

Grid Code Harmonisation for SEM

EirGrid Grid Code OC4.6 Operating Margin

Modifications required for SEM are shown below in OC4.6.3.7 and OC4.6.3.8. An additional category of Reserve, Substitute Reserve, is being included in both the EirGrid Grid Code and the SoNI Grid Code. Modifications to the SoNI Grid Code also include adding EirGrid's existing definitions of POR, SOR, TOR1, TOR2, Replacement Reserve and Contingency Reserve as per OC4.6.3 below.

OC4.6 OPERATING MARGIN

OC4.6.1 INTRODUCTION

OC4.6.1.1 In order to cater for **Demand** forecast variations and to cover against a sudden loss of generation from the **Transmission System**, it is necessary that an **Operating Margin** is maintained through the **Operational Control Phase**.

OC4.6.1.2 The **Operating Margin** is the amount of reserve (provided by additional **Generation** or **Demand** reduction measures) available above that required to meet the expected **System Demand**. **Prudent Utility Practice** requires that a continuum of **Operating Margin** is provided to adequately limit, and then correct, the potential **Frequency** deviation which may occur due to a **Generation/Demand** imbalance.

OC4.6.1.3 OC4.6 describes different types of reserve, as provided in a number of reserve time scales, which the **TSO** expect to utilise in the provision of the **Operating Margin**.

OC4.6.1.4 Minimum connection and operating requirements for **Generators** are outlined in the **Connection Conditions**.

OC4.6.1.5 Procedures for the **Monitoring** and **Testing** of **Operating Reserve** are outlined under OC10.

OC4.6.2 OBJECTIVE

OC4.6.2.1 The objective of OC4.6 is to describe the various time scales for which reserves are required, to describe the policy which will govern the dispatch of the reserves, and to describe the procedures for monitoring the performance of

Generation Units and other reserve providers.

OC4.6.3 CONSTITUENTS OF OPERATING MARGIN

OC4.6.3.1 The **Operating Margin** consists of **Operating Reserve** (which is further broken down into 4 time-scales) and **Replacement Reserve**.

OC4.6.3.2 **Operating Reserve.**

OC4.6.3.2.1 **Operating Reserve** is additional MW output provided from **Generation** plant, or reduction in **Customer Demand**, which must be realisable in real time operation to contain and correct any potential **Transmission System Frequency** deviation to an acceptable level.

OC4.6.3.2.2 **Operating Reserve** definitions relate to the time elapsed from the occurrence of an event which has initiated a **Frequency** disturbance. The definition of the time at which the event is deemed to have occurred and other associated definitions are addressed in OC4.6.4.

OC4.6.3.3 **Primary Operating Reserve (POR).**

OC4.6.3.3.1 **Primary Operating Reserve (POR)** is the additional MW output (and/or reduction in **Demand**) required at the **Frequency** nadir (minimum), compared to the pre-incident output (or **Demand**) where the nadir occurs between 5 and 15 seconds after an **Event**.

OC4.6.3.3.2 If the actual **Frequency** nadir is before 5 seconds or after 15 seconds after the event, then for the purpose of **POR** monitoring (in accordance with OC 10.4.4) the nadir is deemed to be the lowest Frequency which did occur between 5 and 15 seconds after the **Event**.

OC4.6.3.4 **Secondary Operating Reserve (SOR)**

OC4.6.3.4.1 **Secondary Operating Reserve (SOR)** is the additional MW output (and/or reduction in **Demand**) required compared to the pre-incident output (or **Demand**), which is fully available and sustainable over the period from 15 to 90 seconds following an **Event**.

OC4.6.3.5 **Tertiary Operating Reserve**

OC4.6.3.5.1 **Tertiary Operating Reserve band 1 (TOR1)** is the additional MW output

(and/or reduction in **Demand**) required compared to the pre-incident output (or **Demand**) which is fully available and sustainable over the period from 90 seconds to 5 minutes following an **Event**.

OC4.6.3.5.2 **Tertiary Operating Reserve band 2 (TOR2)** is the additional MW output (and/or reduction in **Demand**) required compared to the pre-incident output (or **Demand**) which is fully available and sustainable over the period from 5 minutes to 20 minutes following an **Event**.

OC4.6.3.6 **Replacement Reserve** is the additional MW output (and/or reduction in **Demand**) required compared to the pre-incident output (or **Demand**) which is fully available and sustainable over the period from 20 minutes to 4 hours following an **Event**.

OC4.6.3.7 **Substitute Reserve** is the additional MW output (and/or reduction in **Demand**) required compared to the pre-incident output (or **Demand**) which is fully available and sustainable over the period from 4 hours to 24 hours.

OC4.6.3.8 **Contingency Reserve** is the margin of Availability over forecast **Demand**, which is required in the period from 24 hours ahead down to real time, to cover against uncertainties in availability of generation capacity and also against weather forecast and **Demand** forecast errors. **Contingency Reserve** is provided by generation plant which is not required to be **Synchronised**, but which must be held available to **Synchronise** within a limited time scale.

OC4.6.4 **DEFINITIONS ASSOCIATED WITH AN OPERATING RESERVE INCIDENT**

OC4.6.4.1 Following the occurrence of a significant **Frequency** disturbance, the **TSO** shall monitor, in accordance with OC10.4, and analyse the adequacy of the provision of **Operating Reserve**. For the purposes of this performance analysis, the following criteria have been defined.

OC4.6.4.2 A significant **Frequency** disturbance event is deemed to have occurred if the **Frequency** falls below 49.70 Hz.

OC4.6.4.3 The time of occurrence of the event is defined as the last time at which the **Frequency** fell through the level of 49.80 Hz, prior to the occurrence of the **Frequency** nadir.

OC4.6.4.4 The pre-incident **Frequency** value is the average **Transmission System**

Frequency between 60 and 30 seconds prior to the **Event**.

OC4.6.4.5 The pre-incident value of MW output of a **Generation Unit**, MW **Demand** of a **Customer**, is the appropriate MW value averaged over the period between 60 and 30 seconds prior to the **Event**.

OC4.6.5 OPERATING MARGIN POLICY

OC4.6.5.1 Contingency Reserve

OC4.6.5.1.1 The **TSO** shall determine the amount of **Contingency Reserve** required for each time scale up to 24 hours ahead, taking due consideration of relevant factors, including but not limited to the following:

- (a) historical **Availability Factor** and reliability performance of individual **Generation Units**;
- (b) notified risk to the reliability of individual **Generation Units**; and
- (c) **Demand** forecasting uncertainties.

OC4.6.5.2 Operating Reserve

OC4.6.5.2.1 The **TSO** shall determine the amount of **Primary Operating Reserve**, **Secondary Operating Reserve**, **Tertiary Operating Reserve** and **Replacement Reserve** to be carried at any time to ensure system security. This will not be constrained by the **Trading and Settlement Rules**. Due consideration will be taken of relevant factors, including but not limited to the following:

- (a) the relevant **TSO** operating policy in existence at that time;
- (b) the extent to which **Customer** disconnections allowed under the relevant standard have already occurred within the then relevant period;
- (b) the elapsed time since the last **Customer** disconnection incident;
- (d) particular events of national or widespread significance, which may justify provision of additional **Operating Reserve**;
- (e) the cost of providing **Operating Reserve** at any point in time;
- (f) the magnitude and number of the largest generation infeeds to the **Transmission System** at that time, including infeeds over **External Interconnections** and also over single transmission feeders within the **Transmission System** and also the amount of **Generation** that could

be lost following a single **Contingency**;

- (g) ambient weather conditions, insofar as they may affect (directly or indirectly) **Generation Unit** and/or **Transmission System** reliability;
- (h) the predicted **Frequency** drop on loss of the largest infeed as may be determined through simulation using a dynamic model of the **Power System**;
- (i) constraints imposed by agreements in place with **Externally Interconnected Parties**;
- (j) uncertainty in future **Generation** output.

OC4.6.5.3 The **TSO** shall keep records of significant alterations to the **Operating Reserve** policy so determined under OC4.6.6.2.

OC4.6.6 RESPONSIBILITIES OF THE TSO IN RESPECT OF OPERATING RESERVE

OC4.6.6.1 The **TSO** shall in accordance with **Prudent Utility Practice** make reasonable endeavours to **Dispatch** generation and otherwise operate the system in compliance with the **TSO's** determinations as to **Operating Margin** policies made from time to time.

OC4.6.6.2 The **TSO's** sole responsibility, having met its obligations under the preceding provisions of OC4.6, shall be to, acting in accordance with **Prudent Utility Practice, Dispatch** such **Generation Units** as are available required to meet:

- (a) **System Demand**; and
- (b) the level of **Operating Reserve** required by the **TSO's** then **Operating Reserve** policies.