DISTRIBUTION CODE MODIFICATION PROPOSAL FORM

Modification Proposal submitted By:	**DATE OF SUBMISSION OF PROPOSAL:**	**Modification Proposal Number:** *(to be assigned by Review Panel Secretary)*
Tony Hearne	9th April 2013	#22

CONTACT DETAILS FOR MODIFICATION PROPOSAL ORIGINATOR: (IF NOT DISTRIBUTION CODE REVIEW PANEL

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MODIFICATION PROPOSAL TITLE:	DS3 Fault Ride-Through

DISTRIBUTION CODE SECTION(S) AFFECTED BY PROPOSAL

DCC11.2.1

MODIFICATION PROPOSAL DESCRIPTION *(Clearly state the desired amendment and all text changes. Attach further information if necessary)*

1. Replace the current content of DCC11.2.1 with the material shown in Appendix 1
2. Add the new definitions shown in Appendix 2

MODIFICATION PROPOSAL JUSTIFICATION *(Clearly state the reason for the modification. Attach further information if necessary)*

Active and Reactive Power responses for the WFPS are to be re-defined to offer a more rapid response from WFPS during and after a system event.

IMPLICATIONS OF NOT IMPLEMENTING THIS MODIFICATION

Without improved fault ride through capabilities of WFPS there will be issues around system stability during times of high wind generation. This will likely cause increased curtailment of WFPS.

PLEASE SUBMIT MODIFICATION PROPOSALS TO THE PANEL SECRETARY BY E-MAIL TO: DISTCODEPANEL@MAIL.ESB.IE

Appendix 1: Distribution Code body content

DCC11.2.1 A **Controllable WFPS with Registered Capacity >5MW,** shall remain connected to the **Distribution System** for **Voltage Dips** on any or all phases, and shall remain **Stable**, where the Distribution System Phase to phase Voltage measured at the **Connection Point** remains above the heavy black line in *Figure 9*.

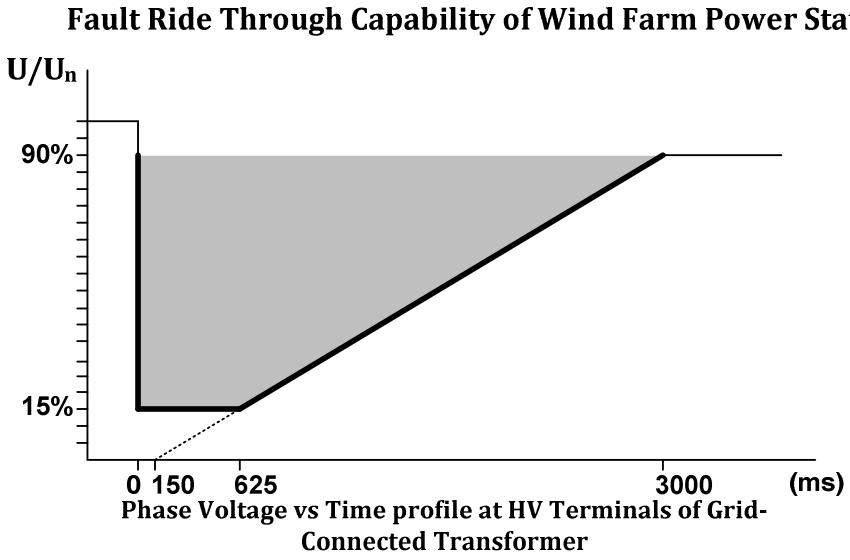

Figure 9: Fault Ride-Through Capability for Controllable Wind Farm Power Stations connected to the Distribution System.

DCC11.2.2 In addition to remaining connected to the Distribution System, the Wind Farm Power Station shall have the technical capability to provide the following functions:

a) During ~~the~~ **Voltage Dips**, the **Controllable WFPS** shall provide **Active Power** in proportion to retained **Voltage** and provide reactive current to the **Distribution System,** as set out in DCC11.2.3 (c). The ~~maximisation~~ provision of reactive current shall continue until the **Distribution Voltage** recovers to within the normal operational range of the **Distribution System** voltage at which the WFPS is connected**,** as specified in Table 5A~~,~~ or for at least 500ms, whichever is the sooner. The **Controllable WFPS** may use all or any available reactive sources, including installed statcoms or SVCs, when providing reactive support during **Voltage Dips**;

b) For **Voltage Dips** cleared within 140ms, the **Controllable WFPS** shall provide at least 90% of its maximum **Available Active Power** as quickly as the technology allows and in any event within 500ms of the Voltage a**t the Connection Point** recovering to the normal operating range, per Table 5A below~~.~~**,** of the voltage level at which the **WFPS** is connected**,**. For longer duration **Voltage Dips**, the **Controllable WFPS** shall provide at least 90% of its maximum **Available Active Power** within 1 second of the Voltage a**t the Connection Point** recovering to the **Normal operating range** for the voltage at which it is connected.

c) During and after faults, priority shall always be given to the **Active Power** response as defined in DCC11.2.2 (a) and DCC11.2.2 (b). The reactive current response of the **Controllable WFPS** shall attempt to control the **Voltage** back towards the voltage at which the WFPS is connected, recovering to its normal operating range as specified in Table 5A and should be at least proportional to the **Voltage Dip**. The reactive current response shall be supplied within the rating of the **Controllable WFPS,** with a **Rise Time** no greater than 100ms and a **Settling Time** no greater than 300ms. For the avoidance of doubt, the **Controllable WFPS** may provide this reactive response directly from individual **WTG**s, or other additional installed dynamic reactive devices on the site, or a combination of both.

d) The **Controllable WFPS** shall be capable of providing its transient reactive response irrespective of the reactive control mode in which it was operating at the time of the **Voltage Dip**. The **Controllable WFPS** shall revert to its pre-fault reactive control mode and setpoint within 500ms of the voltage at which the WFPS is connected, recovering to its normal operating range as specified in Table 5A

e) ESB Networks may seek to reduce the magnitude of the dynamic reactive response of the **Controllable WFPS** if it is found to cause over-voltages on the **Distribution System**. In such a case, the **ESB Networks** will make a formal request to the **Controllable WFPS.** The **Controllable WFPS** and the **ESB Networks** shall agree on the required changes, and the **Controllable WFPS** shall formally confirm that any requested changes have been implemented within 120 days of receiving the **ESB Networks'** formal request.

Description	Nominal Voltage	Normal Operating Range [kV][1]	
		Lower bound	Upper bound
MV	10kV	9.6	11.3
MV	20kV	19.3	22.5

[1] DSO reserves the right to operating at voltages outside these ranges in emergency situations

HV	38kV	35.6	43.8
110kV	110kV	99	123

Table 5A:

Appendix 2: New / Revised Definitions

Active Power Control Mode: A mode of operation of a **Controllable WFPS** where the **Controllable WFPS** has been instructed by the **TSO or DSO as agreed between DSO and TSO,** to maintain its **Active Power** output at the **Active Power Control Set-Point.**

Rise Time: In relation to reactive current response from **Controllable WFPS**, it is the length of time from **Fault Inception** for reactive current to reach 90% of its steady-state value

Settling Time: **In relation to reactive current response from Controllable WFPS, it is the length of time from Fault Inception for reactive current to settle within +/-10% of its steady-state value.**

Stable / Stability: A **Generation Unit** is adjudged to be stable if the various machine states and variables, including but not limited to rotor angle, active power output, and reactive power output, do not exhibit persistent or poorly damped oscillatory behaviour, when the **Generation Unit** is subjected to a **Fault Disturbance** or other transient event on the **Distribution System**

Transmission System Disturbance Any type of fault including, but not limited to, single line to ground, line to line and three-phase short-circuits, in any single item of Plant anywhere in the Transmission System where the operation of the TSO protection will not disconnect the Generator Plant from the existing or planned Transmission System under normal or Scheduled Outages conditions. For the avoidance of doubt this Fault Disturbance can include bus zone protection.

Voltage Dip: This is a short-duration reduction in phase to phase Voltage on any or all phases, resulting in Voltages outside the ranges as specified in Table 5A, and more generally, bus Voltages or terminal Voltages of less than 90% of nominal voltage on any or all phases. Percentage Voltage Dip shall be calculated with respect to nominal voltage.