

Grid Code Harmonisation for SEM  
Frequency Control  
EirGrid Grid Code OC4.3 and CC.12.2

Consultation Version 2

Modifications required for SEM are shown below. In SONI's Grid Code frequency response issues are dealt with in SDC3, and the modifications below are as a result of harmonising the two Codes for SEM.

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**1. Modification Proposals to OC4.3**

**OC4            SYSTEM SERVICES**

**OC4.1        INTRODUCTION**

**System Services** refers to the services essential to the proper functioning of the **Power System** which electricity utilities collectively provide for their customers in addition to the provision of electrical power, the supply of electric energy, and the transmission and distribution of this energy, and which thus determine **Power Quality**:

- (a) **Frequency Control;**
- (b) **Voltage Control;**
- (c) **Network Control;**
- (d) **Operating Margin; and**
- (e) **Black Start.**

In order to ensure secure operation, the **TSO** shall have control over all **System Services**; i.e. the **TSO** shall specify what **System Services** are to be provided when and by whom.

**OC4.2        SCOPE**

OC4.2.1       OC4 applies to the **TSO** and to the following, each of which is a **User** under this OC4:

- (a) **Grid Connected Generators** with **Registered Capacity** greater than 2MW;
- (b) **Demand Customers**; and
- (c) The **Distribution System Operator (DSO)**.

## **OC4.3 FREQUENCY CONTROL**

### **OC4.3.1 INTRODUCTION**

OC4.3.1.1 In order to maintain the security and integrity of the **Transmission System** it is necessary that the **TSO** operates the **Transmission System** and **Dispatches** in such a manner as to provide adequate **Frequency Control** so as to achieve operation within applicable **Frequency** limits at all times.

### **OC4.3.2 OBJECTIVE**

OC4.3.2.1 The objectives of OC4.3 are:

- (a) to set out the procedures required to ensure that adequate **Frequency Control** capability is provided on the **Transmission System** to enable operational **Frequency Control** by the **TSO** so as to achieve the applicable limits; and
- (b) to set out the procedures required to enable the **TSO** to control the **Transmission System Frequency** and (insofar as possible) to maintain **Frequency** within the limits set out in CC8.2.1.

### **OC4.3.3 DESCRIPTION OF FREQUENCY CONTROL**

OC4.3.3.1 **Frequency Control** occurs in two time scales, namely:

- (a) **Primary Frequency Control**; and
- (b) **Secondary Frequency Control**.

#### **OC4.3.3.2 Primary Frequency Control**

OC4.3.3.2.1 **Primary Frequency Control** takes place in the period of up to 30 seconds after a change in **Frequency** and is achieved by automatic corrective responses to **Frequency** deviations occurring on the **Transmission System**. This automatic correction arises from:

- (a) natural frequency demand relief of motor load;
- (b) automatic MW output adjustment of **Generation Units** initiated by **Governor Droop** or other responses including peaking of Combustion Turbine units, condensate stop or frequency triggered response of pumped storage units;
- (c) automatic load shedding (see OC5: **Demand Control**).

OC4.3.3.2.2 Automatic **Primary Frequency Control** actions in response to normal **Frequency** fluctuations, within the levels specified in CC.8.2.1 (a), on the **Transmission System** can be termed as "**Frequency Regulation**". Inadequate **Frequency Regulation** can result in:

- (a) unscheduled operation because **Generation Units** are moving away from their **Dispatched MW** levels due to **Frequency** drift;
- (b) poor **External Interconnection** tie-line control; and
- (c) failure to meet the applicable **Frequency** limits.

OC4.3.3.2.3 **Frequency** deviations, outside the levels specified in CC8.2.1(a) such as those that may occur on the loss of **Generation Unit(s)**, or other MW input into, the **Transmission System** or the **Distribution System** are corrected through the use of **Operating Reserve**.

#### OC4.3.3.3 **Secondary Frequency Control**

OC4.3.3.3.1 **Secondary Frequency Control** takes place in the time scale from 5 seconds up to 10 minutes after the change in **Frequency**. It is provided by a combination of automatic and manual actions.

OC4.3.3.3.2 Improved **Secondary Frequency Control** can be achieved by use of a **Secondary Frequency Regulation System** which acts directly on the **MW Outputs** of participating **Generation Units**. This automatic action facilitates more frequent MW output adjustments than is practicable by means of **Dispatch Instructions** and manual setpoint adjustment, thus allowing more frequent and rapid **Frequency** correction.

#### **OC4.3.4 REQUIREMENTS OF GENERATION UNIT GOVERNOR SYSTEMS**

OC4.3.4.1 In order that adequate **Frequency Regulation** is maintained on the **Transmission System** at all times, **Generators** are required to comply with the provisions of OC4.3.4.

OC4.3.4.2 Other than as permitted in accordance with OC4.3.4.3:

- (a) **Generation Units** when **Synchronised** to the **Transmission System** shall operate at all times under the control of a **Governor Control System**, unless otherwise specified by the **TSO**, with characteristics within the appropriate ranges as specified in **Connection Conditions**;
- ~~(b)~~ The **TSO** shall be informed at all times of the present state of the **Generator's governor limiter**;
- ~~(c)~~ no time delays other than those necessarily inherent in the design of the **Governor Control System** shall be introduced;
- ~~(d)~~ A **Frequency Deadband** of no greater than +/- 15mHz may be applied to the operation of the **Governor Control System**. The design, implementation and operation of the **Frequency Deadband** shall be agreed with the **TSO** prior to the **Commissioning**.

OC4.3.4.3 The **Generator** may only restrict governor action in such a manner as to contravene the terms of OC4.3.4.2 where:

- (a) the action is essential for the safety of personnel and/or to avoid damage to **Plant**, in which case the **Generator** shall inform the **TSO** of the restriction without delay; or
- (b) in order to (acting in accordance with **Good Industry Practice**) secure the reliability of the **Generation Unit**; or
- (c) the restriction is agreed between the **TSO** and the **Generator** in advance; or
- (d) the restriction is in accordance with a **Dispatch Instruction** given by the **TSO**.

OC4.3.4.4 In the event that the **TSO** in accordance with OC4.3.4.3 either agrees to a restriction on governor action or instructs such a restriction, the **TSO** shall record the nature of the restriction, the reasons, and the time of occurrence and duration of the restriction.

OC4.3.4.5 Action required by **Generators** in Response at Low Frequency

- (a) If **System Frequency** falls to below 49.80 Hz each **Generator** will be required to check that each of its **CDGUs** is achieving the required level of response including that required from the **Governor Control System**, where applicable in order to contribute to containing and correcting the low **System Frequency**.

- (b) Where the required level of response is not being achieved appropriate action should be taken by the **Generator** without delay and without receipt of instruction from the **TSO** to achieve the required levels of response, provided the **Generator's** local security and safety conditions permit.

OC4.3.4.6 Action required by **Generators** in response to High **Frequency**:

- (a) If **System Frequency** rises to or above 50.2Hz each **Generator** will be required to ensure that its **CDGUs** has responded in order to contribute to containing and correction the high **System Frequency** by automatic or manually reducing **MW Output** without delay and without receipt of instruction from the **TSO** to achieve the required levels of response, provided the **Generator's** local security and safety conditions permit.

OC4.3.5 **Dispatch Instructions**

When the **TSO** determines it is necessary, by having monitored the **System Frequency**, it may, as part of the procedure set out in SDC2, issue a **Dispatch Instruction** (including **Target Frequency** where applicable) in order to seek to regulate **Frequency** to meet the requirements for **Frequency Control**. The **TSO** will give, where applicable, 15 minutes notice to each relevant **User** of variation in **Target Frequency**.

**OC4.3.56 SECONDARY FREQUENCY REGULATION SYSTEM (SFRS)**

OC4.3.56.1 The secondary **Frequency** regulation system operational on the **Transmission System** is known as the "**Secondary Frequency Regulation System**" (**SFRS**).

OC4.3.56.2 **Generation Units** with a **Registered Capacity** of 60MW or greater are, under **Connection Conditions**, required to be connected to **SFRS**, the **SFRS control range** being a **Registered Operating Characteristic**.

OC4.3.56.3 Other than as provided for in OC4.3.5.4 and OC4.3.5.5 all **Generation Units** fitted with **SFRS** shall operate under the control of **SFRS** when within their **SFRS control range**.

OC4.3.56.4 In the event that the **Generator** (acting in accordance with **Good Industry Practice**) considers that it is necessary to secure the reliability of a **Generation Unit**, or for the safety of personnel and/or **Plant**, to prevent a **Generation Unit** from operating under **SFRS** and commences to control the MW output manually, then the **Generator** shall inform the **TSO** of this without delay. **Generators** shall also inform the **TSO** of the reasons for not operating the

**Generating Unit** under **SFRS**, and the course of action being taken to rectify the problem forthwith. When the problem has been rectified, the **Generator** shall contact the **TSO** to arrange for the **Generation Unit** to return to operation under the control of **SFRS**.

OC4.3.56.5 The **TSO** may issue a **Dispatch Instruction** to a **Generator** to prevent a **Generation Unit** (fitted with **SFRS**) from operating under **SFRS**, in accordance with **SDC2**.

OC4.3.56.6 **Generation Units** not operating under **SFRS** for reasons set out in OC4.3.5.4 and OC4.3.5.5 shall nevertheless continue to follow **MW Dispatch Instructions** as required by **SDC2**.

## **1. Modification Proposals to CC12.2**

CC.12.2 Signals and indications required to be provided by **Users** will include but shall not be limited to the following:

- (a) **LV** switchgear positions pertinent to the status of each **Grid Connected Transformer** through a set of two potential free auxiliary contacts (one contact normally open and one contact normally closed when circuit breaker is open) for each circuit breaker;
  - (b) kV at transformer low **Voltage** terminals; and
  - (c) a minimum of four sets of normally open potential free auxiliary contacts in each transformer LV bay for fault indication.
- (d), (e), (f), (g) and (h) are applicable to **Generators** only*
- (d) MW and +/-Mvar at alternator terminals of each **Generation Unit**;
  - (e) kV at **Generator Transformer LV** terminals;
  - (f) **Generator Transformer** tap position;
  - (g) Measured or derived MW output on each fuel, from **Generation Units** that can continuously fire on more than one fuel simultaneously; and
  - (h) Where it is agreed between the **TSO** and the **Generator** that signals are not available on the **HV** terminals, +/- **MW** and +/- **Mvar** shall be provided at the **Grid Connected Transformer** low **Voltage** terminals.
  - (i) Status of **Governor Control System** and any **Load limiters**.