

**SONI Limited**  
**Rate of Change of Frequency Modifications**  
**Grid Code Amendments Consultation Paper**

**17 October 2012**

**1. Introduction**

- 1.1 Following the discussions in the DS3 Joint Grid Code Working Group and the DS3 Joint Grid Code Working Group Position Paper, subsequently published in September 2012, relating to changes to the Rate of Change of Frequency (RoCoF) levels needed to manage the future operation of the All-Island Power System, and following the discussions held at the Joint Grid Code Review on 3 October 2012 in Belfast including a discussion about the RoCoF Modification Proposal – TSOs’ Recommendations and at the Grid Code Review Panel on 3 October 2012 in Belfast, SONI has prepared drafts of certain sections of the SONI Grid Code with proposed amendments to cover the issues raised regarding the RoCoF modifications.
- 1.2 The proposed amended texts of the Grid Code, with both clean and redlined versions of each relevant section showing all the changes made to the existing version of the Grid Code, can be found in the “Grid Code Drafts” section of SONI’s website. This consultation paper sets out a high-level summary of the proposed changes to the SONI Grid Code and SONI seeks comments from Users on any aspect of the proposed amendments.
- 1.3 Section 2 of this paper provides background information and a general overview of the proposed changes. Section 3 provides a detailed overview of the proposed changes. As explained in paragraph 4.1, the deadline for submission of comments is close of business on 15 November 2012.

**2. Background and overview**

- 2.1 SONI, as the Transmission System Operator (TSO) in Northern Ireland, is responsible for the operation of the Northern Ireland Transmission network in a secure, safe and reliable manner.
- 2.2 The Facilitation of Renewables (FOR) study, published in 2010, was a detailed technical study that considered levels of non-synchronous generation (wind and HVDC imports) up to 100% of system demand. The study has shown that during times of high wind generation following the loss of the single largest credible contingency, RoCoF values of greater than 0.5 Hz/s could be experienced on the island power system and RoCoF values in excess of 2 Hz/s could be experienced in Northern Ireland if system separation were to occur on the island. Simulations show that for a voltage dip induced power imbalance in a system with significant volumes of wind farms, RoCoF values far in excess of 2Hz/s can occur.
- 2.3 Accordingly, the main outcome of the FOR study was that wind levels (Non-Synchronous generation) of up to about 75% of demand could be accommodated, but a series of mitigation measures would have to be carried out. One of the main mitigation measures was the need to address the issue of RoCoF. This issue is the current binding limitation on operating the power system past a system non-synchronous penetration (SNSP) of 50%.
- 2.4 At present the SONI Grid Code does not define RoCoF or identify the required RoCoF capability. Historically, SONI set out in a Minimum Function Specification with a RoCoF requirement at the connection offer stage. The increasing penetration of wind generation and the

outcome of the FOR study, make it necessary for SONI to take measures to address RoCoF issues.

- 2.5 The current position in relation to RoCoF levels that may be needed to be managed in the future operation of the All-Island Power System is set out in the DS3 Joint Grid Code Working Group Position Paper. Further, based on the information understood as at 4 September 2012, SONI and EirGrid have published RoCoF Modification Proposal – TSOs’ Recommendations paper setting out the background and contextual information as well as their recommendations for modifications to the SONI and EirGrid Grid Codes which SONI and EirGrid believe are a necessary first step in enabling the SONI and EirGrid to operate the system with higher levels of Non-Synchronous generation in their respective areas and which would assist Northern Ireland and Ireland with achieving their renewable energy targets.
- 2.6 As set out in the proposed Grid Code modifications, SONI will complete certain technical analysis during the connection process to assess the transient stability of new and amended connections to the NI Transmission System in accordance with the methodology described in the Northern Ireland Security and Planning Standards. These studies will aim to identify the required fault ride through capability without operating the User’s Plant and Apparatus beyond its safe operating range. The results of this analysis will be provided to the User to inform the necessary protection requirements for the connection. For the avoidance of doubt, the adequacy of protection equipment installed by the User for protecting the User’s Plant and Apparatus against transmission system disturbances is for the User to determine.

### 3. Section by section review

#### 3.1 Introduction

The main modifications to the Grid Code are the addition of a new definition of, and descriptions of the Rate of Change Frequency. This is to clarify how Rate of Change and Frequency and standards relating to it are treated within the Grid Code.

#### 3.2 Glossary

An addition is proposed in the Glossary section to include a definition for Rate of Change of Frequency, which will be as measured at the **User’s Connection Point** over a specified time period, as set out in CC.5.3.3 of the Connection Conditions.

#### 3.3 Connection Conditions

Several changes are proposed to the Connection Conditions as the new Rate of Change of Frequency standard applies to all types of generation. Accordingly this new defined term has been used in the Connection Conditions as proposed to be amended.

- 3.3.1 In CC5.3 (*Frequency Variations*), new connection conditions are added at CC5.3.3 and CC5.3.4 to introduce a new fault through requirement for both transmission and distribution system connected generation as measured over a 500ms period. A small change has also been made to CC5.3.2 to note that the Electricity Supply Regulations (N.I.) 1991 may be amended, updated or superseded.
- 3.3.2 The reference at CC8.8.4(b) (*Variations in System Frequency*) is deleted because the new Rate of Change of Frequency standard exceeds 0.5Hz/s.
- 3.3.3 Insertion of a new condition CC.S1.1.5.6 (*Generating Unit Control Arrangements*) is proposed to allow the **TSO** to require, in accordance with the methodology described

in the NI Security and Planning Standards, the completion of technical analysis to identify the fault ride performance with which the relevant **Generating Unit** would be required to comply.

- 3.3.4 A new CC.S1.2.4.4 (*Generating Unit Control Arrangements*) is proposed which would allow the **TSO** to require, in accordance with the methodology described in the NI Security and Planning Standards, for certain technical analysis to be completed as part of the connection process. This analysis would be to identify the fault ride performance with which the relevant **Generating Unit** would be required to comply and the scope of this analysis will be agreed in conjunction with the **DNO**.
- 3.3.5 As small change is made to CC.S2.1.9.2 (b) (*Automatic Load Shedding Devices*) to use the defined term of Rate of Change of Frequency.
- 3.3.6 Minor tidying amendments are made at CC.S1.2.1(d) and CC.S2.2.1(e) to note that Engineering Recommendation G59/1/NI may be amended, updated or superseded.

#### **4. Next Steps**

- 4.1 The consultation period will run for 4 weeks. Users are invited to send their comments to SONI **by close of business on 15 November 2012**. In the meantime, should any Users have any queries or require a meeting with SONI, they should contact Brendan Woods at SONI (Email: [Brendan.Woods@soni.ltd.uk](mailto:Brendan.Woods@soni.ltd.uk) Phone: 028 90 707542).
- 4.2 Following receipt of comments from those whom it has consulted by this Consultation Paper and the expiration of the period for making comments, SONI will, in accordance with paragraph 2 of Condition 16 of its Licence, send to the Northern Ireland Authority for Utility Regulation (the "Authority"):
  - 4.2.1 a report on the outcome of its review;
  - 4.2.2 the proposed revisions to the Grid Code which SONI (having regard to the outcome of such review) reasonably thinks fit for the achievement of the objectives of the Grid Code referred to in paragraph 1(b) and (c) of Condition 16 of the SONI Licence; and
  - 4.2.3 any written representations or objections from electricity undertakings or the Republic of Ireland System Operator (including any proposals by such persons for revisions to the Grid Code not accepted by SONI in the course of the review) arising during the consultation process and subsequently maintained.
- 4.3 Following the end of the consultation period and the discussions to be held with the Authority, revisions to the Grid Code will be finalised and published on the SONI website once approval has been received from the Authority.

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