Grid Code Review Panel: 8th June, 2011

MPID 215: Changes to CC.7.3.1.1(h) Proposed by Fault Ride Through Working Group

Fault Ride Through Working Group (FRTWG)

Members (GCRP members or their nominees)

- Anne Trotter, Chairman (EirGrid)
- Arlene Chawke, Secretary (EirGrid)
- Jonathan O'Sullivan (EirGrid)
- Barry Sherry (Endesa Ireland Ltd)
- Martin Stronge (ESB Energy International)
- Jane McArdle (SSE Renewables)
- Gary Thompson (Bord Gáis Energy)
- Brendan Connolly (Bord na Mona Energy Ltd)
- Salim Temtem (EirGrid)
- Marta Val Escudero (EirGrid)

- The following attended some of the meetings:
  - Tom Egan(Edenderry Power Limited), Simon Swiatek (SSE Renewables), Andrew Halley (Transend, Australia - observer)
  - Alan Rogers, Simon Grimes, Mark Norton & Brian Malone (all EirGrid)

There were nine meetings of the FRTWG held between 16th June 2010 and 4th May 2011

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Terms of Reference of Working Group

Deliverables:

- Any changes to CC.7.3.1.1 with supporting documentation: history, technical justification, impacts
- Principles document regarding assessment of Grid Code Compliance Pre and Post Commissioning
- Information Provision: what data currently provided where and any additional information required by IPP at design stage
- International Best Practice Report
- EirGrid Paper on the apparent inconsistency in fault clearance times between the Grid Code and the Transmission Planning Criteria

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VOLTAGE DIP MAGNITUDE	Fault Ride-Through Times		
	400 kV System	220 kV System	110 kV System
95% (5% retained)	150 ms	150 ms	150 ms
50% (50% retained)	450 ms	450 ms	450 ms

*Apply over the full operating capabilities of the **Generation Unit at the Connection Point**

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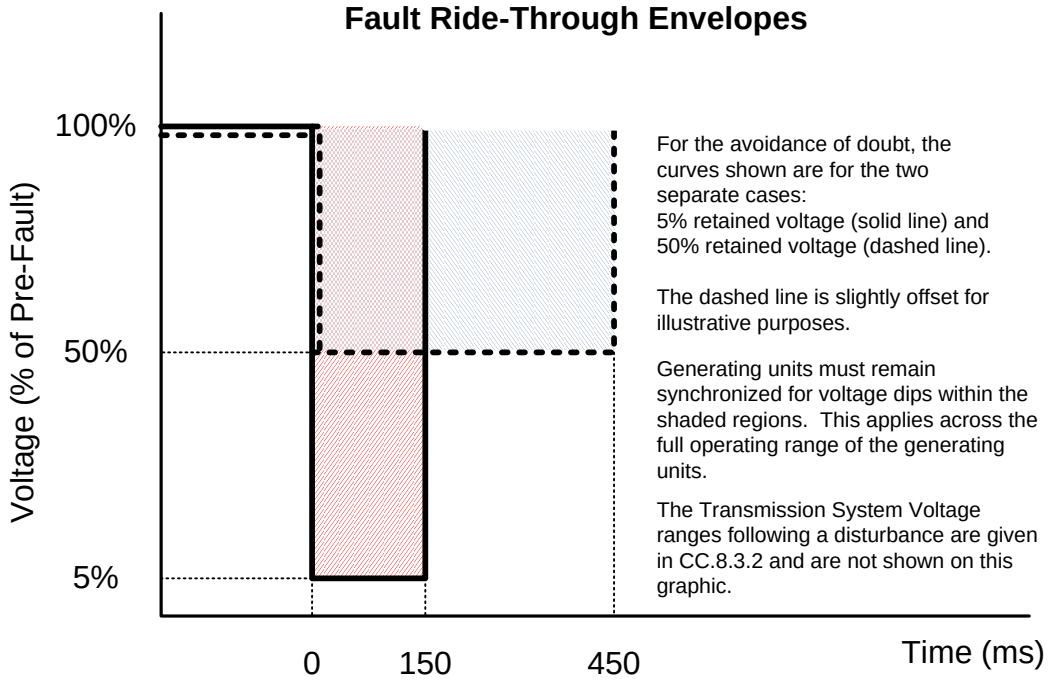

*Apply over the full operating capabilities of the **Generation Unit at the Connection Point.**

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Any changes to CC.7.3.1.1 with supporting documentation: history, technical justification, impacts

- The use of **Extraordinary Governor Response** and/or **Extraordinary AVR Response** to remain synchronised during and following a fault is prohibited unless specifically agreed with the **TSO**, such agreement not be unreasonably withheld

- **New Glossary Definitions**
  - Fault Disturbance
  - Extraordinary Governor Response
  - Extraordinary AVR Response
  - Critical Fault Clearance Time
  - Fault Ride-Through
  - Fault Ride-Through Time

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Principles document regarding assessment of Grid Code Compliance Pre and Post Commissioning

- **Pre Commissioning**
  - It is the responsibility of the Generator to ensure that the Generation Unit is Grid Code Compliant
  - Studies using the SMIB model are adequate for Generator self-assessment of FRT compliance
  - Transmission System nominal voltages as per CC.8.3.1 should be used as infinite bus voltage
  - As part of the connection offer process the TSO will perform transient stability studies to determine the dynamic impact of the Generation Unit on the Transmission System

- **During Commissioning**
  - As part of the commissioning process the Generator is obliged to demonstrate Grid Code Compliance (or seek derogation from Grid Code) by completion of a suite of tests, some of which will be witnessed by the TSO, and submitting the relevant data, which the TSO will review

- **Post Commissioning**
  - Ongoing Performance Monitoring as per OC10
  - Following refurbishment and / or adjustment of generator controls re-testing (and possibly modification to connection agreement) required
  - If a User finds that it is, or will be, unable to comply with any provision of the Grid Code, it is obliged, under section GC.9.1, to report such non compliance to the TSO and subject to the provisions of GC.9.2 make such reasonable efforts as are required to remedy such non compliance

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Information Provision: what data currently provided where and any additional information required by IPP at design stage

- Prior to submitting an application for connection the Generator should use the Transmission Forecast Statement to get indicative values of max / min fault levels
- As part of the Connection Offer Process the TSO will provide updated Minimum Fault Levels to Generators at the Connection Method Meeting
- The TSO can carry-out specific minimum fault-level studies for prospective Generators prior to submission of application for connection and payment of the relevant application fees. The scope of such studies would be agreed with the Customer and a nominal fee would be charged.

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International Best Practice Report

KEMA Scope of Work:

Desk-top review of other international Grid Codes, to ascertain the current standard in approaching FRT in other transmission networks. The report to include such aspects as:

- How the minimum standard was established i.e. what are the operating characteristics of the particular transmission network that led to the particular definition of FRT; has the value been changed and if so why
- Voltage levels and length of lines of comparison network
- Establish the differences, if any, in FRT requirements for interconnected systems and island networks;
- How other Grid Codes propose to deal with a high penetration of asynchronous generation expected through the proliferation of wind turbine generating systems;
- How other countries assess FRT for connection offers, at commissioning and for the lifetime of the Generation Unit;
- Have other countries changed FRT requirements because of increased penetration of wind generation and why?
- Reference Countries: Great Britain, Spain, Germany, Denmark, USA (ERCOT), Western Australia and New Zealand

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International Best Practice Report

- The reference countries all have a Grid Code
- Summary Tables comparing Ireland's Grid Code FRT Requirements with the seven reference countries were very interesting
- The FRT Requirement in Ireland's Grid Code requiring a conventional Generation Unit to remain synchronised for 200 ms during a 90% voltage is within the range of values seen in the Grid Codes of the reference countries
- There is a lack of evidence of Grid Code enforcement of the reference countries, with much reliance on self certification, so it is unclear whether the Generation Units in these countries actually comply with all of the provisions of their Grid Code

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EirGrid Paper on the apparent inconsistency in fault clearance times between the Grid Code and the Transmission Planning Criteria

- The TPC is the means of identifying the need for statutory investment in the transmission system while considering a cost, reliability and efficiency balance
- The GC outlines the day-to-day rules for the operation of the transmission system and all aspects relating to the use of connected Plant (and/or Apparatus) and the necessary capabilities that the Plant (and/or apparatus) must provide
- The GC and the TPC are designed for distinct and different purposes

Therefore it is appropriate that the GC and the TPC have different standards with respect to FRT

- In EirGrid's opinion if the network was planned to cover all operational situations i.e. to the GC standard, this would lead to unnecessary and unjustifiable infrastructure
- If the GC FRT standard was set to that of the TPC in the event a protection relay did not operate correctly there is a potential to cause a cascade failure
- In EirGrid's opinion the stability of the power system could be materially compromised if generation is designed to a FRT of primary protection time

Therefore given the resulting impacts above, it is not appropriate that the TPC and the GC FRT clauses are the same.

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Unanimous Recommendation to GCRP
All Deliverables Agreed by FRTWG


EIRGRID