SONI Limited

WFPS Settings Schedule

Grid Code Amendments Consultation Paper

16 July 2012

1. Introduction

1.1 The purpose of this consultation paper is to obtain views on the proposed draft of the updated WFPS Settings Schedule for connecting Wind Farm Power Stations ("**WFPSs**") to the transmission system or the distribution system in Northern Ireland. This consultation paper follows on from discussions held at the Grid Code Review Panel on 13 October 2011 at the Grand Canal Dublin, on 23 February 2012 at the Radisson Blu Belfast and on 24 May 2012 at the Clarion Hotel Dublin and a workshop on 27 March 2012 in Belfast, SONI.

1.2 The proposals provide further detail on the testing and signalling criteria for WFPS developers for the purpose of publishing an updated version of the WFPS Settings Schedule, as defined in the Grid Code, for Northern Ireland and thus provide greater clarity for Users of the requirements which they will be expected to meet when connecting to the Northern Ireland transmission or distribution system. The proposed amended text of the WFPS Settings Schedule is attached to this consultation paper and can also be found in the "Grid Code Drafts" section of SONI's website.

1.3 The draft WFPS Settings Schedule attached to this consultation paper has been updated as a result of discussions referred to above and the workshop held on 27 March 2012.

1.4 As described in section 2 below, the current WFPS Settings Schedule is deemed to be part of the Grid Code Connection Conditions and sets out certain technical criteria in respect of Connection Conditions that Generators connecting a WFPS to the NI System are required to comply with. These include Settings in respect of (a) start-up and ramp rates; (b) ramp frequency controller; (c) WFPS control arrangements; (d) constrained operating mode; (e) telemetry and control; and (f) WFPS SCADA signals required from either the WFPS or from SONI.

1.5 The updated WFPS Settings Schedule (as outlined in section 5 below) continues to be part of the Grid Code. The updated WFPS Settings Schedule expands the technical criteria for these Settings and details how the tests in respect of these Settings and the additional criteria added in the updated WFPS Settings Schedule would be conducted. The updated WFPS Settings Schedule also provides further details and thus clarity of requirements on a WFPS in the context of its participation in the SEM and sets out further requirements that SONI and NIE require in order to understand the overall impact of the WFPS on the NI System. To clarify the areas of overlap between the Grid Code Connection Conditions and the requirements in the WFPS Settings Schedule, as well as to address the requirement to provide SONI with modelling data, certain changes have also been proposed to the Grid Code. These modifications are described in section 4 of this consultation paper and 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.

1.6 As the number of WFPSs connecting to the NI System increases in the coming years, these compliance Settings and the information requested in the updated WFPS Settings Schedule

will become increasingly important for SONI to manage the transmission system in Northern Ireland as required by its System Operator Licence.

1.7 To date, the discussions regarding the WFPS Settings Schedule have been primarily in respect of onshore wind farms connecting to the distribution system in NI. Accordingly the updated WFPS Settings Schedule has been amended to take into consideration the issues that apply to onshore WFPSs. As the offshore wind industry develops in Northern Ireland, it is anticipated that offshore WFPSs will become connected to the NI System at a later date. Although some issues would apply to all types of WFPSs, SONI would wish to understand issues particular to offshore WFPSs as this sector develops and to review the Grid Code and the WFPS Settings Schedule in light of such discussions and carry out further consultations at such time, as necessary. Accordingly, the requirements of the WFPS Settings Schedule would apply to onshore WFPSs after the date that the updated WFPS Settings Schedule comes into effect.

1.8 This consultation paper sets out how the WFPS Settings Schedule would operate and how the WFPS Settings Schedule would fit within the Grid Code, as amended. It also details how the WFPS Settings Schedule would be applied in relation to the Distribution Code. The latter is set out here for information only and NIE will carry out a separate consultation in respect of amendments to the Distribution Code. Section 2 of this consultation paper provides background information to the WFPS Settings Schedule and how SONI would apply the provisions of the WFPS Settings Schedule once the revised document comes into effect. Section 3 explains the proposed roles of SONI and NIE and how Users would have clarity on the respective roles that NIE and SONI would perform and the rights and responsibilities of SONI and NIE under the WFPS Settings Schedule. Section 4 sets out the proposed amendments to several sections of the Grid Code proposed to clarify the language of the Grid Code in connection with the proposed amendments to the WFPS Settings Schedule. Section 5 provides an overview of how the WFPS Settings Schedule is to be structured and section 6 sets out the next steps. As explained in paragraph 6.1, the deadline for submission of comments is close of business on 28 August 2012.

1.9 Terms used in this consultation paper shall have the same meaning as defined in the SONI Grid Code unless otherwise stated.

2. Background to the WFPS Settings Schedule

SONI and the Grid Code

2.1 SONI, as the Transmission System Operator (TSO) in Northern Ireland, is responsible for the operation of the Northern Ireland Transmission network. Pursuant to condition 16(1) of its System Operator's licence, SONI is obliged to implement and comply with a Grid Code which is, in respect of the transmission system, designed "to permit the development, maintenance and operation of an efficient, co-ordinated and economical system for the transmission of electricity in Northern Ireland and to "facilitate the transmission system being made available to persons authorised to supply or generate electricity in Northern Ireland on terms which neither prevent nor restrict competition in the supply or generation of electricity on the Island of Ireland".

2.2 The Grid Code provisions specify, amongst other things, the requirements that apply to generators wishing to connect to the NI System such as technical capabilities and the provision of certain planning data. This allows SONI to ensure that it operates the Transmission System in line with its Transmission Licence obligations.

2.3 The Grid Code contains Connection Conditions which specify the minimum technical, design and operational criteria which must be complied with by a WFPS connected to or seeking

connection to the transmission or distribution systems. Pursuant to CC.S2.1.1 of the Grid Code, WFPSs connected to the transmission system, must meet the "Technical Design and Operational Criteria" set out in Schedule 2. CC.S2.2.1 sets out mirror requirements in respect of WFPSs connected to the distribution system.

WFPS Settings Schedule within the Grid Code

2.4 The WFPS Settings Schedule is defined in the Grid Code as "the document of that name setting out in accordance with CC.7.2 certain technical criteria that Generators must comply with in respect of their Wind Farm Power Stations." These technical criteria are set out in CC7, CC8 and Schedule 2 to CC7. Pursuant to CC.7.2, the WFPS Settings Schedule is deemed to form part of the Grid Code Connection Conditions.

2.5 According to CC7.3, in the event of any inconsistency between the provisions of CC8 (*Technical Criteria*) and the WFPS Settings Schedule, the provisions of the WFPS Settings Schedule shall prevail.

2.6 SONI has proposed to amend and update the WFPS Settings Schedule for reasons set out below. As part of the proposed changes, SONI has also proposed to make the modifications to the Grid Code described in section 4 of this consultation paper in order to align the requirements of the Grid Code with the requirements that would be set out in the updated WFPS Settings Schedule and has proposed to make certain changes to both CC7.2 and CC7.3.

Updating the WFPS Settings Schedule

2.7 SONI's current WFPS Settings Schedule is dated 15 March 2006 (and was marked due to be reviewed on 15 March 2008). In March 2011 SONI consulted with interested parties in the consultation paper entitled "Guidance notes for WFPS Developers". Subsequently, SONI published its response paper in October 2011 ("**Response Paper**"). At that time the reference to "Guidance notes for WFPS Developers" was renamed to "WFPS Settings Schedule" so as to situate the document within the Grid Code more clearly. In light of the discussions with the interested parties and in view of the anticipated impact arising out of an increase in WFPSs connecting to the NI System, SONI has revised the current WFPS Settings Schedule (as discussed below) so as to provide greater clarity for the Users.

2.8 *Consistency and transparency of the connection process:* To date there are over 25 onshore wind farms connected to either the distribution or the transmission system in Northern Ireland. SONI expects an additional ~100MW of electricity to be connected to the distribution or transmission system that is generated by onshore wind farms by 2015. Historically, SONI has liaised with connecting WFPS on a case by case basis to assess that WFPS's compliance with the Grid Code. With the increasing number of WFPSs connecting to the NI System and in the interests of ensuring consistency and transparency of the connection process for WFPSs, SONI has prepared a more detailed WFPS Settings Schedule which is more appropriate for the current circumstances and which serves to better enable SONI to carry out its obligation under its System Operator's licence in light of the anticipated circumstances in Northern Ireland.

2.9 *Single Electricity Market:* Any WFPS with maximum export capacity equal to or greater than 10MW is required to participate in the Single Electricity Market (SEM), which has been operating on the island of Ireland since 1 November 2007 and comply with the requirements set out in the Trading and Settlement Code (TSC). Similarly, a WFPS with maximum export capacity below 10MW may voluntarily take part in the SEM. The updated WFPS Settings Schedule takes into account the operation of the SEM and provides clarity of tests SONI would expect a WFPS to complete in order to obtain the certificate needed prior to the WFPS being classified as a Variable Price Taker (see paragraph 4.15 below).

2.10 *Priority dispatch policy*: The decision paper, "Principles of Dispatch and the Design of the Market Schedule in the Trading and Settlement Code", published by the SEM Committee on 26 August 2011 emphasises that the TSOs (i.e. SONI and EirGrid) should continue to "adhere to an absolute interpretation of priority dispatch whereby economic factors are only taken account of in exceptional situations". On 5 March 2012 SONI has published a categorisation policy on wind farm controllability[1] setting out its policies on priority dispatch and controllability. It is important for SONI to apply its policies on priority dispatch in a transparent and consistent manner and therefore SONI requires certain information to understand the controllability of a given WFPS. Accordingly, the testing set out in the WFPS Settings Schedule would provide information to SONI which would enable it to better manage dispatch of WFPSs based on factors including reserve and security constraints.

To whom the updated WFPS Settings Schedule would apply

2.11 Pursuant to CC3.1, the Connection Conditions apply to SONI as the TSO and to Users which includes "Generators with respect to Generating Units[2] connected to or seeking a connection to the Transmission System and with respect to CDGUs and Controllable WFPSs[3] connected to or seeking a connection to the Distribution System." The Connection Conditions Schedule 2 (CC.S2.1.1(c) and CC.S2.2.1 (c)) states that the WFPS Settings Schedule applies only to Controllable WFPSs or Dispatchable WFPSs.

2.12 The definitions of Controllable WFPS or Dispatchable WFPS mean that the requirements in the WFPS Settings Schedule would not apply to a WFPS first connected to the transmission or the distribution system before 1 April 2005 and whose wind turbines comprise a Registered Capacity of 5 MW or more, unless that WFPS is subject to "material modification" If a material modification is made, the WFPS would become treated as a Controllable WFPS or Dispatchable WFPS and expected to comply with the requirements of the Grid Code.

2.13 The requirements of the Grid Code would continue to apply to Users. Where the Grid Code regulates a WFPS to which the Grid Code applies, the updated testing and signalling criteria in the proposed WFPS Settings Schedule would apply to such WFPS. As mentioned above, provisions specifically applicable to offshore wind farms shall be prepared by SONI and consulted on at a later date.

3. The roles of SONI and NIE in respect of the WFPS Settings Schedule

3.1 The distribution network in Northern Ireland is operated by NIE and the processes of connecting to the distribution network are set out in NIE's Distribution Code.

3.2 This section sets out how the various testing criteria set out in the proposed WFPS Settings Schedule would be carried out by NIE and SONI, and sets out how obligations in the WFPS Settings Schedule would be situated in respect of the Grid Code and the Distribution Code. Any proposals included in this section in respect of the role of NIE and the treatment of the WFPS Settings Schedule under the Distribution Code is for information only. Any amendments to the Distribution Code would be consulted on by NIE in a separate consultation and implemented in line with NIE's licence obligations.

[1] http://www.soni.ltd.uk/upload/Wind%20Farm%20Controllability%20Categorisation%20Policy.pdf
[2] Defined as "... a wind turbine generator within a Wind Farm Power Station, together with all Plant and Apparatus (including any step-up transformer) which relates exclusively to the operation of that wind turbine generator."
[3] Defined as "A WFPS first connected to the NI System on or after 1 April 2005 whose wind turbines comprise a Registered Capacity of 5 MW or more".

NIE and the WFPS Settings Schedule

3.3 In order to ensure the efficient workings of the transmission system and the distribution system, each of SONI and NIE is interested in establishing an effective process to manage crucial interactions and data exchange and to ensure through a series of compliance testing and reporting procedures that the WFPS is able to comply with the requirements under SONI's Grid Code and NIE's Distribution Code, as applicable.

3.4 There are obligations similar to those in the Grid Code in respect of WFPSs in the Distribution Code – for example, in Appendix A to the Planning Code of the Distribution Code. There are also connection conditions in the Distribution Code. Connection Condition section 7.9.2 of the Distribution Code requires that in respect of Generating Unit control arrangements, WFPSs with "an Output of 5MW or more first connected on or after 1 November 2007 ...must be fitted with a fast acting control system capable of being switched between Voltage Control mode and power factor control mode within a voltage band as specified within the Connection Agreement for the particular site..." In the Distribution Code a Dispatchable WFPS is "a Controllable WFPS which is dispatched via an Electronic Interface by the TSO" and "a WFPS first connected to the Distribution System on or after 1 April 2005 whose wind turbines comprise a Registered Capacity of 5MW or more".

3.5 As discussed in paragraphs 5.19 through 5.23 of this consultation paper, the compliance tests proposed in the WFPS Settings Schedule include tests which would be carried out by SONI, by NIE, and by both SONI and NIE. Accordingly, NIE shall have responsibility for ensuring that these test the WFPS's ability to comply with the Distribution Code and Grid Code requirements and SONI and NIE would work together with the Users in respect of the various tests set out in the proposed WFPS Settings Schedule to achieve compliance with the relevant parts of the Distribution Code and the Grid Code.

NIE's Distribution Code and the WFPS Settings Schedule

3.6 At present, the Distribution Code does not include a definition of a WFPS Settings Schedule. Without the inclusion of a WFPS Settings Schedule concept in the Distribution Code no link exists at present to connect the tests and criteria set out in the WFPS Settings Schedule to the provisions of the Distribution Code. Thus while Distribution Code Connection Condition section 7.9.2 requires for the WFPS to be fitted with Voltage Control specific equipment, the Distribution Code does not at present provide for any additional technical criteria to be set out in a separate document such as the WFPS Settings Schedule. Subject to further discussions with NIE, a modification may be needed to introduce the concept of the WFPS Settings Schedule in the Distribution Code and SONI is working with NIE to co-ordinate this.

Amendments to WFPS Settings Schedule

3.7 The WFPS Settings Schedule forms part of the Grid Code. Any changes to the WFPS Settings Schedule would, as at present, continue to be made by SONI in accordance with its Grid Code modification procedures. In addition, SONI would propose the parts of the WFPS Settings Schedule which are the responsibility of NIE also form part of NIE's WFPS Settings Schedule (as discussed at paragraph 3.5 above).

3.8 There are provisions in the WFPS Settings Schedule relating to testing where both SONI and NIE or just NIE would have primary responsibility for carrying these out. Where it is proposed that NIE carries out the tests or other activities, SONI and NIE would work together by means of the Commissioning/Acceptance Panel and where necessary, any modification to the Grid Code and the Distribution Code would, in so far as possible, also be made in parallel so that WFPSs would be required to follow just one process in respect of both SONI and NIE requirements.

4. Proposed changes to the Grid Code

4.1 In view of the changes being put forward to the WFPS Settings Schedule, SONI has proposed certain modifications to the Grid Code to more closely align the requirements in the WFPS Settings Schedule and the requirements of the Grid Code and to clarify the Connection Conditions that would apply to WFPSs.

4.2 Section by Section Review:

Glossary

4.3 Additions have been proposed to the Glossary section to include definitions for Active Power Control Set-Point Ramp Rate, Fast Acting, Frequency Response Ramp Rate, and Normal Wind Following Ramp Rate.

4.3.1 **Active Power Control Set-Point Ramp Rate:** the definition has been added to clarify the maximum rate of increase or decrease of Output of a WFPS which a Generator would calculate in response to an Active Power Dispatch Instruction sent by the TSO via SCADA based on the change in Active Power required and the curtailment time interval set point.

4.3.2 **Fast Acting**: this definition has been added to set out what SONI would consider to be "fast acting" in relation to Frequency Control and Voltage Control response.

4.3.3 **Frequency Response Ramp Rate:** the definition has been added to clarify the maximum rate of increase or decrease of Output of a WFPS when providing Frequency Control.

4.3.4 **Normal Wind Following Ramp Rate:** the definition has been added to clarify the maximum rate of increase or decrease of Output of a WFPS in response to an increase in wind speed or removal of any SONI action via SCADA which limits Output of the WFPS.

Planning Code

4.4 Additions to Appendix A (*Planning Data Requirements For Users (Other than the DNO) Connected to the Transmission System only*) and Appendix B (*Planning Data Requirements for Users Connected to the Distribution System*) of the Planning Code is proposed as a new PC.A2.1.4 and a new PC.B2.1.3 to reflect the requirement for Generators to supply dynamic models that are representative of the WFPS at the Connection Point. These additions would be used for System planning purposes and are not intended to constrain any Ancillary Service agreements.

Connection Conditions

4.5 SONI has proposed certain modifications to align the Grid Code with the WFPS Settings Schedule with regards to the technical criteria (CC7). Criteria modified are: reactive capability; frequency; ramp rates; fault ride through capability, and the compliance certification process.

4.6 CC7.2: words "Connection Conditions" would be deleted to situate the WFPS Settings Schedule in the Grid Code as a whole and not just as part of the Grid Code Connection Conditions. This is to take into account the changes proposed to the Planning Code.

4.7 CC7.3 is amended to clarify that the technical criteria in relation to communications, control and telemetry that Generators must comply with in respect of their WFPSs, as set out in both the Grid Code and the WFPS Settings Schedule. As part of the change, the wording about inconsistencies with CC8 has been removed.

4.8 Corresponding changes to technical criteria requirements are also made in Connection Conditions Schedule 2 both in Part I (*Technical Criteria for WFPSs Connected to the Transmission System*) and in Part II (*Technical Criteria for WFPSs Connected to the Distribution System*).

4.9 The following modifications are proposed for WFPSs Connected to the Transmission System:

4.9.1 CC.S2.1.3.2: has been amended to explain that there are three Voltage Control modes and that a WFPS would be required to continuously control voltage at the Connection Point within its Reactive Power capability limits within the voltage limits specified under CC.5.4. The definition of "minimum reactive capability" and "reactive capability" is proposed by reference to the graph included at CC.S2.1.3.2 and stipulates that the WFPS must be capable of exporting or importing Mvars within the envelope ABCD on the graph and be capable of responding to variations in the voltage of the NI System in accordance with CC5.4.

4.9.2 CC.S2.1.3.6:

(a) CC.S2.1.3.6 (b): minor change is made to replace references to "wind turbines" with "Generating Unit" to align the requirements with defined terms of the Grid Code.

(b) CC.S2.1.3.6 (c): the first sentence has been removed as this requirement is now addressed separately. The speed of response of the WFPS control system is proposed to be amended from within 1 second to within 500ms of the voltage recovery to the normal range.

(c) CC.S2.1.3.6 (f): a new criterion is proposed to set out the voltage range with which each WFPS is required to be capable of satisfactory operation and the time for achieving such a range. Generator and SONI may agree other voltage thresholds.

4.9.3 CC.S2.1.3.7 (*Start-Up and Ramp Rates*) is proposed to be amended as follows:

(a) CC.S2.1.3.7 (a): sets out the requirement for a WFPS control system to be capable of controlling the ramp rate of its Output. This would be in accordance with the three ramp rate capabilities stipulated. The modification also clarifies the order of priority according to which a WFPS would be required to operate.

(b) CC.S2.1.3.7 (b): the references to ramping have been replaced with references to increases in Output and the range within which the ramp Frequency controller should be capable of being set has been modified to be 50.0 Hz to 52.0 Hz in steps of 0.1 Hz (the current position is: 50.2 Hz to 52.0 Hz).

(c) CC.S2.1.3.7 (d): The requirements for updating SONI in respect of exceed wind speeds has been removed and the process for sending a SCADA signal in respect of increasing/decreasing Output has been set out in further detail.

(d) CC.S2.1.3.7 (e): a new criterion has been added to specify that upon removal of an Active Power Dispatch Instruction sent by the TSO via SCADA when the WFPS is operating in an Active Power control mode and under normal operational conditions, the WFPS would be required to ramp at the Normal Wind Following Ramp Rate.

(e) CC.S2.1.3.7 (f): the circumstances in which the ramp rates requirements would not need to be met have been amended to delete existing CC.S2.1.3.7 (e)(ii) to apply just where wind speeds exceed the rate required to control the Output to be within the ramp rate.

(f) CC.S2.1.3.7 (g): an addition has been made to specify that in the absence of a **TSO Dispatch Instruction**, each **Generating Unit** comprising a **Controllable WFPS** or **Dispatchable WFPS** would be required to operate as per the power curve submitted to SONI and remain connected to the **NI System** between the **Generating Unit** cut-in speed and cut-out speed.

4.9.4 CC.S2.1.5 (*WFPS Control Arrangements*):

(a) CC.S2.1.5.2 (a): has been modified to situate the definition of "Fast Acting" as set out in the WFPS Settings Schedule within CC.S2.1.5 and clarify that the droop control should be set independently. Further, clarifying language has been added to specify that in responding to **Frequency** excursions on the **System**, the change in **Active Power Output** of the **Controllable WFPS** or **Dispatchable WFPS** should be at the **Frequency Response Ramp Rate.**

(b) CC.S2.1.5.2 (b): has been modified to provide that SONI may require a **Controllable WFPS** or a **Dispatchable WFPS** to operate below its maximum instantaneous **Output** on a droop setting to be set in the range 2% to 20% and that this would be providing some of the **System** reserve

(c) CC.S2.1.5.3: changes have been proposed to situate the definition of "Fast Acting" as set out in the WFPS Settings Schedule within CC.S2.1.5.3 (a) and set out the requirements on a **Controllable WFPS** or a **Dispatchable WFPS** in respect of voltage, power factor or the **Reactive Power** output at the Connection Point. Further, the modification specify that a WFPS would be required to continuously control voltage at the **Connection Point** within its **Reactive Power** capability limits. Minor changes are made to CC.S2.1.5.3 (b) and CC.S2.1.5.3 (c) to replace references to "wind turbines" with Generating Unit to align the requirements with defined terms of the Grid Code.

4.9.5 CC.S2.1.10 (Additional information) has been amended mainly to provide for three types of compliance certificates: a temporary certificate and then either a restricted or a final certificate. These changes are reflected in CC.S2.1.10.1 and CC.S2.1.10.2.

4.10 The modifications proposed for WFPSs Connected to the Transmission System are intended to apply the same requirements to the Distribution connected WFPSs:

4.10.1 CC.S2.2.3.3 modifications would be to replace references to "wind turbines" with Generating Unit to align the requirements with defined terms of the Grid Code and to amend the speed of response of the WFPS control system from within 1 second to within 500ms of the voltage recovery to the normal range. A new CC.S2.2.3.3 (d) is proposed to set out the voltage range within which each WFPS is required to be

capable of satisfactory operation and the time for achieving such a range. Generator and SONI may agree other voltage thresholds.

4.10.2 CC.S2.2.3.4 (*Start-Up and Ramp Rates*): these changes mirror the changes made to CC.S2.1.3.7 and would apply to **Distribution System** connected **Generating Units**.

4.10.3 CC.S2.2.5 (*WFPS Control Arrangements*) these changes mirror the changes made to CC.S2.1.5 and would apply to **Distribution System** connected **Generating Units**.

4.10.4 CC.S2.2.7 (*Additional information*) as with CC.S2.1.10, for the **Distribution System** connected **Generating Units** the modifications provide for three types of compliance certificates: a temporary certificate and then either a restricted or a final certificate. These changes are reflected in CC.S2.2.7.1 and CC.S2.2.7.2.

5. Outline of the WFPS Settings Schedule

5.1 The WFPS Settings Schedule is comprised of seven sections with section 6 and 7 setting out the compliance procedures and tests that a WFPS connecting to either the transmission or distribution system in Northern Ireland will be required to meet as part of the connection conditions under the Grid Code and NIE's Distribution Code, as applicable. This section sets out an outline of the overall scope of the updated WFPS Settings Schedule and how it would fit within the requirements of the Grid Code. It is not a summary of the provisions and consultees are encouraged to review the proposed WFPS Settings Schedule and raise any specific issues with SONI as per paragraph 6.1 of this consultation paper.

5.2 SONI has previously consulted (March 2011) on the testing procedure which a WFPS connecting to either the transmission or distribution system would be expected to follow in order to be granted a full Grid Code Compliance Certificate pursuant to CC.S2.1.10.2 and CC.S2.2.7.2 of the Grid Code. The responses to the March 2011 consultation had sought more details on each step of the testing procedure. In light of these responses and in anticipation of increasing number of WFPSs connecting to the NI System, the updated WFPS Settings Schedule (Sections 5 through 7) includes certain further technical criteria both for WFPSs connecting to the transmission system as well as the distribution system. This includes technical criteria in respect of modelling and availability testing.

Sections 3 and 4: Initial Studies and Bilateral Agreement

5.3 Section 3 of the WFPS Settings Schedule notes that SONI and, where relevant, NIE, will carry out initial modelling and simulation studies that replicate the effect of connecting the WFPS to the transmission or distribution systems and to ensure that the new network additions or modifications would not result in unacceptable or unstable conditions on the transmission and distribution system. The WFPS would also enter into certain bilateral agreements, as set out in Section 4 of the WFPS Settings Schedule such as: a) a connection agreement; and either b) a Transmission Use of System Agreement, or a Grid Code Compliance Agreement.

5.4 As noted in Section 3, costs that are attributable to a WFPS would be met by the WFPS as part of the connection charges under the terms of the connection offer with SONI (and, respectively, for the Distribution Code, by NIE). Depending on the tests carried out, the costs associated with modelling and testing set out in the WFPS Settings Schedule would be met through SONI's or NIE's connection offer charges, as applicable.

Section 5: Modelling & Compliance Simulation Studies

5.5 There are currently control related requirements in the Grid Code Pursuant to CC.S2.1.2, "each connection between a WFPS and the Transmission System unless specified otherwise in the Connection Agreement must be controlled by a circuit breaker capable of interrupting the maximum short circuit current at the point of connection. The short circuit current design values at a Connection Point will be set out in the Connection Agreement." CC.S2.2.2. sets out similar requirements for a connection between a WFPS and the distribution system.

5.6 Prior to being connected to the transmission or distribution system, the generator is required to enter into a connection agreement with SONI which, pursuant to PC7.4 (e), would include "a condition requiring the User to supply Detailed Planning Data pertaining to the User Development as listed in Part 2 of Appendix A in the case of Users connected to the Transmission System or Part 2 of Appendix B in the case of Users connected to the Distribution System (to the extent not already supplied) within 28 days of acceptance of the offer (or such longer period as the TSO may agree in a particular case)."

5.7 As referred to in paragraph 4.4 above, modifications have also been proposed to the Planning Code to specify that SONI may ask for certain modelling information to satisfy the system studies requirements. In order to understand the impact of the WFPS on the transmission system, SONI requires the Generator (and manufacturers supplying to the WFPS) to provide it with all the modelling information/data that allows SONI to develop a detailed model to analyse the impact of the WFPS on the dynamic performance, security and stability of the transmission and distribution systems.

5.8 Both SONI and NIE would then carry out compliance simulation studies to analyse the effect of the WFPS at its connection point. These studies will include:

5.8.1 Steady State Reactive Capability

5.8.2 Voltage Control & Reactive Power Stability

5.8.3 Low Voltage Ride Through and High Voltage Ride Through

5.8.4 Low Frequency Response and High Frequency Response

5.9 SONI and the DNO would use this data for compliance studies and network studies to analyse the effect of the connecting WFPSs on the overall system and access to this data would be subject to appropriate confidentiality agreements that SONI and NIE would enter into with the manufacturers. This data would be made available to NIE on confidential basis pursuant to the terms set out in the Transmission Interface Agreement between SONI and NIE.

5.10 In order to properly assess the impact of the WFPS on the NI System, these models should be submitted by the WFPS to SONI and/or NIE at least six months prior to energisation.

Section 6 Compliance Procedures

5.11 Section 6 of the WFPS Settings Schedule sets out the connection and compliance process that a WFPS would be expected to carry out from pre-energisation until a Final Compliance Certificate is issued to it by SONI.

5.12 This section elaborates the requirements set out in Schedule 2 of the Connection Conditions which specify certain technical criteria that WFPSs connected to either the transmission or the distribution system must meet and provides for SONI to monitor the WFPSs for a period to confirm the validity of the calculations (CC.S2.1.10.1 for transmission system connected and

CC.S2.2.7.1 for distribution system connected WFPSs). Once the monitoring is completed, a Final Compliance Certificate would be issued by SONI.

5.13 In particular, where the WFPSs would also operate in the SEM, the Active Power Control Test and the MW Availability Test would need to be completed so that the WFPS can progress from being classified as an "Autonomous Generator Unit" as defined in the TSC to a "Variable Price Taker Generator Unit".

5.14 Consultees are invited to read Section 6 in conjunction with Section 2.1 of the WFPS Settings Schedule where SONI has set out its proposed treatment of newly connected WFPSs until such time as the WFPSs passes the following two tests:

5.14.1 the Active Power Control Test; and

5.14.2 the MW Availability Test.

5.15 Once these two tests have been successfully completed by the WFPS, SONI would issue an Operational Readiness Confirmation which would allow the WFPS to then qualify as a Variable Price Taker in the SEM. As set out in Section 2.1 of the WFPS Settings Schedule, a WFPS with a Registered Capacity above 10MW must change its status to a Variable Price Taker in the SEM; for a WFPS with a Registered Capacity between 5MW and 10MW making this change in status is optional.

Section 6.8: User Data Library

5.16 In order to provide a common directory where information in support of compliance statements and technical data for a particular WFPS would be submitted, the concept of a User Data Library has been introduced at Section 6.8 of the WFPS Settings Schedule. This sets out the requirement on the User in terms of providing the data to SONI and outlines how SONI intends to use such data.

5.17 A connecting WFPS would provide data available to it by way of an interim version of the User Data Library report six weeks prior to energisation. Subsequently, the WFPS would provide the final version of the User Data Library report within two months of Grid Code Compliance testing being completed.

5.18 The full structure of the User Data Library and references to the requirements for that information under the Grid Code is set out at Appendix A of the WFPS Settings Schedule and templates for Pre-energisation Checklist and Supporting Documentation and the Site Responsibility Schedule are included at Appendix B of the WFPS Settings Schedule. Please note that further technical information may be required depending on the particular features of the connecting WFPS.

Section 7: Compliance Tests

5.19 Section 7 sets out in detail the compliance tests that a WFPS (connecting to either the transmission or the distribution system) is required to carry out in order for monitoring period to commence and a a Final Compliance Certificate to be issued. These tests elaborate the requirements of the Grid Code as detailed in Section 7 and/or the obligations on the WFPS included in the Connection Agreement.

5.20 The provision of the technical criteria in relation to these compliance tests is intended to provide greater clarity for WFPSs and to add to SONI's ability to operate the transmission system in a transparent and effective manner for all Users.

5.21 These tests at times overlap with those which would be carried out by NIE and the responsibilities between SONI and NIE are discussed in section 3 of this consultation paper.

5.22 The following tests would be carried out by NIE for a Distribution Connected Generator:

5.22.1 Voltage Control Mode and Reactive Capability Tests

5.22.2 Automatic Voltage Control Test

5.22.3 Power Factor Control Test

5.22.4 Reactive Power Dispatch Test

5.22.5 Project Specific Tests

5.22.6 WFPS Control System Tests[4]

5.23 The following tests would be carried out by SONI:

5.23.1 for a Distribution Connected Generator:

(a) Active Power Control Test

(b) Ramp Blocking Test

(c) MW Availability Test

(d) Frequency Control Test

(e) Shutdown Request Test

(f) Start-Up Sequence & Ramp Rate Test

5.23.2 for a Transmission Connected Generator:

(a) Active Power Control Test

(b) Ramp Blocking Test

(c) MW Availability Test

(d) WFPS Control System Tests

(e) Frequency Control Test

(f) Voltage Control Mode and Reactive Capability Tests

(g) Automatic Voltage Control Test

(h) Power Factor Control Test

(i) Reactive Power Dispatch Test

(j) Shutdown Request Test

[4] These tests would be carried out once with SONI and/or NIE present as witnesses.

(k) Start-Up Sequence & Ramp Rate Test

Failure to complete the compliance testing

5.24 As mentioned in Section 7, failure to complete compliance testing in the stipulated timelines would mean that a Final Compliance Certificate would not be issued. Further, if the compliance testing is not carried out within the one year period from issue of the Temporary Compliance Certificate, this Temporary Compliance Certificate may not be extended and in certain circumstances the WFPS may be disconnected from the NI System until the WFPS is in a position to resume the compliance testing. In such case (or where a final compliance certificate is withdrawn for non compliance), SONI may issue a restricted compliance certificate which will set out areas of non compliance, the MVA rating at the Connection Point to which the WFPS is restricted and the timescales for resolution of the non compliance. Once these matters are resolved, SONI may re-issue a temporary or final compliance certificate.

5.25 In addition, as mentioned in paragraphs 5.14 and 5.15, SONI would be unable to issue an Operational Readiness Confirmation which would allow the WFPS to qualify as a Variable Price Taker for the purposes of the SEM, until the WFPS passes the Active Power Control Test and the MW Availability Test. These two tests would be expected to be completed within the 3 month period from the date that the WFPS achieves full Active Power export capacity.

6. Next Steps

6.1 The consultation period will run for six weeks. Users are invited to send their comments to SONI **by close of business on 28 August 2012**. In the meantime, should any Users have any queries on any aspect of this document or on the WFPS Settings Schedule or require a meeting with SONI, they should contact Conor O'Doherty at SONI (by email to Conor.ODoherty@soni.ltd.uk or by telephone on 02890707513).

6.2 Some issues may be specific to a particular generator or type of WFPS and SONI would be happy to engage with such parties on an individual basis during the consultation period. SONI would invite such parties to contact SONI and arrange a meeting to discuss any issues raised by the proposed amendments to the WFPS Settings Schedule.

6.3 SONI intends to collate all responses that it receives to this consultation as part of its report to the Authority. SONI will publish a copy of its report to the Authority on its website.

6.4 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"):

6.4.1 a report on the outcome of its review;

6.4.2 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

6.4.3 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.

6.5 Following the end of the consultation period and the discussions to be held with the Authority, revisions to the WFPS Settings Schedule will be finalised and published on the SONI website once approval has been received from the Authority.

SONI Limited
16 July 2012