutions-EirGrid-and-SONI-Information-Paper-November-2025.pdf
- EirGrid and SONI continuously monitor and review the appropriateness of the operational policies applied to ensure grid security for all customers.
- Recent updates to operational policy have been published in EirGrid and SONI's 'Weekly Operational Constraints Update' (this can be found at General Publications | SEMO) to notify industry of the further changes to operational policy related to the management of the FRT issue.

Operational Measures - Overview

- Operational measures adopted by the TSOs to date have kept the FRT risk within manageable limits and ensured the security of the power system.
- The measures include placing limits on HVDC Interconnector exports, as well as enhancement of over-frequency support capability and increased running of a synchronous condenser to provide more reserves and inertia on the power system. In particular, the restriction of HVDC Interconnector exports has been a critical mitigating operational measure.
- However, as non-FRT capable data centre demand utilisation continues to increase, the benefits of these operational measures will gradually be exhausted (for example, once Interconnector exports are restricted to zero).
- As outlined in the Information Paper, several additional operational measures that would directly impact demand facilities are also under consideration. This includes deploying demand control actions that are taken when in System Alert or System Emergency states.

Operational Measures

Active measures to manage the current operational issues

Further measures under review

1. Total 'load rejection' limited to 900 MW*
2. Enhanced battery settings and charge management
3. Enabled Wind / Solar Farm Frequency Control all of the time
4. Moneypoint Sync Comp made "must-run"
5. Enhancements made to Look-ahead Security Assessment Tool
6. Enabled dynamic reserves on Greenlink IC
7. SNSP Limit Remaining at 75%
8. Review of Over Frequency Generation Shedding Scheme
9. Pre-emptive curtailment of demand facilities
10. Controlled restoration of demand facilities

Impacts of active operational measures:

- Changes to operational management of many market participants
- Impact on market outcomes
- Higher curtailment of renewable generation
- Risk to achieving climate action targets

* 900 MW insecurity threshold is the maximum upper bound which the Operational Policy Review Committee (OPRC) deem should be manageable with the available operational mitigations and system defence measures. It is subject to ongoing review with potential to be lowered if that is deemed to be required.

Operational Measures - Recent Updates

New Addition:

- A new 900 MW 'Load Rejection' limit to cap the potential system imbalance in the event of a fault event. The load rejection can be made up of large energy user demand plus HVDC Interconnector exports. All HVDC Interconnectors are considered and included in determining the level of 'load rejection' experienced for contingency events.

Updates to existing measures:

- Aggregate Battery unit charging is limited to 200 MW and Battery state of charge is limited to 85% of storage capacity. This is to maintain a level of Battery response (charging capability) to the high frequency caused by a fault event.

Removal:

- The explicit limiting of EWIC exports to 200 MW has been removed as it is now being managed by the 900 MW Load Rejection limit.

Part 2
Compliance and Derogation Framework Proposals

EirGrid

Recap on MPID345

EirGrid

MPID345 - Grid Code Modification Engagement Timeline

Sept. 2024	JGCRP - Discussion Item
Oct. 2024	Industry Webinar 1
Dec. 2024	Industry Webinar 2
Dec. 2024	JGCRP - Discussion Item
Sept. 2025	JGCRP - Discussion Item
Nov. 2025	Industry Webinar 3
Nov. 2025	Industry Webinar 4
Dec. 2025	JGCRP - Final Modification Proposal
Jan. 2026	Industry Webinar 5
Jan. 2026	Submit Grid Code Recommendation Paper to CRU

Bi-lateral Mtgs

Updates:

Initial FRT Proposal

↓

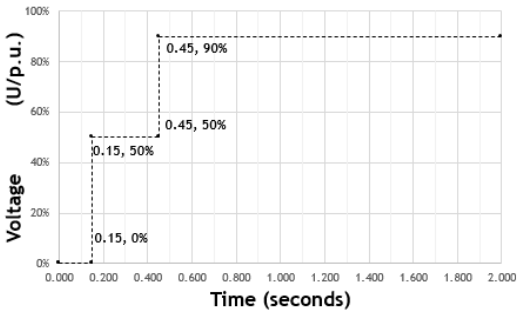
Active Power Recovery Time Defined
RoCoF, Voltage and Frequency Ranges

↓

Response during fault clarified
Recovery Threshold Updated
Modification Split (Non-DCC)

EirGrid

MPID345 - Proposed Grid Code FRT/APR Requirements



Required Voltage against time profile as proposed as part of forthcoming EirGrid/SONI code modification proposal

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 (EirGrid/SONI Grid Code Reference Figure TBC) at the Connection Point.

Following clearance of the Fault Disturbance, the Demand Facility should return to at least 90% of its pre-fault 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.

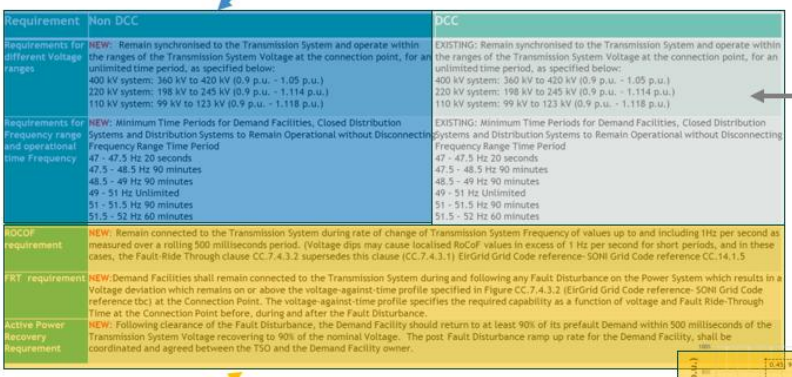
EirGrid

MPID345 - Full Modification Proposals

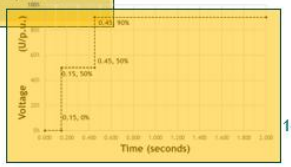
Requirement	Non DCC*	DCC*
Requirements for different Voltage ranges	NEW: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)	EXISTING: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)
Requirements for Frequency range and operational time Frequency	NEW: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes	EXISTING: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes
ROCOF requirement	NEW: 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 CC.7.4.3.2 supersedes this clause (CC.7.4.3.1) EirGrid Grid Code reference- SONI Grid Code reference CC.14.1.5	
FRT requirement	NEW: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.7.4.3.2 (EirGrid Grid Code reference- SONI Grid Code reference tbc) at the Connection Point. The voltage-against-time profile specifies the required capability as a function of voltage and Fault Ride-Through Time at the Connection Point before, during and after the Fault Disturbance.	
Active Power Recovery Requirement	NEW: Following clearance of the Fault Disturbance, the Demand Facility should return to at least 90% of its prefault 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.	

MPID345 - Splitting of Modification Proposals

Mod 2 - Subject to separate CBA/consultation



Existing Requirements - no change



Mod 1 - Brought to the December 2025 GCRP

Compliance / Derogation Framework Proposals Overview

EirGrid

The need for a Compliance/Derogation Framework

- Addressing the FRT issue is urgent; we are approaching a limit to the level of demand loss that can be securely accommodated on the power system.
- Based on industry feedback, it is anticipated that there will initially be a high level of inability to comply with the proposed FRT requirements across transmission connected demand sites.
- EirGrid therefore requires mechanisms to manage the risk to the power system pending customers' implementation of solutions.
- Bringing forward the FRT Grid Code modification within the proposed compliance/derogation framework outlined on the next slide, will support EirGrid's ability to manage the current issue while facilitating customers' assessment of, and progress on, compliance.

Compliance / Derogation Framework - High-Level Proposal

PROPOSAL

EirGrid recommends to CRU that Grid Code modification proposal MPID345 (FRT/APR/RoCoF*) is approved with **immediate effect** and that this approval is accompanied by a **time-limited, conditional, group** derogation.**

immediate effect: within [1] month of the decision to approve, to allow time for customer acceptance or otherwise of the offer of a group derogation.

time-limited: a [12] month derogation from the requirements on acceptance of the derogation conditions. This period would commence on the modification approval date. Any further extension would be subject to an assessment of progress on compliance.

conditional:

1. A customer with non FRT/APR/RoCoF capable demand consumption will be capped at close to its current consumption level. FRT/APR/RoCoF capable demand can continue to grow within the contractual Maximum Import Capacity (MIC).
2. The customer will provide EirGrid a compliance plan or, if the customer considers that full compliance is not achievable, they will submit justification for this position along with a plan to minimise any non-compliance along with any associated derogation request for assessment. Submissions to EirGrid will be made within [3] months of activation of the group derogation.
3. The customer will facilitate EirGrid's monitoring of compliance with these conditions.

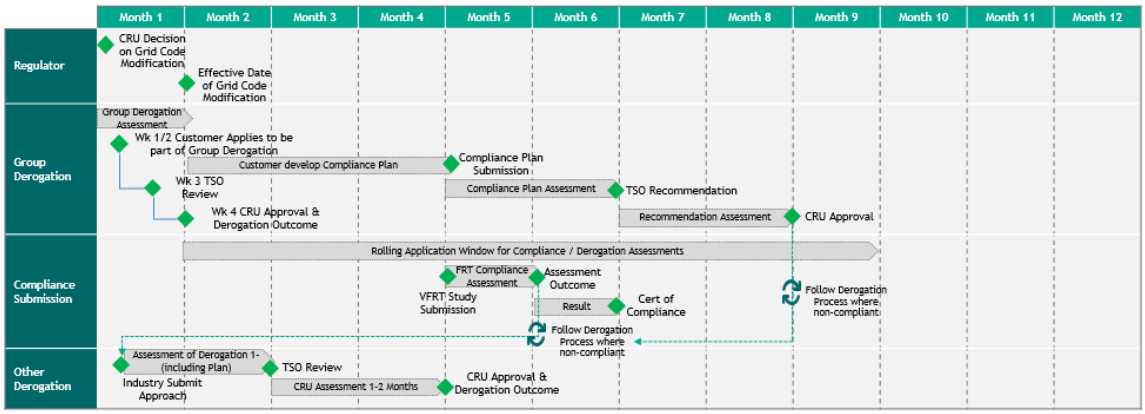
group derogation: offered to all transmission connected Demand Facilities.

** FRT - Fault Ride Through*
APR = Active Power Recovery
RoCoF = Rate of Change of Frequency

*** The term 'class' has been removed from the original proposal and replaced with the term 'group'*

Compliance / Derogation Framework - Timelines

PROPOSAL



- A derogation submission must be made by all customers until such a time as a compliance submission can be made, assessed and a certification of compliance issued.
- Where Compliance submission is not approved the derogation process must be completed.
- Where a derogation outside of the group derogation is requested, the initial submission must include the complete compliance plan or rationale for why a derogation is required.

Focus on Utilisation Cap

Demand Utilisation* Cap Proposal

PROPOSAL

- A cap will be applied to the non-FRT/APR/RoCoF capable demand utilisation of transmission connected demand facilities where compliance with the proposed FRT/APR/RoCoF requirements has not been demonstrated (see compliance process requirements on next slides).
- A demand utilisation cap (in MVA) will be set on a site (demand facility) basis.
- Operational data from the calendar year 2025 (15 minute resolution, spot MVA SCADA data) will be used to determine the cap.
- Caps will be determined on a pro-rata basis across all qualifying demand facilities based on the highest average monthly demand utilisation recorded across 2025. Caps will not be based on contractual MIC or forecast demand utilisation.
- Each site's demand utilisation cap will be above its current (up to December 2025) highest monthly average demand utilisation level but may be below the demand utilisation level forecasted within the next few months, i.e. the cap will potentially bind within the next few months.

** The term "demand utilisation" refers to the actual demand consumed by a Facility as opposed to the contractual Maximum Import Capacity (MIC).*

Demand Utilisation Cap - Worked Example

PROPOSAL

- This is an illustrative example of a scenario in which there is 20 MVA of headroom between the demand utilisation level that can securely be accommodated and the highest monthly average demand recorded across 2025 for five demand sites that meet the qualification criteria.
- It is proposed that this headroom would be allocated across the qualifying sites on a pro-rata basis as illustrated in the example below.

Site	Highest Monthly Average Demand Recorded in 2025 (MVA)	Demand Utilisation Cap (MVA)	Delta (MVA)
A	20.0	21.1	1.1
B	50.0	52.6	2.6
C	60.0	63.2	3.2
D	100.0	105.3	5.3
E	150.0	157.9	7.9
Total	380.0	400.0	20.0

EirGrid

Focus on Group Derogation Process

EirGrid

Group Derogation Process - Overview

PROPOSAL

- The Grid Code including approved Modifications is applied retrospectively and all relevant Users on the System are required to comply with it. To allow Users time to make the necessary modifications to plan an approach & remedy the non compliance, they must submit a derogation application to the TSO.
- Any User who becomes non compliant with a Grid Code requirement is obliged to inform the TSO as soon as this is known. This communication is carried out through a Derogation Application Form, ideally including a work plan that will lead to compliance. For the period of the derogation application process, the User must maintain maximum compliance as technically feasible with Grid Code. It is acknowledged that any Grid Code Modification may render certain users non compliant, and reasonable time may be permitted to re-achieve or maximise compliance.
- This derogation will be assessed by the TSO and a recommendation submitted to CRU. Only CRU can approve a derogation.
- The TSO has identified GC9-1-Non-Network-Codes-Plant-BESS-or-SCU-Derogation-Application-Form_1 as the most appropriate derogation application. A template specific to this non compliance has been developed by EirGrid and will be provided, this should be submitted in the first instance if the User is accepting of joining the group derogation application process.

EirGrid

Group Derogation Process - Next Steps

PROPOSAL

1. Submit Initial Application

Week 1 to 2

To minimise application and assessment timelines the TSO have pre-populated key sections of the derogation application with the relevant information. Users should review this form provided by the TSO and update the highlighted sections (e.g. contact details, demand facility name, MIC etc.)

2. Submit Updated Application

! Submit updated application no later than 3 months after effective date of original derogation

Initial Application will be for 12 months, however, a plan to resolve the issue or justification as to why the issue cannot be technically or economically resolved must be submitted to the TSO within 3 months. The updated application should include details of a compliance plan, timeline and steps required to provide the necessary technical submissions under the compliance process.

3. Application Validation

EirGrid will validate the application, if satisfied that the application is valid then EirGrid will issue a **Derogation Assessment ID** (DAID) Number conduct an assessment and forward it with a recommendation to CRU.

NOTE: Please contact derogationrequests@eirgrid.com if there are any queries in relation to the derogation process.

EirGrid

PROPOSAL

Group Derogation Process - Application

APPLICANT:		*COMPANY NAME*	
APPLICANT CONTACT NAME:	*CONTACT NAME*	DATE:	*DD/MM/YYYY*
APPLICANT TELEPHONE NUMBER:	*TELEPHONE NUMBER*		
APPLICANT POSTAL ADDRESS:	*ADDRESS* Line 2 Line 3 EirCode	APPLICANT E-MAIL ADDRESS:	*EMAIL@COMPANY.COM*
		DEROGATION APPLICATION NUMBER (EIRGRID USE ONLY)	
GRID CODE VERSION:	16.0		
GRID CODE CLAUSE FOR WHICH DEROGATION IS SOUGHT:	CC7.4.3.1 CC7.4.3.2		
PLANT/ SYSTEM FOR WHICH DEROGATION IS SOUGHT:	**Demand Facility Name**		
TOTAL INSTALLED CAPACITY (MW)	Installed Demand = **xx** MW		
MEC (MW)	MIC = **xx** MW		
FINAL OPERATIONAL NOTIFICATION DATE	Connection Date = **dd/mm/yyyy**		
DATE OPERATIONAL CERTIFICATION ACHIEVED	N/A		
DESCRIPTION AND EXTENT OF NON-COMPLIANCE	The site has cannot meet the fault ride though requirements specified in Clauses CC7.4.3.1 and CC7.4.3.2.		

PROPOSAL

Group Derogation Process - Application

IMPACT ON THE ELECTRICITY SYSTEM OF NON-COMPLIANCE	**Risk of high frequency or system disturbance in the event of significant demand reduction following a fault disturbance or rate of change of transmission system frequency.**
REASON FOR NON-COMPLIANCE	**Modification #MPID 345 to Grid Code has rendered existing facility non compliant**
THE END DATE OF THE REQUESTED DEROGATION APPLICATION	Dd/mm/yyyy - TBC
EFFORTS MADE TO IMPROVE/ACHIEVE/ MAXIMISE COMPLIANCE AND PROPOSAL FOR REMEDYING NON-COMPLIANCE. PLEASE INCLUDE MILESTONES AND DATES FOR REMEDYING NON-COMPLIANCE, COSTS, AND RISK FACTORS THAT MAY DELAY COMPLIANCE. (THIS SECTION MUST BE FILLED OUT FOR ALL APPLICATIONS)	This derogation application is to request permission for time to assess the non compliance and to formulate a plan to resolve the issue. Conditions • A customer with non FRT/APR/RoCoF capable demand consumption will be capped at XX MVA**. FRT/APR/RoCoF capable demand can continue to grow within the contractual Maximum Import Capacity (MIC). • The customer will provide EirGrid a compliance plan complete with steps to make technical submissions in-line with the compliance process or, if the customer considers that full compliance is not achievable, they will submit justification for this position along with a plan to minimise any non-compliance along with any associated derogation request for assessment. Submissions to EirGrid will be made within [3] months of activation of the derogation. • The customer will facilitate EirGrid's monitoring of compliance with these conditions.
DETAILS OF SUPPORTING DOCUMENTATION FOR APPLICATION (IF ANY) ATTACHED	N/A
Please submit the Derogation Application to derogationrequests@eirgrid.com	

Confidential & Commercially Sensitive
Not for Onward Circulation

Focus on Compliance Process

EirGrid

Grid Code Compliance Process - Overview

PROPOSAL

FRT & RoCoF Study Requirements

- All TSO connected Demand Facilities are required to submit a FRT & RoCoF study report to EirGrid.
- FRT & RoCoF studies must be assessed based on the **Minimum System Strength (MSS)** data ; it will be issued to the customers for the purpose of modelling the transmission in the simulation studies.

Timeline for FRT & RoCoF Study Submissions

Item	Timeline	Responsible	Submit to
Minimum System Strength Data	MSS data will be issued upon request to customer following notice of intention to show compliance	EirGrid	Customers
FRT & RoCoF Study Submission	Within 3 months of the Grid Code Modification Effective Date.	Customers	EirGrid
Review of Customer Submissions	Within 2-3 weeks after customer submission ; comment log will be issued to customer.	EirGrid	Customers
Response to EirGrid Comments	Within 2 weeks after receiving comments.	Customers	EirGrid
Approval of FRT & RoCoF study	The outcome will be notified to customer after review process.	EirGrid	Customers

Minimum System Strength Data

- It is the minimum fault level at the connection point (CP) where the facilities were connected and this MSS data is used for the modelling of external grid.

EirGrid

Grid Code Compliance Process - Overview

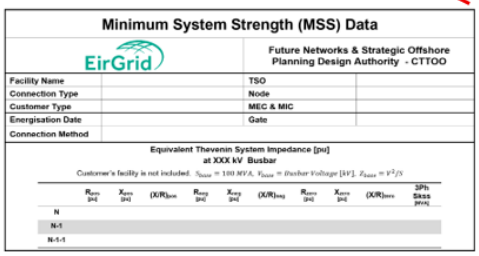
PROPOSAL

Sample MSS Data Report & SLD shown.

Study Methodology for FRT

- The pre-disturbance period, N-1 should be considered ; steady state
- The disturbance period, N-1 should be considered ; Fault
- The post-disturbance period, N-1-1 should be considered ; APR

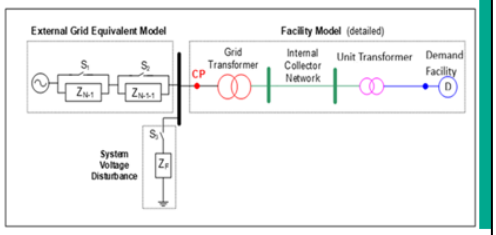
Period	S_1	S_2	S_3	Comment
Pre-disturbance T < T1	Open	Closed	Open	Steady state under Z_{N-1}
Disturbance T1 ≤ T < T2	Open	Closed	Closed	Apply voltage disturbance under Z_{N-1}
Post-disturbance T2 ≤ T	Closed	Open	Open	Remove disturbance, Change external grid impedance to Z_{N-1-1}



Study Methodology for RoCoF

- 1Hz per second as measured over a rolling 500 milliseconds period.
- RoCoF assessment pack will be send to customer along with MSS data.

Frequency Trace	Frequency Trace Characteristics
1	Frequency rise
2	Frequency rise with subsequent fast drop resulting in under-frequency
3	Frequency drop
4	Frequency drop with subsequent fast rise resulting in over-frequency



EirGrid

Grid Code Compliance Process

PROPOSAL

FRT & RoCoF Study Submission

- All the following reports/data listed in the table, should be submitted by the customers to EirGrid.

#	Report / Document / Data
1	Customer self-assessment FRT & RoCoF Report
2	Single-line diagram of the facility
3	Dynamic modelling files for FRT study
4	Validation report for dynamic model
5	Documents used as reference in the FRT & RoCoF study
6	Other supporting documents, if needed

FRT / APR Requirements

- The demand facility shall be capable of staying connected to the transmission system during fault as specified in the voltage-against-time profile at the CP [1].
- Following clearance of the fault disturbance, the demand facility should return to 90% of its prefault active power demand within 500 ms of the transmission system voltage recovering to 90% of the nominal voltage.
- Customers are requested to cover the test cases (Balanced & Unbalanced fault cases) for FRT/APR assessment as set out in the table.

Retained Voltage	Fault Type			
	3 Phase	2 Phase to ground	1 Phase to ground	Phase to Phase
0%	140 ms	140 ms	140 ms	140 ms
0%	150 ms	150 ms	150 ms	150 ms
50%	150 ms	150 ms	150 ms	150 ms
50%	450 ms	450 ms	450 ms	450 ms
85%	450 ms	450 ms	450 ms	450 ms
89%	2000 ms	2000 ms	2000 ms	2000 ms

EirGrid

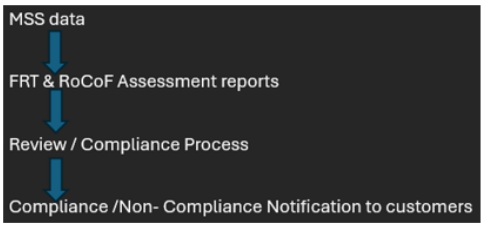
Grid Code Compliance Process - FRT/APR Simulation Results/Study

PROPOSAL

FRT Simulation Results

- The required signals are listed in the table below.
- Reference [2] would provide more information for carrying out study and will soon be published on the EirGrid website .

Plot #1	Signals/Parameters	Node	Unit
Plot 1	Voltage	CP	Per Unit
Plot 2	Frequency	CP	Actual Values
Plot 3	Active Power Demand	CP	Per Unit
Plot 4	Active Power Demand	CP	Actual Values
Plot 5	Voltage, Active Power Demand	CP	Actual Values
Plot 6	Voltage, Active Power Demand	LV terminal	Actual Values



Compliance Process Flow

Approval of FRT & RoCoF Study

- Compliance / non-compliance notification will be sent to customers through proper channel.
- Mitigations will be discussed in case of non-compliance.

References

[1] MPID 345 Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities.
[2] VOLTAGE FAULT RIDE - THROUGH (VFRT) STUDY TEMPLATE AND ASSESSMENT GUIDE For Demand Facility - 05.12.2025.pdf

Next Steps

EirGrid

PROPOSAL

Summary of Proposed Demand Facility Owner Actions

On approval of Grid Code modification MPID345 and associated compliance/derogation framework by CRU:

- Each demand facility owner will assess their offer of a conditional, time-limited derogation and accept/reject within 2 weeks (failure to accept will be deemed as non-acceptance).

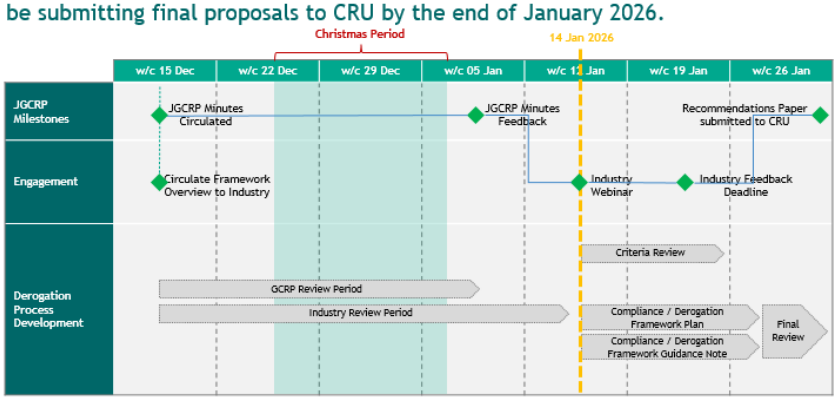
- Those demand facility owners that accept the conditional, time-limited derogation will be required to:
  - Cap their non FRT/APR/RoCoF capable demand utilisation at the agreed demand utilisation cap,
  - Submit a compliance plan to EirGrid within 3 months of the conditional, time-limited derogation coming into effect,
  - Permit EirGrid monitoring of compliance with the conditions of the time-limited derogation.

- Those demand facility owners that do not accept the conditional, time-limited, derogation will be required to:
  - Submit a compliance/derogation report to EirGrid within 1 month of the grid code modification (MPID345) coming into effect.
  - Note that this may not be supported by EirGrid.

PROPOSAL

Compliance/Derogation Framework Development Plan, Engagement and Next Steps

- Final feedback on the compliance/derogation framework is requested by 21 January 2026.
- EirGrid are open to bi-lateral engagements on these proposals. To provide feedback, or request a bi-lateral meeting, please contact your account manager.
- EirGrid will be submitting final proposals to CRU by the end of January 2026.



Open Q&A

EirGrid

Part 20 – Presentation from the 7th Industry Webinar on 19th January 2026:

19/01/2026

Fault Ride Through Grid Code Modification (MPID345)

Industry Webinar on the Proposed Compliance and Derogation Framework (Part 2)

EirGrid

Agenda

Topic	Times
Introduction • Why is EirGrid proposing this approach?	14:00 - 14:10
Focused Recap of Presentation from 14th January	
Operational Measures Update	14:10 - 14:30
Recap on MPID345	
Compliance / Derogation Framework Proposal Overview	
Focus on Demand Utilisation Cap	
Focus on Group Derogation Process	
Focus on Compliance Process	
Next Steps	
Q&A	14:30 - 16:00

EirGrid

SLIDE ADDED FOR PART 2 OF WEBINAR

PROPOSAL

Why is EirGrid Proposing This Approach?

- If non-FRT capable demand continues to increase as forecast, we will soon reach the limit of demand loss that can be securely accommodated on the power system.
- In addition to the operational measures already implemented by EirGrid, our proposed approach to managing this issue is to recommend that FRT requirements are implemented immediately in the Grid Code in order to ensure that there are technical requirements that all demand connections, including future demand connections, are aware of, and design to.
- If a cap on non-FRT capable demand is not put in place and non-FRT capable demand continues to grow, and our operational measures are exhausted, demand control actions to reduce non-FRT capable demand would be taken, as is required of the TSO, if the power system enters a System Alert or System Emergency state.

EirGrid

Recap of Presentation from 14th of January

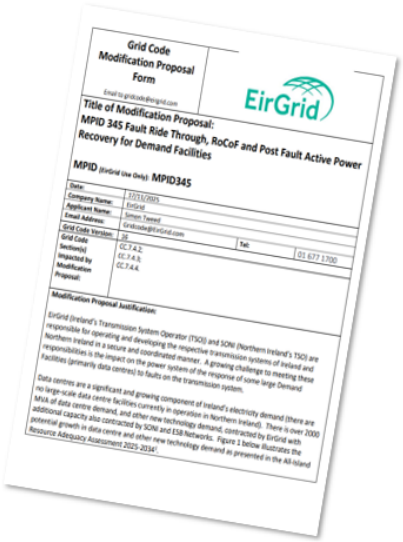
EirGrid

Introduction

Following a period of extensive consultation with industry, EirGrid and SONI presented the proposed Demand Facility Fault Ride Through (FRT), Active Power Recovery (APR) and Rate of Change of Frequency (RoCoF) Modifications (MPID345) to the 3 December 2025 Joint (EirGrid and SONI) Grid Code Review Panel (JGCRP).

This presentation sets out EirGrid's proposal for an associated Compliance and Derogation Framework for this proposed Grid Code modification.

We also set out a recent updates to the operational measures being taken to manage this issue which highlight the urgency of progressing the modification and compliance/derogation framework.


Grid Code Modification Proposal Form

EirGrid

Title of Modification Proposal:
MPID 345 Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities

MPID (EirGrid Use Only): MPID345

Date:	12/12/2025
Company Name:	EirGrid
Applicant Name:	Simon Tweed
Email Address:	Gridcode@EirGrid.com
Grid Code Version:	10
Tel:	01 677 1700
Grid Code Section(s) impacted by Modification Proposal:	CC.7.4.2. CC.7.4.3. CC.7.4.4.

Modification Proposal Justification:

EirGrid (Ireland's Transmission System Operator (TSO)) and SONI (Northern Ireland's 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'.

Grid Code Modifications | The Grid Code | EirGrid

Part 1
Operational Measures Update

Operational Measures - Introduction

- An extensive list of operational measures being taken to manage the FRT issue was set out in EirGrid and SONI's MPID345-Large-Demand-Facility-Fault-Ride-Through-Issue-and-Proposed-Solutions-EirGrid-and-SONI-Information-Paper-November-2025.pdf
- EirGrid and SONI continuously monitor and review the appropriateness of the operational policies applied to ensure grid security for all customers.
- Recent updates to operational policy have been published in EirGrid and SONI's 'Weekly Operational Constraints Update' (this can be found at General Publications | SEMO) to notify industry of the further changes to operational policy related to the management of the FRT issue.

Operational Measures - Overview

- Operational measures adopted by the TSOs to date have kept the FRT risk within manageable limits and ensured the security of the power system.
- The measures include placing limits on HVDC Interconnector exports, as well as enhancement of over-frequency support capability and increased running of a synchronous condenser to provide more reserves and inertia on the power system. In particular, the restriction of HVDC Interconnector exports has been a critical mitigating operational measure.
- However, as non-FRT capable data centre demand utilisation continues to increase, the benefits of these operational measures will gradually be exhausted (for example, once Interconnector exports are restricted to zero).
- As outlined in the Information Paper, several additional operational measures that would directly impact demand facilities are also under consideration. This includes deploying demand control actions that are taken when in System Alert or System Emergency states.

Operational Measures

Active measures to manage the current operational issues

Further measures under review

1. Total 'load rejection' limited to 900 MW*
2. Enhanced battery settings and charge management
3. Enabled Wind / Solar Farm Frequency Control all of the time
4. Moneypoint Sync Comp made "must-run"
5. Enhancements made to Look-ahead Security Assessment Tool
6. Enabled dynamic reserves on Greenlink IC
7. SNSP Limit Remaining at 75%
8. Review of Over Frequency Generation Shedding Scheme
9. Pre-emptive curtailment of demand facilities
10. Controlled restoration of demand facilities

Impacts of active operational measures:

- Changes to operational management of many market participants
- Impact on market outcomes
- Higher curtailment of renewable generation
- Risk to achieving climate action targets

* 900 MW insecurity threshold is the maximum upper bound which the Operational Policy Review Committee (OPRC) deem should be manageable with the available operational mitigations and system defence measures. It is subject to ongoing review with potential to be lowered if that is deemed to be required.

Operational Measures - Recent Updates

New Addition:

- A new 900 MW 'Load Rejection' limit to cap the potential system imbalance in the event of a fault event. The load rejection can be made up of large energy user demand plus HVDC Interconnector exports. All HVDC Interconnectors are considered and included in determining the level of 'load rejection' experienced for contingency events.

Updates to existing measures:

- Aggregate Battery unit charging is limited to 200 MW and Battery state of charge is limited to 85% of storage capacity. This is to maintain a level of Battery response (charging capability) to the high frequency caused by a fault event.

Removal:

- The explicit limiting of EWIC exports to 200 MW has been removed as it is now being managed by the 900 MW Load Rejection limit.

Part 2
Compliance and Derogation Framework Proposals

EirGrid

Recap on MPID345

EirGrid

MPID345 - Grid Code Modification Engagement Timeline

Sept. 2024	JGCRP - Discussion Item
Oct. 2024	Industry Webinar 1
Dec. 2024	Industry Webinar 2
Dec. 2024	JGCRP - Discussion Item
Sept. 2025	JGCRP - Discussion Item
Nov. 2025	Industry Webinar 3
Nov. 2025	Industry Webinar 4
Dec. 2025	JGCRP - Final Modification Proposal
Jan. 2026	Industry Webinar 5
Jan. 2026	Submit Grid Code Recommendation Paper to CRU

Bi-lateral Mtgs

Updates:

Initial FRT Proposal

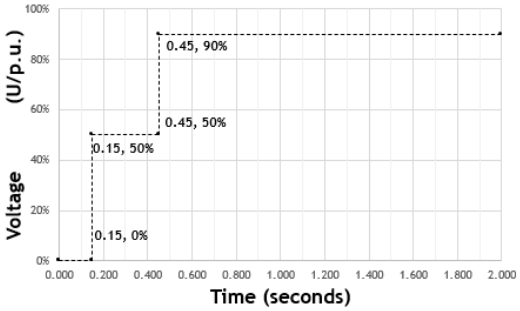
↓

Active Power Recovery Time Defined
RoCoF, Voltage and Frequency Ranges

↓

Response during fault clarified
Recovery Threshold Updated
Modification Split (Non-DCC)

MPID345 - Proposed Grid Code FRT/APR Requirements



Required Voltage against time profile as proposed as part of forthcoming EirGrid/SONI code modification proposal

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 (EirGrid/SONI Grid Code Reference Figure TBC) at the Connection Point.

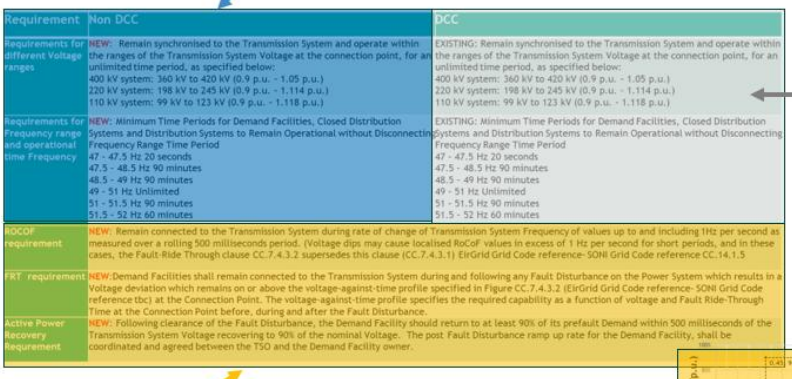
Following clearance of the Fault Disturbance, the Demand Facility should return to at least 90% of its pre-fault Demand within 500 milliseconds of the Transmission System Voltage recovering to 90% of the nominal Voltage. The post Fault Disturbance ramp up rate for the Demand Facility, shall be coordinated and agreed between the TSO and the Demand Facility owner.

MPID345 - Full Modification Proposals

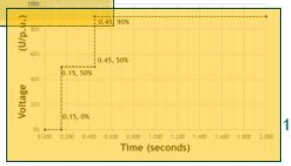
Requirement	Non DCC*	DCC*
Requirements for different Voltage ranges	NEW: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)	EXISTING: Remain synchronised to the Transmission System and operate within the ranges of the Transmission System Voltage at the connection point, for an unlimited time period, as specified below: 400 kV system: 360 kV to 420 kV (0.9 p.u. - 1.05 p.u.) 220 kV system: 198 kV to 245 kV (0.9 p.u. - 1.114 p.u.) 110 kV system: 99 kV to 123 kV (0.9 p.u. - 1.118 p.u.)
Requirements for Frequency range and operational time Frequency	NEW: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes	EXISTING: Minimum Time Periods for Demand Facilities, Closed Distribution Systems and Distribution Systems to Remain Operational without Disconnecting Frequency Range Time Period 47 - 47.5 Hz 20 seconds 47.5 - 48.5 Hz 90 minutes 48.5 - 49 Hz 90 minutes 49 - 51 Hz Unlimited 51 - 51.5 Hz 90 minutes 51.5 - 52 Hz 60 minutes
ROCOF requirement	NEW: 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 CC.7.4.3.2 supersedes this clause (CC.7.4.3.1) EirGrid Grid Code reference- SONI Grid Code reference CC.14.1.5	
FRT requirement	NEW: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.7.4.3.2 (EirGrid Grid Code reference- SONI Grid Code reference tbc) at the Connection Point. The voltage-against-time profile specifies the required capability as a function of voltage and Fault Ride-Through Time at the Connection Point before, during and after the Fault Disturbance.	
Active Power Recovery Requirement	NEW: Following clearance of the Fault Disturbance, the Demand Facility should return to at least 90% of its prefault 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.	

MPID345 - Splitting of Modification Proposals

Mod 2 - Subject to separate CBA/consultation



Existing Requirements - no change



Mod 1 - Brought to the December 2025 GCRP

Compliance / Derogation Framework Proposals Overview

The need for a Compliance/Derogation Framework

- Addressing the FRT issue is urgent; we are approaching a limit to the level of demand loss that can be securely accommodated on the power system.
- Based on industry feedback, it is anticipated that there will initially be a high level of inability to comply with the proposed FRT requirements across transmission connected demand sites.
- EirGrid therefore requires mechanisms to manage the risk to the power system pending customers' implementation of solutions.
- Bringing forward the FRT Grid Code modification within the proposed compliance/derogation framework outlined on the next slide, will support EirGrid's ability to manage the current issue while facilitating customers' assessment of, and progress on, compliance.

PROPOSAL

Compliance / Derogation Framework - High-Level Proposal

EirGrid recommends to CRU that Grid Code modification proposal MPID345 (FRT/APR/RoCoF*) is approved with **immediate effect** and that this approval is accompanied by a **time-limited, conditional, group**** derogation.

immediate effect: within [1] month of the decision to approve, to allow time for customer acceptance or otherwise of the offer of a group derogation.

time-limited: a [12] month derogation from the requirements on acceptance of the derogation conditions. This period would commence on the modification approval date. Any further extension would be subject to an assessment of progress on compliance.

conditional:

1. A customer with non FRT/APR/RoCoF capable demand consumption will be capped at close to its current consumption level. FRT/APR/RoCoF capable demand can continue to grow within the contractual Maximum Import Capacity (MIC).
2. The customer will provide EirGrid a compliance plan or, if the customer considers that full compliance is not achievable, they will submit justification for this position along with a plan to minimise any non-compliance along with any associated derogation request for assessment. Submissions to EirGrid will be made within [3] months of activation of the group derogation.
3. The customer will facilitate EirGrid's monitoring of compliance with these conditions.

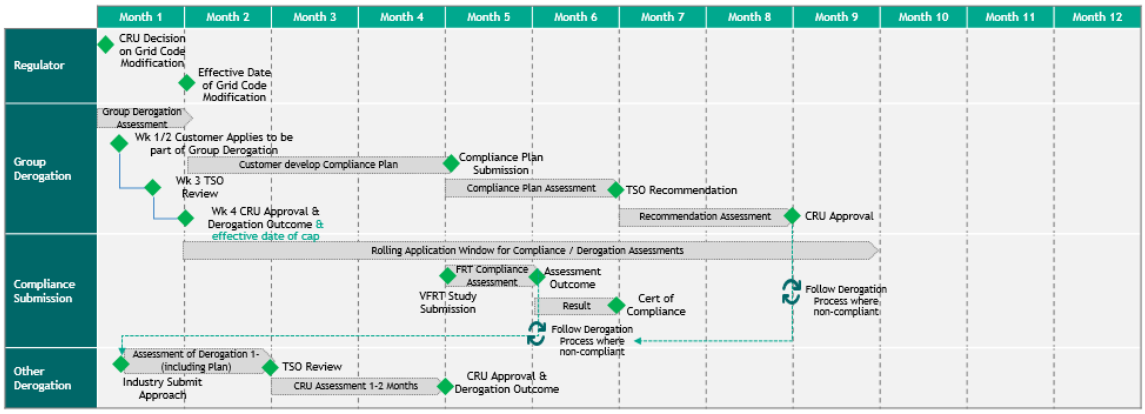
group derogation: offered to all transmission connected Demand Facilities.

** FRT - Fault Ride Through*
APR = Active Power Recovery
RoCoF = Rate of Change of Frequency

*** The term 'class' has been removed from the original proposal and replaced with the term 'group'*

PROPOSAL

Compliance / Derogation Framework - Timelines



- A derogation submission must be made by all customers until such a time as a compliance submission can be made, assessed and a certification of compliance issued.
- Where Compliance submission is not approved the derogation process must be completed.
- Where a derogation outside of the group derogation is requested, the initial submission must include the complete compliance plan or rationale for why a derogation is required.

SLIDE ADDED FOR PART 2 OF WEBINAR

PROPOSAL

Comparison of Group / Non-Group Derogation Processes

#	Area	Group Derogation Process	Non-Group Derogation Process
1	Contractual Maximum Import Capacity (MIC)	Not impacted by this process	
2	Treatment of FRT Capable Demand Utilisation	No restriction on FRT Capable Demand Utilisation up to Contractual Maximum Import Capacity (MIC)	
3	Treatment of Non FRT Capable Demand Utilisation	• Non FRT Capable Demand Utilisation capped at a Demand Facility level	• Non FRT Capable Demand at increased risk of demand control when in System Alert or System Emergency states.
4	Automatic Granting of Derogation on Effective Date of Modification	• Yes, for 12 months	• No
5	Compliance Plan as part of Derogation Submission Timeframe *(i.e. time to submit plan from Mod. Effective date)*	• 3 months	• 1 month

Focus on Utilisation Cap

EirGrid

Demand Utilisation* Cap Proposal

PROPOSAL

- A cap will be applied to the non-FRT/APR/RoCoF capable demand utilisation of transmission connected demand facilities where compliance with the proposed FRT/APR/RoCoF requirements has not been demonstrated (see compliance process requirements on next slides).
- A demand utilisation cap (in MVA) will be set on a site (demand facility) basis.
- Operational data from the calendar year 2025 (15 minute resolution, spot MVA SCADA data) will be used to determine the cap.
- Caps will be determined on a pro-rata basis across all qualifying demand facilities based on the highest average monthly demand utilisation recorded across 2025. Caps will not be based on contractual MIC or forecast demand utilisation.
- Each site's demand utilisation cap will be above its current (up to December 2025) highest monthly average demand utilisation level but may be below the demand utilisation level forecasted within the next few months, i.e. the cap will potentially bind within the next few months.

** The term "demand utilisation" refers to the actual demand consumed by a Facility as opposed to the contractual Maximum Import Capacity (MIC).*

Demand Utilisation Cap - Worked Example

PROPOSAL

- This is an illustrative example of a scenario in which there is 20 MVA of headroom between the demand utilisation level that can securely be accommodated and the highest monthly average demand recorded across 2025 for five demand sites that meet the qualification criteria.
- It is proposed that this headroom would be allocated across the qualifying sites on a pro-rata basis as illustrated in the example below.

Site	Highest Monthly Average Demand Recorded in 2025 (MVA)	Demand Utilisation Cap (MVA)	Delta (MVA)
A	20.0	21.1	1.1
B	50.0	52.6	2.6
C	60.0	63.2	3.2
D	100.0	105.3	5.3
E	150.0	157.9	7.9
Total	380.0	400.0	20.0

Focus on Group Derogation Process

Group Derogation Process - Overview

PROPOSAL

- The Grid Code, including approved Modifications, applies to all Grid Users ~~retrospectively~~ and all relevant Users on the System are required to comply with it. To allow Users time to make the necessary modifications to plan an approach & remedy the non compliance, they must submit a derogation application to the TSO.
- Any User who becomes non compliant with a Grid Code requirement is obliged to inform the TSO as soon as this is known. This communication is carried out through a Derogation Application Form, ideally including a work plan that will lead to compliance. For the period of the derogation application process, the User must maintain maximum compliance as technically feasible with Grid Code. It is acknowledged that any Grid Code Modification may render certain users non compliant, and reasonable time may be permitted to re-achieve or maximise compliance.
- This derogation will be assessed by the TSO and a recommendation submitted to CRU. Only CRU can approve a derogation.
- The TSO has identified GC9-1-Non-Network-Codes-Plant-BESS-or-SCU-Derogation-Application-Form_1 as the most appropriate derogation application. A template specific to this non compliance has been developed by EirGrid and will be provided, this should be submitted in the first instance if the User is accepting of joining the group derogation application process.

PROPOSAL

Group Derogation Process - Next Steps

1. Submit Initial Application

Week 1 to 2

To minimise application and assessment timelines the TSO have pre-populated key sections of the derogation application with the relevant information. Users should review this form provided by the TSO and update the highlighted sections (e.g. contact details, demand facility name, MIC etc.)

2. Submit Group Derogation compliance plan

! *Submit no later than 3 months after effective date of original derogation*

Initial Application will be for 12 months, however, a plan to resolve the issue or justification as to why the issue cannot be technically or economically resolved must be submitted to the TSO within 3 months. This should include details of a compliance plan, timeline and steps required to provide the necessary technical submissions under the compliance process presented previously.

3. Application Validation

EirGrid will validate the application, if satisfied that the application is valid then EirGrid will issue a **Derogation Assessment ID** (DAID) Number conduct an assessment and forward it with a recommendation to CRU.

NOTE: Please contact derogationrequests@eirgrid.com if there are any queries in relation to the derogation process.

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PROPOSAL

Group Derogation Process - Application

APPLICANT:		*COMPANY NAME*	
APPLICANT CONTACT NAME:	*CONTACT NAME*	DATE:	*DD/MM/YYYY*
APPLICANT TELEPHONE NUMBER:	*TELEPHONE NUMBER*		
APPLICANT POSTAL ADDRESS:	*ADDRESS* Line 2 Line 3 EirCode	APPLICANT E-MAIL ADDRESS:	*EMAIL@COMPANY.COM*
		DEROGATION APPLICATION NUMBER (EIRGRID USE ONLY)	
GRID CODE VERSION:	16.0		
GRID CODE CLAUSE FOR WHICH DEROGATION IS SOUGHT:	CC7.4.3.1 CC7.4.3.2		
PLANT/ SYSTEM FOR WHICH DEROGATION IS SOUGHT:	Demand Facility Name		
TOTAL INSTALLED CAPACITY (MW)	Installed Demand = xx MW		
MEC (MW)	MIC = xx MW		
FINAL OPERATIONAL NOTIFICATION DATE	Connection Date = dd/mm/yyyy		
DATE OPERATIONAL CERTIFICATION ACHIEVED	N/A		
DESCRIPTION AND EXTENT OF NON-COMPLIANCE	The site has cannot meet the fault ride though requirements specified in Clauses CC7.4.3.1 and CC7.4.3.2.		

EirGrid

PROPOSAL

Group Derogation Process - Application

IMPACT ON THE ELECTRICITY SYSTEM OF NON-COMPLIANCE	**Risk of high frequency or system disturbance in the event of significant demand reduction following a fault disturbance or rate of change of transmission system frequency.**
REASON FOR NON-COMPLIANCE	**Modification #MPID 345 to Grid Code has rendered existing facility non compliant**
THE END DATE OF THE REQUESTED DEROGATION APPLICATION	**Dd/mm/yyyy - TBC**
EFFORTS MADE TO IMPROVE/ACHIEVE/ MAXIMISE COMPLIANCE AND PROPOSAL FOR REMEDYING NON-COMPLIANCE. PLEASE INCLUDE MILESTONES AND DATES FOR REMEDYING NON-COMPLIANCE, COSTS, AND RISK FACTORS THAT MAY DELAY COMPLIANCE. (THIS SECTION MUST BE FILLED OUT FOR ALL APPLICATIONS)	**This derogation application is to request permission for time to assess the non compliance and to formulate a plan to resolve the issue.** Conditions • A customer with non FRT/APR/RoCoF capable demand consumption will be capped at XX MVA**. FRT/APR/RoCoF capable demand can continue to grow within the contractual Maximum Import Capacity (MIC). • The customer will provide EirGrid a compliance plan complete with steps to make technical submissions in-line with the compliance process or, if the customer considers that full compliance is not achievable, they will submit justification for this position along with a plan to minimise any non-compliance along with any associated derogation request for assessment. Submissions to EirGrid will be made within [3] months of activation of the derogation. • The customer will facilitate EirGrid's monitoring of compliance with these conditions.
DETAILS OF SUPPORTING DOCUMENTATION FOR APPLICATION (IF ANY) ATTACHED	**N/A**
Please submit the Derogation Application to derogationrequests@eirgrid.com	

Focus on Compliance Process

Grid Code Compliance Process - Overview

PROPOSAL

FRT & RoCoF Study Requirements

- All TSO connected Demand Facilities are required to submit a FRT & RoCoF study report to EirGrid.
- FRT & RoCoF studies must be assessed based on the Minimum System Strength (MSS) data ; it will be issued to the customers for the purpose of modelling the transmission in the simulation studies.

Timeline for FRT & RoCoF Study Submissions

Item	Timeline	Responsible	Submit to
Minimum System Strength Data	MSS data will be issued upon request to customer following notice of intention to show compliance	EirGrid	Customers
FRT & RoCoF Study Submission	Within 3 months of the Grid Code Modification Effective Date.	Customers	EirGrid
Review of Customer Submissions	Within 2-3 weeks after customer submission ; comment log will be issued to customer.	EirGrid	Customers
Response to EirGrid Comments	Within 2 weeks after receiving comments.	Customers	EirGrid
Approval of FRT & RoCoF study	The outcome will be notified to customer after review process.	EirGrid	Customers

Minimum System Strength Data

- It is the minimum fault level at the connection point (CP) where the facilities were connected and this MSS data is used for the modelling of external grid.

EirGrid

Grid Code Compliance Process - Overview

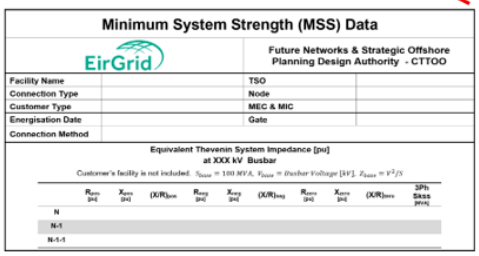
PROPOSAL

Sample MSS Data Report & SLD shown.

Study Methodology for FRT

- The pre-disturbance period, N-1 should be considered ; steady state
- The disturbance period, N-1 should be considered ; Fault
- The post-disturbance period, N-1-1 should be considered ; APR

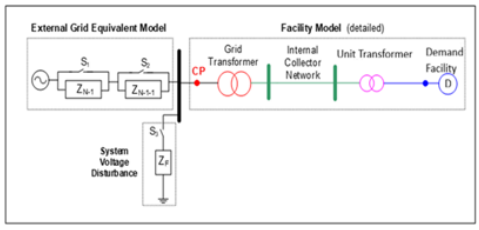
Period	S_1	S_2	S_3	Comment
Pre-disturbance T < T1	Open	Closed	Open	Steady state under Z_{N-1}
Disturbance T1 ≤ T < T2	Open	Closed	Closed	Apply voltage disturbance under Z_{N-1}
Post-disturbance T2 ≤ T	Closed	Open	Open	Remove disturbance, Change external grid impedance to Z_{N-1-1}



Study Methodology for RoCoF

- 1Hz per second as measured over a rolling 500 milliseconds period.
- RoCoF assessment pack will be send to customer along with MSS data.

Frequency Trace	Frequency Trace Characteristics
1	Frequency rise
2	Frequency rise with subsequent fast drop resulting in under-frequency
3	Frequency drop
4	Frequency drop with subsequent fast rise resulting in over-frequency



EirGrid

PROPOSAL

Grid Code Compliance Process

FRT & RoCoF Study Submission

- All the following reports/data listed in the table, should be submitted by the customers to EirGrid.

#	Report / Document / Data
1	Customer self-assessment FRT & RoCoF Report
2	Single-line diagram of the facility
3	Dynamic modelling files for FRT study
4	Validation report for dynamic model
5	Documents used as reference in the FRT & RoCoF study
6	Other supporting documents, if needed

FRT / APR Requirements

- The demand facility shall be capable of staying connected to the transmission system during fault as specified in the voltage-against-time profile at the CP [1].
- Following clearance of the fault disturbance, the demand facility should return to 90% of its prefault active power demand within 500 ms of the transmission system voltage recovering to 90% of the nominal voltage.
- Customers are requested to cover the test cases (Balanced & Unbalanced fault cases) for FRT/APR assessment as set out in the table.

Retained Voltage	Fault Type			
	3 Phase	2 Phase to ground	1 Phase to ground	Phase to Phase
0%	140 ms	140 ms	140 ms	140 ms
0%	150 ms	150 ms	150 ms	150 ms
50%	150 ms	150 ms	150 ms	150 ms
50%	450 ms	450 ms	450 ms	450 ms
85%	450 ms	450 ms	450 ms	450 ms
89%	2000 ms	2000 ms	2000 ms	2000 ms

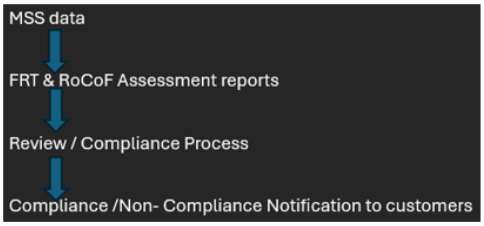
PROPOSAL

Grid Code Compliance Process - FRT/APR Simulation Results/Study

FRT Simulation Results

- The required signals are listed in the table below.
- Reference [2] would provide more information for carrying out study and will soon be published on the EirGrid website .

Plot #1	Signals/Parameters	Node	Unit
Plot 1	Voltage	CP	Per Unit
Plot 2	Frequency	CP	Actual Values
Plot 3	Active Power Demand	CP	Per Unit
Plot 4	Active Power Demand	CP	Actual Values
Plot 5	Voltage, Active Power Demand	CP	Actual Values
Plot 6	Voltage, Active Power Demand	LV terminal	Actual Values



Compliance Process Flow

Approval of FRT & RoCoF Study

- Compliance / non-compliance notification will be sent to customers through proper channel.
- Mitigations will be discussed in case of non-compliance.

References

[1] MPID 345 Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities.
[2] VOLTAGE FAULT RIDE - THROUGH (VFRT) STUDY TEMPLATE AND ASSESSMENT GUIDE For Demand Facility - 05.12.2025.pdf

Next Steps

EirGrid

Summary of Proposed Demand Facility Owner Actions

PROPOSAL

On approval of Grid Code modification MPID345 and associated compliance/derogation framework by CRU:

- Each demand facility owner will assess their offer of a conditional, time-limited derogation and accept/reject within 2 weeks (failure to accept will be deemed as non-acceptance).

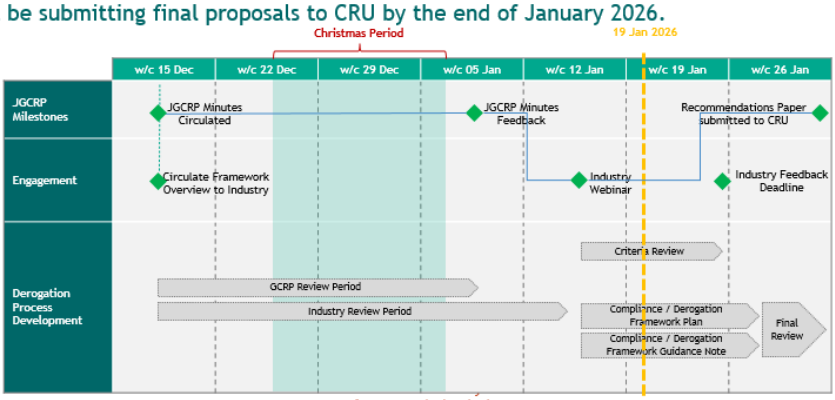
- Those demand facility owners that accept the conditional, time-limited derogation will be required to:
  - Cap their non FRT/APR/RoCoF capable demand utilisation at the agreed demand utilisation cap,
  - Submit a compliance plan to EirGrid within 3 months of the conditional, time-limited derogation coming into effect,
  - Permit EirGrid monitoring of compliance with the conditions of the time-limited derogation.

- Those demand facility owners that do not accept the conditional, time-limited, derogation will be required to:
  - Submit a compliance/derogation report to EirGrid within 1 month of the grid code modification (MPID345) coming into effect.
  - Note that this may not be supported by EirGrid.

PROPOSAL

Compliance/Derogation Framework Development Plan, Engagement and Next Steps

- Final feedback on the compliance/derogation framework is requested by 23 January 2026 ~~21 January 2026.~~
- EirGrid are open to bi-lateral engagements on these proposals. To provide feedback, or request a bi-lateral meeting, please contact your account manager.
- EirGrid will be submitting final proposals to CRU by the end of January 2026.



Open Q&A

Part 21 – Presentation from the 8th Industry Webinar on 11th February 2026:

11/02/2026

Fault Ride Through Grid Code Modification (MPID345)

Industry Webinar on the Proposed Compliance and Derogation Framework (Part 3)

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Agenda

Topic	Times
1. Introduction	10:30 - 11:30
2. Compliance and Derogation Framework	
3. Capping Methodology	
4. Next Steps	
5. Q&A	11:30 - 12:00

1

Introduction

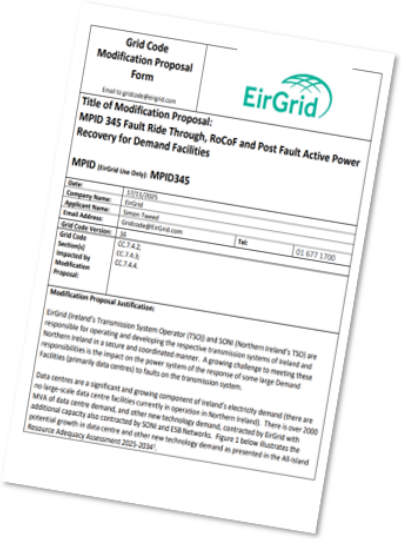
Introduction

EirGrid and SONI presented the proposed Demand Facility Fault Ride Through (FRT), Active Power Recovery (APR) and Rate of Change of Frequency (RoCoF) Modifications (MPID345) to the 3 December 2025 Joint (EirGrid and SONI) Grid Code Review Panel (JGCRP).

EirGrid subsequently shared with industry an overview of the proposed Compliance and Derogation Framework associated with this modification in December 2025 and held two supporting industry webinars on 14 and 19 January 2026.

This industry webinar provides an update on our proposed Compliance and Derogation Framework following the feedback received from industry. Note that no recent updates have been made to the Grid Code Modification itself - the version submitted to the December 2025 JGCRP remains unchanged.

We now plan to submit our final Grid Code Modification and Compliance and Derogation Framework proposals to CRU during the week commencing 16 February 2026.



Grid Code Modification Proposal Form

EirGrid

Title of Modification Proposal:
MPID 345 Fault Ride Through, RoCoF and Post Fault Active Power Recovery for Demand Facilities

MPID (EirGrid Use Only): MPID345

Date:	12/12/2025
Company Name:	EirGrid
Applicant Name:	Simon Tweed
Email Address:	gridcode@EirGrid.com
Grid Code Version:	16
Tel:	01 677 1700
Grid Code Section(s) impacted by Modification Proposal:	CC.7.4.2. CC.7.4.3. CC.7.4.4.

Modification Proposal Justification:

EirGrid (Ireland's Transmission System Operator (TSO)) and SONI (Northern Ireland's 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".

Grid Code Modifications | The Grid Code | EirGrid

Background

If non-FRT capable demand continues to increase as forecast, we will soon reach the limit of demand loss that can be securely accommodated on the power system.

In addition to the operational measures already implemented by EirGrid, our proposed approach to managing this issue is to recommend that FRT requirements are implemented immediately in the Grid Code in order to ensure that there are technical requirements that all demand connections, including future demand connections, comply with.

To accompany this Grid Code Modification, we have proposed a Compliance and Derogation Framework that allows for conditional derogations. A key condition is that non-FRT capable demand is capped.

If a cap on non-FRT capable demand is not put in place and non-FRT capable demand continues to grow, and our operational measures are exhausted, the power system would enter a System Alert or System Emergency state and demand control actions to reduce non-FRT capable demand would be taken as is required of the TSO to protect the integrity of Ireland's power system

2

Derogation & Compliance Framework

EirGrid

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The need for a Compliance/Derogation Framework

- Addressing the FRT issue is urgent; we are approaching a limit to the level of demand loss that can be securely accommodated on the power system.
- Based on industry feedback, it is anticipated that there will initially be a high level of inability to comply with the proposed FRT requirements across transmission connected demand sites.
- EirGrid therefore requires mechanisms to manage the risk to the power system pending customers' implementation of solutions.
- Bringing forward the FRT Grid Code modification within the proposed compliance and derogation framework outlined on the next slide, will support EirGrid's ability to manage the current issue while facilitating customers' assessment of, and progress on, compliance.

Compliance & Derogation Framework - Updates

PROPOSAL

Following industry feedback from bi-lateral engagements and webinars, the following changes have been made to the Compliance and Derogation Framework Proposal:

- **There will be three distinct Compliance and Derogation processes within the framework:**
  - a Group Compliance and Derogation Process for Data Centres,
  - a Group Compliance and Derogation Process for Non-Data Centres, and
  - the standard (non-group) compliance and derogation process
  - There will be differing conditions and timelines associated with each process in order to prioritise and manage the overall framework
  - This is explained in the subsequent slides
- **We provide clarification that the application of Non-FRT Capable Demand Caps will be per Connection Agreement**
- **Will provide additional flexibility for customers with multiple demand facilities**
  - Customers will have flexibility to manage the distribution of FRT Capable and Non FRT Capable demand within their demand facility and, where available, across their demand facility portfolio, as long as the total non-FRT capable demand utilisation remains within each customers total agreed cap.
- **We propose to extend the duration of the Group Derogations from 12 months to 24 months**

Compliance/Derogation Framework - Approach

PROPOSAL

- All demand facilities will ultimately be required to demonstrate compliance with MPID345 or achieve a derogation from these requirements irrespective of this proposed grouping of demand facilities (subject to approval of CRU).
- However, it is proposed that the Group Compliance and Derogation framework will allow for two Group Compliance and Derogation groupings linked to transmission demand facility types:
    - Group A Compliance and Derogation Process for Data Centres, and
    - Group B Compliance and Derogation Process for Non-Data Centres
- These groupings will allow for differing conditions and timelines to be associated with each group in order to prioritise and manage the overall framework.
- This group is based on the distinguishing characteristics of these demand facility types, comparisons of their observed performance during actual fault and data centre demand facility modelling and customer engagements.
- In addition to the group derogations, all customers can choose to follow the standard (non-group) derogation process should they choose to do so. However, there are risks with this standard (non-group) approach which are set out on the next slides.

Compliance / Derogation Framework - Group A

PROPOSAL

EirGrid recommends to CRU that Grid Code modification proposal MPID345 (FRT/APR/RoCoF*) is approved with **immediate effect** and that this approval is accompanied by a **time-limited, conditional, group derogation for data centre demand facilities.**

immediate effect: within 1 month of the decision to approve, to allow time for customer acceptance or otherwise of the offer of a group derogation.

time-limited: a 24 month derogation from the requirements on acceptance of the derogation conditions. This period would commence on the modification approval date. Any further extension would be subject to an assessment of progress on compliance.

conditional:

1. A customer with non FRT/APR/RoCoF capable demand consumption will be capped at close to its current consumption level. FRT/APR/RoCoF capable demand can continue to grow within the contractual Maximum Import Capacity (MIC).
2. The customer will provide EirGrid a compliance plan or, if the customer considers that full compliance is not achievable, they will submit justification for this position along with a plan to minimise any non-compliance along with any associated derogation request for assessment. Submissions to EirGrid will be made within 3 months of activation of the group derogation.
3. The customer will facilitate EirGrid's ongoing monitoring of compliance with these conditions.

Group A derogation: offered to all transmission connected data centre Demand Facilities.

** FRT - Fault Ride Through*
APR = Active Power Recovery
RoCoF = Rate of Change of Frequency

Compliance / Derogation Framework - Group B

PROPOSAL

EirGrid recommends to CRU that Grid Code modification proposal MPID345 (FRT/APR/RoCoF*) is approved with **immediate effect** and that this approval is accompanied by a **time-limited, conditional, group derogation for non-data centre demand facilities.**

immediate effect: within 1 month of the decision to approve, to allow time for customer acceptance or otherwise of the offer of a group derogation.

time-limited: a 24 month derogation from the requirements on acceptance of the derogation conditions. This period would commence on the modification approval date. Any further extension would be subject to an assessment of progress on compliance.

conditional:

1. The customer will provide EirGrid a compliance plan or, if the customer considers that full compliance is not achievable, they will submit justification for this position along with a plan to minimise any non-compliance along with any associated derogation request for assessment. Submissions to EirGrid will be made within 12 months of activation of the group derogation.
2. The customer will facilitate EirGrid's ongoing monitoring of compliance with these conditions.

Group B derogation: offered to all transmission connected non-data centre Demand Facilities.

EirGrid

** FRT - Fault Ride Through*
APR = Active Power Recovery
RoCoF = Rate of Change of Frequency

Comparison of Group / Non-Group Derogation Processes

PROPOSAL

#	Area	Group Derogation Process		Non-Group Derogation Process
		Group A - Data Centres	**Group B - Non Data Centres**	
1	Treatment of Non FRT Capable Demand Utilisation	Non FRT Capable Demand Utilisation capped at a Demand Facility / Portfolio level	No cap applied.	• It will be recommended to CRU that non FRT Capable Demand Utilisation be capped at a Demand Facility / Portfolio level • Non FRT Capable Demand at increased risk of demand control when in System Alert or System Emergency states.
2	Automatic Granting of Derogation on Effective Date of Modification	Yes, for 24 months	Yes, for 24 months	No
3	Compliance Plan as part of Derogation Submission Timeframe *(i.e. time to submit plan from Mod. Effective date)*	3 months	12 months	On or before Grid Code Modification Effective Date
4	Treatment of FRT Capable Demand Utilisation	No restriction on FRT Capable Demand Utilisation up to Contractual Maximum Import Capacity (MIC)		
5	Contractual Maximum Import Capacity (MIC)	Not impacted by this process		

EirGrid

Benefits of the Updated Group Processing Approach

PROPOSAL

- Allows for the focus of the initial compliance/derogation process to be on the assessment of the most impactful demand facilities (i.e. data centres).
- The derogation period for both Group A and Group B demand facilities is extended from 12 to 24 months.
- Group A demand facility caps will be higher as a result of the available headroom being exclusively allocated to data centres (rather than pro-rata across all demand facilities).
- Group B demand facilities will not be capped and will benefit from an extended period to develop compliance plans - extended from 3 months to 12 months.
- Will enable more efficient processing of compliance/derogations by EirGrid and CRU as assessments/decisions will be phased and over a longer overall period.

Group Derogation Process - Group A & B

PROPOSAL

1	2	3	4	5	6	7
TSO Prepares Draft Group Derogation	**Customer Completes & Submits Group Derogation Application**	**TSO Receives & Reviews Group Derogation Application**	**CRU Decision on Group Derogation**	**Customer Submits Compliance Plan to TSO**	**TSO Receives & Reviews Compliance Plan**	**CRU Decision on Compliance Plan**
TSO populates initial sections of the group derogation application form and issues to customer in draft.	Customer populates unit specific sections and submits completed application form to TSO.	TSO ensures application form is properly completed. TSO makes recommendation to CRU to accept the derogation request.	CRU reviews TSO recommendation and approves / rejects derogation request. CRU decision is communicated to customer.	Customer submits plan to TSO, outlining how they will achieve compliance with FRT requirements OR justification (with reasons) as to why compliance is not possible.	TSO reviews / assesses compliance plan / justification. TSO makes updated recommendation to CRU to approve or reject the modified derogation request including the compliance plan/justification.	CRU reviews TSO recommendation and approves/ rejects modified derogation request including compliance plan or justification. CRU decision is communicated to customer.
Once Grid Code Mod is approved	*Within 2 weeks of Grid Code Mod Approval*	*Within 1 week of receipt of application from customer*	*Dependent on CRU timelines*	*Group A: Within 3 months of Grid Code Modification effective date* *Group B: Within 12 months of Grid Code Modification effective date*	*Time to review and make recommendation is dependent on quality of plan /mitigants*	*Dependent on CRU timelines*

PROPOSAL

Non-Group Derogation Process

1
Customer Submits Derogation Request (including plan)

Customer submits derogation request to TSO if customer believes that;

1) it would be unreasonable (based on cost and technical considerations) to require customer to achieve compliance with FRT requirements,

   OR

2. customer should be granted extended period to achieve compliance and demonstrates the necessity for this based on a detailed compliance plan.

On or before Grid Code Mod effective date

2
TSO Receive & Review Non-Group Derogation Request

TSO ensures application form is properly completed.
TSO makes recommendation to CRU to accept OR reject the derogation request.

N.B. TSO cannot guarantee derogations sought outside of the 'Group' derogation process will be recommended for approval. Each application will be assessed on its merits, however taking into account overall impact on power system security must be the priority.

Time to review and make recommendation is dependent on quality of plan /mitigants

3
CRU Decision on Non-Group Derogation Request

CRU reviews TSO recommendation and approves /rejects derogation request.

CRU's decision is communicated to customer.

Dependent on CRU timelines

EirGrid

3

Capping Methodology

EirGrid

Demand Utilisation* Cap Proposal

PROPOSAL

- Note that this capping methodology remains unchanged from the original proposal other than it is now proposed that caps will only apply to data centre demand facilities.
- A cap will be applied to the non-FRT/APR/RoCoF capable demand utilisation of transmission connected data centre demand facilities where compliance with the proposed FRT/APR/RoCoF requirements has not been demonstrated.
- A demand utilisation cap (in MVA) will be set on a demand facility Connection Agreement basis, or a portfolio basis where multiple demand facilities fall under a single parent company.
- Operational data from the calendar year 2025 (15 minute resolution, spot MVA SCADA data) will be used to determine the cap.
- Caps will be determined on a pro-rata basis across all qualifying demand facilities based on the highest average monthly demand utilisation recorded across 2025. Caps will not be based on contractual MIC or forecast demand utilisation.
- Each site's demand utilisation cap will be above its current (up to December 2025) highest monthly average demand utilisation level but may be below the demand utilisation level forecasted within the next few months, i.e. the cap will potentially bind within the next few months.

EirGrid

** The term "demand utilisation" refers to the actual demand consumed by a Facility as opposed to the contractual Maximum Import Capacity (MIC).*

Demand Utilisation Cap - Worked Example

PROPOSAL

- This is an illustrative example of a scenario in which there is 20 MVA of headroom between the demand utilisation level that can securely be accommodated and the highest monthly average demand recorded across 2025 for five demand sites that meet the qualification criteria.
- It is proposed that this headroom would be allocated across the qualifying sites on a pro-rata basis as illustrated in the example below.

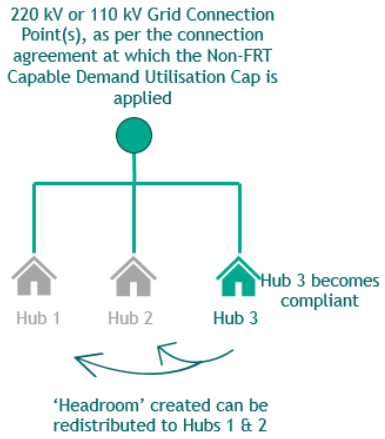
Site	Highest Monthly Average Demand Recorded in 2025 (MVA)	Demand Utilisation Cap (MVA)	Delta (MVA)
A	20.0	21.1	1.1
B	50.0	52.6	2.6
C	60.0	63.2	3.2
D	100.0	105.3	5.3
E	150.0	157.9	7.9
Total	380.0	400.0	20.0

EirGrid

Application of Non-FRT Capable Demand Cap on a Connection Agreement Basis

PROPOSAL

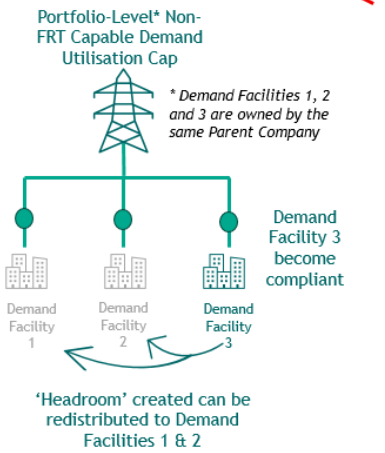
- The non-FRT capable demand utilisation cap is applied on a Connection Agreement basis, not at individual buildings or hubs behind the connection point(s), as per the connection agreement.
- A customer may have multiple buildings, halls, or hubs connected at a Demand Facility. The cap is applied overall to the total non-FRT capable demand across all the connection point(s) for that Demand Facility.
- Compliance improvements (reduction of non-FRT/APR/RoCoF capable demand) in one hub / building may free up 'headroom' that can then be used by other hubs / buildings at the same Demand Facility.
- The customer has flexibility to redistribute demand internally, as long as the total non-FRT capable demand utilisation at the Demand Facility stays within the agreed cap.



Portfolio-Level Application of the Cap (Parent Company Level)

PROPOSAL

- For customers with multiple Demand Facilities across multiple connection points, the non-FRT capable demand utilisation cap can be applied at the portfolio level, aggregating across all their metered sites.
- The cap applies to the sum of non-FRT capable demand utilisation across all Demand Facilities within the customer's portfolio.
- If a customer reduces non-FRT/APR/RoCoF-capable demand at one Demand Facility, the resulting 'headroom' can be used at another one of its Demand Facilities.
- The customer has flexibility to redistribute non-FRT capable demand, as long as the total non-FRT capable demand summed across the various Demand Facilities stays within the sum of the agreed caps for all its Demand Facilities.
- This gives customers flexibility across their wider portfolio of Demand Facilities while ensuring overall compliance during the period that the derogation applies.



4

Next Steps

Next Steps

- Webinar slides will be shared with the group.
- We now plan to submit our final Grid Code Modification and Compliance and Derogation Framework proposals to CRU during the week commencing 16 February 2026.
    - The Grid Code Modification and Compliance and Derogation Framework will be available on the EirGrid website after submission.

5

Open Q&A

EirGrid

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Part 22 – Presentation from the 9th Industry Webinar on 12th March 2026:

12/03/2026

Fault Ride Through Grid Code Modification (MPID345)

Industry Webinar on the Proposed Compliance and Derogation Framework

EirGrid

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Overview

- EirGrid's proposals for the Compliance and Derogation Framework associated with MPID345 have evolved based on engagement with industry at webinars and bi-lateral meetings over recent months.
- At previous webinars, in January and February 2026, we outlined our proposals for this Framework including updates related to providing extended derogation periods, removal of caps for non data centre demand facilities and facilitating a portfolio approach for data centres.
- The purpose of this webinar is to set out our updated Framework proposals including the introduction of a 'demand utilisation threshold' approach to managing non MPID345 capable demand levels in place of the 'absolute cap' approach previously proposed.
- We are of the view that these updated proposals represent an appropriate balance of accounting for industry feedback and the need to ensure power system security.
- **The proposals outlined in these slides are subject to final EirGrid consideration and approval, and the final positions and wording will be set out in the CRU submission documents, including the Compliance & Derogation framework and Derogation Application forms which will include the derogation conditions.**

Agenda

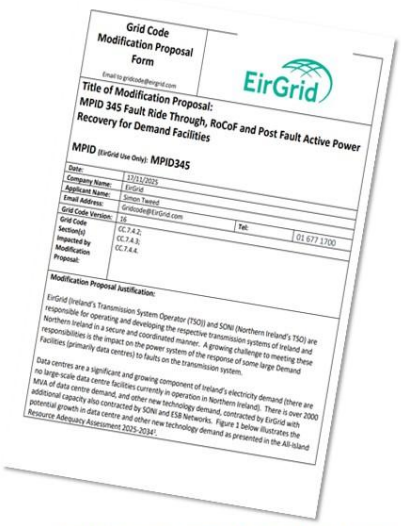
Topic
1. Introduction
2. Demand Utilisation Threshold
3. Compliance & Derogation Framework (Recap)
4. Summary of Industry Feedback and EirGrid's Response
5. Next Steps
6. Q&A

1

Introduction

Introduction

- EirGrid and SONI presented the proposed Demand Facility Fault Ride Through (FRT), Active Power Recovery (APR) and Rate of Change of Frequency (RoCoF) Modifications (MPID345) to the 3 December 2025 Joint (EirGrid and SONI) Grid Code Review Panel (JGCRP).
- EirGrid subsequently shared with industry an overview of the proposed Compliance and Derogation Framework associated with this modification in December 2025 and held three supporting industry webinars on 14 and 19 January as well as 11 February 2026.
- This industry webinar provides an update on our proposed Compliance and Derogation Framework following the feedback received from industry. Note that no recent updates have been made to the Grid Code Modification itself - the version submitted to the December 2025 JGCRP remains unchanged.
- We now plan to submit our final Grid Code Modification and Compliance and Derogation Framework proposals to CRU in March 2026.



Grid Code Modifications | The Grid Code | EirGrid

2

Demand Utilisation Threshold

Demand Utilisation Threshold Proposal

PROPOSAL

Industry feedback from previous webinars and bi-lateral engagements has highlighted concerns with an 'absolute cap' approach to limiting non FRT capable demand utilisation. We now propose a 'demand utilisation threshold' to replace the 'absolute cap'.

- A demand utilisation threshold will set a fixed monthly average MVA limit on non FRT/APR/RoCoF capable demand utilisation for each transmission connected data centre demand facility or on a portfolio basis where multiple demand facilities fall under a single parent company.
- Demand utilisation may peak above the demand utilisation threshold at times as long as the monthly average demand utilisation remains within the threshold.
- If a demand facility owner wishes to temporarily peak above their demand utilisation threshold by more than 10%, prior written agreement with EirGrid will be required.
- Monitoring of compliance with the demand utilisation threshold will be performed by EirGrid.

Note: The term "demand utilisation" refers to the actual demand consumed by a Facility as opposed to the contractual Maximum Import Capacity (MIC).

Determining the Demand Utilisation Threshold

PROPOSAL

The proposals outlined here are unchanged from those previously presented on 11 February with the exception of the term 'cap' being replaced by 'demand utilisation threshold'.

- Demand utilisation thresholds will only apply to data centre demand facilities.
- A threshold will be applied to the non-FRT/APR/RoCoF capable demand utilisation of transmission connected data centre demand facilities where compliance with the proposed FRT/APR/RoCoF requirements has not been demonstrated.
- A demand utilisation threshold (in MVA) will be set on a demand facility Connection Agreement basis, or a portfolio basis where multiple demand facilities fall under a single parent company.
- EirGrid's operational data from the calendar year 2025 (15 minute resolution, spot MVA SCADA data) will be used to determine the threshold.
- Thresholds will be determined on a pro-rata basis across all qualifying demand facilities based on the highest average monthly demand utilisation recorded across 2025. Thresholds will not be based on contractual MIC or forecast demand utilisation.
- Each site's demand utilisation threshold will be above maximum monthly averages up to December 2025 but may be below the demand utilisation level forecasted within the next few months, i.e. the threshold will potentially bind within the next few months.

Demand Utilisation Threshold - Worked Example

PROPOSAL

- This is an illustrative example of a scenario in which there is 20 MVA of headroom between the demand utilisation level that can securely be accommodated and the highest monthly average demand recorded across 2025 for five demand sites that meet the qualification criteria.
- It is proposed that this headroom would be allocated across the qualifying sites on a pro-rata basis as illustrated in the example below.

Site	Highest Monthly Average Demand Recorded in 2025 (MVA)	Demand Utilisation Threshold (MVA)	Delta (MVA)
A	20.0	21.1	1.1
B	50.0	52.6	2.6
C	60.0	63.2	3.2
D	100.0	105.3	5.3
E	150.0	157.9	7.9
Total	380.0	400.0	20.0

3

Compliance & Derogation Framework (Recap)

PROPOSAL

Comparison of Group / Non-Group Derogation Processes

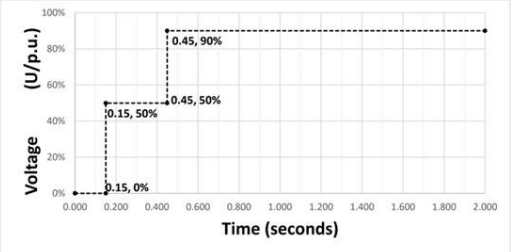
There will be three distinct Compliance and Derogation processes within the framework

#	Area	Group Derogation Process		Non-Group Derogation Process
		Group A - Data Centres	Group B - Non Data Centres	
1	Treatment of non MPID345 Capable Demand Utilisation	Non MPID345 Capable Demand Utilisation threshold at a Demand Facility / Portfolio level	No DUT applied.	• It will be recommended to CRU that non MPID345 Capable Demand Utilisation have a threshold at a Demand Facility / Portfolio level • Non MPID345 Capable Demand at increased risk of demand control when in System Alert or System Emergency states.
2	Automatic TSO recommendation to CRU for approval of Derogation on Effective Date of Modification	Yes, for 24 months	Yes, for 24 months	No
3	Compliance Plan as part of Derogation Submission Timeframe *(i.e. time to submit plan from Mod. Effective date)*	3 months	12 months	On or before Grid Code Modification Effective Date
4	Treatment of MPID345 Capable Demand Utilisation	No restriction on MPID345 Capable Demand Utilisation up to Contractual Maximum Import Capacity (MIC)		
5	Contractual Maximum Import Capacity (MIC)	Not impacted by this process		

Compliance Study Assessment Guides

PROPOSAL

- Demand facility Owners will be required to undertake a self-assessment of their compliance with the proposed Grid Code requirements and submit their assessment to EirGrid.
- To support this assessment, EirGrid has developed study assessment guides to inform the modelling and simulation work that should be undertaken and the outputs required. Two study assessment guides have been developed:
    - Fault Ride Through (FRT) / Active Power Recovery (APR) Study Assessment Guide for Demand Facilities
    - Rate of Change of Frequency (RoCoF) Study Assessment Guide for Demand Facilities
- These guides will be made available on the EirGrid website as part of our submission of proposals to CRU.



4

Summary of Industry Feedback and EirGrid's Response

Industry Feedback - EirGrid's Response

No.	Industry Feedback	EirGrid's Response
1.	Concerns around the ability of customers to assess compliance and make progress within the 12-month derogation period. The ability of a small number of equipment OEMs and technical advisors to support compliance/derogation assessments would be challenging in the proposed timeframe. The ability of EirGrid and CRU to process a significant number of compliance plans / derogation requests within the proposed timeframe was highlighted by industry as potentially challenging.	The operational measures being implemented to manage the FRT issue are currently impacting on the operation of the all-island market with significant impacts on some market participants. While progressing compliance with MPID345 as quickly as possible is critical to resolving these issues, EirGrid recognise the challenges that existing demand facilities have in achieving this. EirGrid now proposes that the group derogation process be extended from 12 to 24 months for all demand facilities. We consider this an appropriate balance between providing demand facilities time to progress solutions and the all-island market impacts of having an extended derogation period. Demand facilities have been grouped into data centre and non data centre categories to allow prioritisation of activities. Non-data centre demand facility owners now have 12 months, rather than 3 months, to submit their compliance plan.

Industry Feedback - EirGrid's Response

No.	Industry Feedback	EirGrid's Response
2.	The capping of demand utilisation at demand facilities will be very challenging across industry with significant business impacts. For some customers, it may not be possible to limit their demand utilisation and capping of capacity (even if not normally utilised) presents significant commercial risk.	Placing a threshold on non MPID345 capable demand utilisation is essential to maintaining the security of the power system. If non MPID345 capable demand continues to grow, the power system would enter an alert or emergency state, and demand control actions would need to be taken by EirGrid to secure the power system. The demand utilisation limitation only applies to non MPID345 capable demand. There is no restriction on MPID345 capable demand up to contractually agreed levels (MIC). The requirement for non data centre demand to cap their demand has been removed based on the differing characteristics and risk profile that this demand presents. The original 'absolute cap' proposal has evolved to a 'demand utilisation threshold' approach that facilitates some peaking of data centre demand above average monthly limits. This will provide some individual flexibility to all data centre demand facilities while still providing a high degree of certainty that aggregate demand utilisation levels stay within the overall system security limit. We are of the view that consistent application of the demand utilisation threshold setting methodology equally to all data centre demand facilities continues to be the appropriate approach to managing the technical challenges being presented by these facilities.

Industry Feedback - EirGrid's Response

No.	Industry Feedback	EirGrid's Response
3.	How will new demand facilities connecting to the grid be treated with respect to the compliance and derogation process?	Any new demand facility that connects to the transmission system before the end of 2026 will be offered the opportunity to avail of the appropriate 'group' process. The 24 month derogation period allowed under the group process will continue to run from the effective date of MPID345. Any new demand facility that connects from 2027 onwards, will be required to proceed via the standard (non-group) derogation process if they are not compliant.

EirGrid

Industry Feedback - EirGrid's Response

No.	Industry Feedback	EirGrid's Response
4.	Clarification required on what happens after the 24 month group derogation period.	During the 24 month group derogation period, all demand facilities must either achieve compliance or obtain a new derogation for the period post expiry of the first 24 month group derogation. Failure to achieve compliance or obtain a new derogation within the 24 month group derogation period will result in non-compliance. EirGrid's recommendation on any new derogation request will be based on the assessment of each demand facility owner's compliance plan/derogation request submitted prior to expiry of the 24 month group derogation period. CRU will ultimately decide on any new derogation request.
5.	Implications of a breach of derogation conditions.	A breach of a derogation condition is a breach of Grid Code and EirGrid will consider the actions available to it.

EirGrid

Industry Feedback - EirGrid's Response

No.	Industry Feedback	EirGrid's Response
6.	Concerns have been expressed regarding the ability of non-data centre demand facilities to comply with MPID345	In the recent update to EirGrid's Compliance and Derogation Framework proposals, significant changes were made to proposals related to the treatment of non data centre demand facilities in recognition of the lower FRT risk to the power system that they present. These were a) removal of the proposed cap on non-data centre demand facilities and b) extension of the timeframe for submission of non-data centre demand facility compliance plans. However, a requirement remains for all demand facilities, data centres and non-data centres, to either achieve compliance or obtain a derogation. Derogation requests will be assessed in line with Grid Code processes taking into consideration the technical feasibility of potential solutions and the risk to / impact on the power system of solutions not being implemented.
7.	Some data centre owners have requested that EirGrid provide their proposed Demand Utilisation Threshold	EirGrid propose providing all data centre demand facility owners with an indicative demand utilisation threshold within the coming weeks.

5

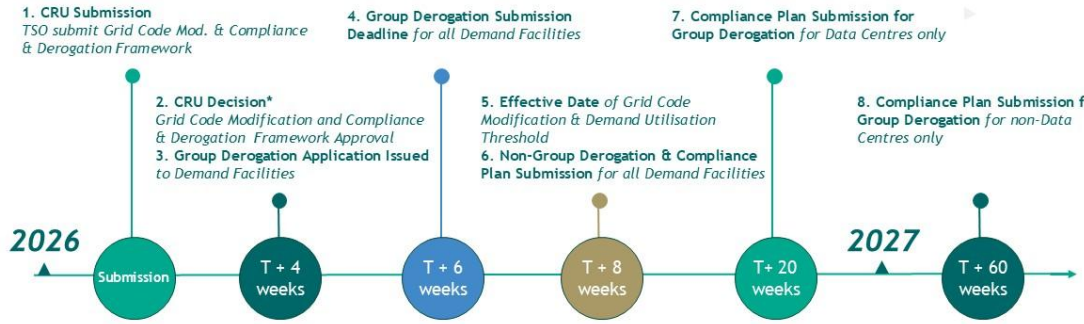
Next Steps

PROPOSAL

Proposed Timelines

Below is an illustration of the proposed timeline for the submission to CRU, CRU decision and, assuming approval, subsequent compliance and derogation framework milestones.

We also aim to issue indicative Demand Utilisation Thresholds to Data Centre Demand Facilities in the coming weeks.



Decision and subsequent timelines are CRU dependent.

Additional Key Milestones ~ 2027

9. **TSO Recommendation to CRU on Compliance Plans for Group Derogations and Non-Group Derogations**
10. **CRU Decision;**
    a) Compliance Plans for Group Derogation
    b) Non-Group Derogation Requests

PROPOSAL

EirGrid Submission to CRU

The EirGrid submission to CRU will consist of the following documents which will be published on the EirGrid Website at the time of submission:

Document	Description
MPID345 Grid Code Modification Proposal	Background to, and technical justification for the FRT/APR/RoCoF modification proposals. Includes industry feedback on the proposals, Grid Code Panel meeting minutes and webinar presentations.
MPID345 Compliance and Derogation Framework Proposal	Proposals for the compliance and derogation framework to support the implementation of the FRT/APR/RoCoF modification proposals. Includes industry feedback on the proposals and webinar presentations.
Fault Ride Through Overview Document	Plain English guide to the FRT issue.
Fault Ride Through (FRT) / Active Power Recovery (APR) Study Assessment Guide for Demand Facilities	FRT/APR compliance study guide.
Rate of Change of Frequency (RoCoF) Study Assessment Guide for Demand Facilities	RoCoF compliance study guide.

These are in addition to the Large Demand Facility Fault Ride Through Issue and Proposed Solutions Information Paper published in November 2025 Grid Code Modifications | The Grid Code | EirGrid

6

Q&A

Appendix B – further correspondence received from Grid Code Review Panel members:

Part 1 – letter from Tom Birney of Energy Storage Ireland:

EirGrid Grid Code Team
Emailed to: gridcode@Eirgrid.com

7th November 2025

Re: Large Demand Facility Fault Ride-Through Issue and Proposed Solutions – Information Paper

Dear Eirgrid,

I am writing this letter as the Energy Storage representative on the Eirgrid Grid Code Review Panel and also on behalf of Energy Storage Ireland (ESI), the representative body for the energy storage industry in Ireland & Northern Ireland.

We appreciate the opportunity to provide feedback in relation to the "Large Demand Facility Fault Ride-Through Issue and Proposed Solutions" information paper circulated to stakeholders on the 17th October 2025. It is very encouraging to see that the issue is being carefully considered.

While we can see merit in considering imposing additional grid code requirements on LEUs, we note that there is concern raised generally from LEUs in respect to mass non-compliance with the proposed requirements which will likely result in a high volume of derogations, particularly for existing LEUs. We do see opportunity to further consider and more comprehensively assess solving this issue via market led solutions. We acknowledge that this is considered in the information paper under "System Service and Grid Solutions", in particular in scenario 4 on page 12, however we believe that this scenario should be assessed more comprehensively with consideration for higher volumes of additional reserves and inertia and any other potential services (e.g. DRR) that might help alleviate the issue. We ask that the TSOs conduct a cost benefit analysis to determine the optimal solution.

Additionally, we also note that there have been recent changes imposed by the TSOs to limit the operational state of charge on operational energy storage units (e.g. >85%) which we understand was intended to reserve certain volumes of over frequency reserves in an attempt toresolve the issue identified in the information paper. This topic warrants careful consideration and consultation with industry to ensure there is no unintended impact to existing and future investment decisions. Furthermore, we believe a more appropriate way to tackle this issue is to incentivise energy storage to operate in a way that addresses and resolves system needs.

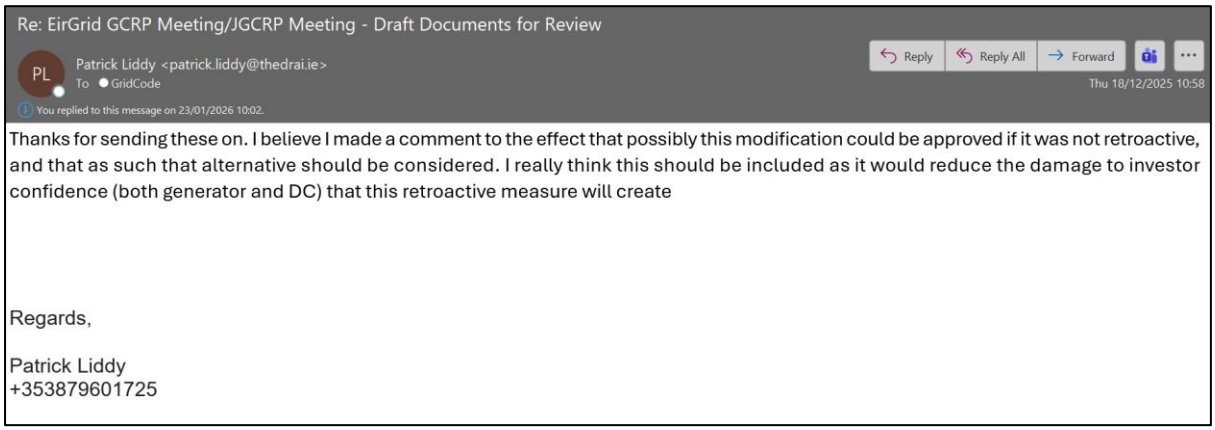
Regards,

Tom Birney

Tom Birney

(representing Energy Storage Ireland)

Part 2 – email from Patrick Liddy of DRAI:



Re: EirGrid GCRP Meeting/JGCRP Meeting - Draft Documents for Review

PL

Patrick Liddy <patrick.liddy@thedrai.ie>
To GridCode

Reply | Reply All | Forward

Thu 18/12/2025 10:58

You replied to this message on 23/01/2026 10:02.

Thanks for sending these on. I believe I made a comment to the effect that possibly this modification could be approved if it was not retroactive, and that as such that alternative should be considered. I really think this should be included as it would reduce the damage to investor confidence (both generator and DC) that this retroactive measure will create

Regards,

Patrick Liddy
+353879601725

Appendix C – Reference Documents:

1. Large Demand Facility Fault Ride Through Issue and Proposed Solutions Information Paper prepared by EirGrid and SONI
2. ENTSO-E Position on the need for national connection requirements to ensure EU power system stability