

Grid Code Harmonisation for Single Energy Market

Demand Side Units and Aggregators– Impact on the EirGrid Code Consultation Version 2

1 Introduction

Dispatchable Demand Customers are Demand Customers which have the ability to reduce their Demand by at least 4 MW via their Demand Side Units (DSUs) when Dispatched by the System Operator. For Demand Customers with a Demand Reduction capability below 4 MW to participate in the Single Energy Market (SEM) they must be associated with other Demand Customers via an aggregation route with a combined reduction capability of at least by 4 MW.

In simple terms the Dispatchable Demand Customer would submit a Demand Reduction and an associated price, if the price is lower than the System Marginal Price then the Demand Side Unit is dispatched. Dispatchable Demand Customers of this nature have previously not existed on either the EirGrid or SONI System. It is unclear at this point on the likely level of Demand Side Unit participation on the 1st November 2007.

Dispatchable Demand Customers with respect to their Demand Side Units can submit commercial and technical offer data into the market and will be treated exactly the same as other Price Maker Generation Units. That is, the consumption (or planned consumption) by a Demand Customer can be reduced on receipt of a Dispatch Instruction issued by the System Operator as part of a merit order Dispatch. However, this will have implication for the operation of the System and the rules detailed in Grid Codes and Distribution Code.

Section 2 below lists the principles underpinning Demand Side Units participation in the Single Energy Market (SEM), section 3 describes the implementation of Demand Side Units in the Single Energy Market and section 4 details the resulting changes to the EirGrid Grid Code (Glossary, Planning Code, Planning Code Appendix, Connection Conditions, OC2, OC7, OC8, OC10, OC11, SDC1 and SDC2 of the EirGrid Grid Code) while section 5 summaries the conclusions. **In the future, Grid Code Changes outlined below will need to be replicated,**

where appropriate, into the Distribution Code in the RoI. In the interim, the Distribution Code could refer to the appropriate Grid Code clauses.

2 Principles

2.1 Principles of Demand Side Units in the SEM Trading and Settlement Code

The following general principles apply to Demand Side Units under the SEM Trading and Settlement Code (SEM T&SC):

1. Each Demand Side Unit shall be classified as a Predictable Price Maker Generator Unit (Ref: 5.154 SEM T&SC);
2. A single Demand Side Unit can be associated with a number of Demand Sites, provided that those Demand Sites Units comprise of one single Supplier Unit and are within the same Currency Zone (ref: 5.150 SEM T&SC);
3. To qualify to register as a Demand Side Unit, the site must contain the following (ref: 5.151 SEM T&SC):
 - a. Demand Site shall house a final customer or consumer;
 - b. Demand Site must have the technical and operational capability to deliver Demand Reduction in response to Dispatch Instructions from the System Operator in accordance with the Grid Codes or Distribution Code;
 - c. Demand Site will have the appropriate equipment to permit real-time monitoring of delivery by the System Operator;
 - d. The Demand Site shall have a Maximum Import Capacity (MIC) and shall **not** have a Maximum Export Capacity (MEC).

In the Grid Code the Demand Side Unit definition differs from the SEM Trading and Settlement Code definition as it only refers to one Site. However, to capture the multiple sites concept the Grid Cod has introduced the Demand Side Unit Aggregator concept.

2.2 System Operator Requirements

The following general principles are the System Operators requirements for Demand Side Units:

1. Since other price-making units are to be dispatched via the EDIL (Electronic Dispatch Instruction Logger) system (including price-making wind farms), Demand Side Units must have the capability to accept and act upon instructions from the EDIL system;

2. The operator of Demand Side Units will also be obliged to submit declarations of availability (the equivalent of its Available Demand Reduction);
3. Demand Side Units must have SCADA facilities for TSO real-time monitoring of the Demand Reduction;
4. Only Demand Side Units with a load reduction capability of greater than or equal to 4 MW will receive a dispatch instruction from the appropriate System Operator. This threshold is proposed as the number of eligible Demand Side Units could be excessive and it ensures that the System Operators are effectively able to manage the dispatching of the greatly increased volume of participants;
5. Demand Side Units with a load reduction capability less than 4 MW must operate in conjunction with a Demand Side Unit Aggregator. The System Operators will send dispatch instructions to Demand Side Unit Aggregators where their Aggregated Demand Side Units have a combined load reduction capability greater than or equal to 4 MW;
6. The System Operators would still reserve the right to dispatch the individual units below the 4 MW Threshold if required for System Security reasons;
7. The System Operator will monitor responses to ensure Demand Side Units are compliant with Dispatch Instructions; and
8. The rules which apply to a Demand Side Units shall also apply to Aggregated Demand Side Units;

3 Implementation of Demand Side Units in the Single Energy Market

3.1 Demand Side Unit Dispatch and Control

The EDIL interface will be the mechanism by which the System Operator issues a Dispatch Instruction to Dispatchable Demand Customers or Demand Side Unit Aggregators for their respective Demand Side Units. The process will be as follows:

- a. A Dispatchable Demand Customer or a Demand Side Unit Aggregators shall install EDIL at their Control Facility;
- b. The NCC operator will send a Demand Reduction Dispatch Instruction to a Dispatchable Demand Customer or Demand Side Unit Aggregator;
- c. The Responsible Operator accepts the instruction and implements it;
- d. The Demand Reduction Dispatch Instruction will be exported in the same way as Dispatch Instructions are (via the NESS system into the output NGDI file);

- e. The NGDI file will be saved in ODS and then wrapped into XML and sent via web service to the SMO;
- f. Settlement associated with Demand Units will be handled by the SMO.

Each Demand Side Unit Aggregator will install SCADA metering for each individual Site under its control and bring this back to a single control point, called the Control Facility. These multiple sites will then be aggregated to form a single Demand Side Unit and the aggregated SCADA value will be sent to the appropriate System Operator Control Centre. The TSO can request Dispatchable Demand Customers and Demand Side Unit Aggregators to validate that the aggregated SCADA signal is the correct aggregation of the individual sites.

3.2 Real-time Availability Declarations

Dispatchable Demand Customers or Demand Side Unit Aggregators for their respective Demand Side Units will have to declare their availability through the EDIL system, like all other Price-making Generator Units. In respect of Demand Side Unit Aggregators, a single aggregated availability will be required for the Aggregated Demand Side Units.

3.3 Threshold for Individual Demand Side Unit Participation

To efficiently manage dispatching all predictable price maker units, it is proposed that the System Operators would only issue dispatch instructions to all predictable price maker units which have a capability of 4 MW and above. Therefore individual Demand Customers with a Demand Reduction capability below 4 MW will have to follow the aggregated Demand Side Unit route. However as for Generators, they can opt to become part of an Aggregator, or participate as autonomous generation.

As the number of eligible Demand Side Units could be excessive, this proposal ensures that the System Operators are effectively able to dispatch all predictable price maker units in merit, while maintaining Security of Supply and their licence conditions.

3.4 Monitoring Compliance

To ensure system security is maintained, the System Operators must ensure that there is sufficient capacity dispatched to meet the demand and that all Predictable Price Maker Generation Units

responded as confirmed, i.e. complied with the dispatch instructions. This is normally confirmed by monitoring the output of the generators against the dispatch level. This method of confirmation cannot be applied to Demand Side Units as the actual Site Demand can vary significantly between trading periods. In this case the System Operator will propose arrangements to the Demand Side Units with regard to compliance monitoring which will be reflected in the Grid Code and these are given below.

Compliance monitoring will not be performed in real time and will be done on a needs be basis.

For a Demand Side Unit which achieves its reduction only via the operation of a generator, the output of the generator should be provided to the System Operator via a SCADA signal. This signal will be compared to the dispatched Demand Reduction, if the output of the generator is within 5% of the dispatched Demand Reduction, the Demand Side Unit is compliant. For Dispatchable Demand Customers or Demand Side Unit Aggregators who provide Demand Reduction by reducing their consumption in any trading period by switching off process which would normally be on, these customers will be required to submit a Demand Profile as part of their technical offer data. The Demand Profile must not exceed the Demand Sites Maximum Import Capacity. This Demand Profile will be used for availability declaration, dispatch instruction validation and compliance monitoring. In this case, Dispatchable Demand Customers or Demand Side Unit Aggregators would be deemed to be in compliance if the difference between the Demand Profile and the metered quantity plus the Demand Reduction is within an agreed fixed percentage, e.g. 5% of the Demand Reduction. To validate the Demand Profile the TSO can compare the actual Site(s) consumption against the Demand Profile when the Demand Side Unit or Aggregated Demand Side Units were declared available but not Dispatched.

3.5 Demand Side Unit Aggregator Systems

The robustness of the Demand Side Unit Aggregator systems and the level of detail that the Aggregator must submit on the systems needs further consideration e.g. how the aggregator systems operate, the aggregated response to instructions and related data.

4 Impact to the EirGrid Grid Code

The inclusion of Demand Side Units and Aggregated Demand Side Units in the Single Energy Market and the resulting proposed changes as discussed above will impact on the Grid Code. The sections of the EirGrid Grid Code impacted are the Glossary, Planning Code, Planning Code Appendix, Connection Conditions, OC2, OC7, OC8, OC10, OC11, SDC1 and SDC2 and these will be discussed in the following sections.

Where a section of the Grid is being modified solely for the inclusion of Demand Side Units the text changes to the Grid Code will appear in this document otherwise reference will be made to the documents which include all modification to that section of the Grid Code.

4.1 Glossary

The proposed modifications to the Grid Code Glossary driven by the inclusion of Demand Side Unit (s) are as detailed in the SDC New Definitions Document, these new definitions are required to cover the addition of Demand Side Units and Aggregated Demand Side Units and the associated impacts to the Transmission System definition as specified in the Grid Code. The new definitions relevant to the addition of Demand Side Units and Aggregated Demand Side Units are as follows:

Aggregated Demand Side Unit	A group of Demand Sites represented by a Demand Side Unit Aggregator , which together, are capable of a Demand Reduction capability equal to or above 4 MW and is subject to Dispatch Instruction from the TSO
Demand Profile	The estimated consumption in MW Demand for a Demand Site or estimated aggregated consumption in MW Demand for Demand Sites represented by a Demand Side Unit Aggregator for each Trading Period in the following Optimisation Time Horizon Period and which must be submitted to the TSO in the Availability Notice under SDC 1.4.1.2
Demand Reduction	The reduction in MW Demand which can be achieved in one currency zone by a Demand Side Unit or Aggregated Demand Side Unit for each Trading Period in the following Optimisation Time Horizon Period and which must be submitted to the TSO in an Availability Notice under SDC1.4.1.2.
Demand Side Unit	A Demand Site which houses a Demand Customer connected to Transmission System or Distribution System which can deliver a Demand Reduction upon receipt of a Demand Reduction Dispatch Instruction from the TSO and which has a Demand Reduction capability of at least 4 MW.

Demand Side Unit Aggregator	A person who represents several Demand Sites Units , with an aggregated Demand Reduction not less than 4 MW, by in particular preparing notices under SDC1 on behalf of these Demand Side Units and receiving Dispatch Instructions on behalf of these Demand Side Units under SDC2.
Demand Site	A premises owned by a Demand Customer connected to the Transmission or Distribution Systems with a Demand Reduction capability. The Demand Site shall have a Maximum Import Capacity and shall not have a Maximum Export Capacity .
Dispatchable Demand Customer	A person who operates a Demand Side Unit , with an aggregated Demand Reduction not less than 4 MW, and is subject to the Grid Code pursuant to any agreement with the TSO or otherwise.
Initial Demand Reduction	The Demand Reduction of the Demand Side Unit or Aggregated Demand Side Unit following a Dispatch Instruction from the TSO when the Demand Reduction is at 0 MW for a period greater than the Maximum Down Time specified by the Dispatchable Demand Customer or the Demand Side Unit Aggregator in the Technical Parameters .
Initial Demand Reduction Time	The Time as specified by the Dispatchable Demand Customer or the Demand Side Unit Aggregator in the Technical Parameter and is the time it takes for the Dispatchable Demand Customer to be able to implement the Initial Demand Reduction from receipt of Instruction from the TSO .
Maximum Export Capacity	In relation to an Interconnector , the maximum amount of electricity in MW that can be exported through that Interconnector . In all other cases, the value (MW) provided in accordance with the Generator's Connection Agreement
Maximum Import Capacity	In relation to an Interconnector , the maximum amount of electricity in MW that can be imported through that Interconnector . In all other cases, the values (kW and/ or kVA) provided in accordance with the User's Connection Agreement

4.2 Proposed Changes to Planning Code and Planning Code Appendix

The proposed modifications to the Planning Code and the Planning Code appendix are required as the Transmission System Operator needs information on Demand Side Units and Aggregated Demand Side Units. This information was not required in the past as this category of User did not exist prior to SEM.

The proposed modification to the Planning Code is the inclusion of Dispatchable Demand Customers and Demand Side Unit Aggregators in PC.3 Scope. This ensures, where appropriate, that these Users will be bound by the Planning Code and Planning Code Appendix. Please refer to the proposed modified Planning Code for more detail on the proposed modification.

The proposed modification to the Planning Code Appendix is the inclusion of section PC.A5. This section details the information required from Dispatchable Demand Customers and Demand Side Unit Aggregators regarding their Demand Side Unit(s), to enable the Transmission System Operators to efficiently plan the Transmission System. The proposed change is as detailed in red below:

PC. A5 Dispatchable Demand Customers and Demand Side Unit Aggregators

For each Dispatchable Demand Customer and Demand Side Unit Aggregator, the following information shall be provided:

- (a) **Total Demand Reduction Capability (MW);**
- (b) **Location of Demand Site(s);**
- (c) **Demand Reduction capability per Site (MW);**
- (d) **Demand Reduction capability from generation per site (MW);**
- (e) **Demand Reduction capability from avoided Demand consumption per site (MW);**
- (f) **The name of the Transmission Station(s) to which the Demand Site(s) is normally connected; and**
- (g) **Annual Demand Profile.**

[Note: thought is being given to inserting a requirement on Aggregators to submit data on the systems by which they achieve the aggregated response to instructions, and related data]

4.3 Proposed Changes to Connection Conditions

The proposed modifications to Connection Conditions, CC.3 **Scope** and CC.12 **Signals** are required to ensure that the appropriate signals are obtained from the Dispatchable Demand Customers and Demand Side Unit Aggregators which will be used by the TSO, for the efficient operation of the Transmission System and ,where appropriate, to confirm compliance. The modifications to the Connection Conditions are highlighted in red below.

CC.3 SCOPE

The **Connection Conditions** apply to the **TSO** and to the following **Users**:

- (a) **Generators** with **Registered Capacity** greater than 2MW;
- (b) The **Distribution System Operator**;
- (c) **Demand Customers**; and
- (d) **Dispatchable Demand Customers and Demand Side Unit Aggregators**

in relation to their connection to the **Transmission System**.

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CC.12 SIGNALS TO BE PROVIDED BY USERS

CC.12.1 Each **User** shall provide such signals and indications in relation to the **User's Plant and Apparatus** as are required by the **TSO** (acting reasonably) in accordance with the **Connection Agreement**.

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 the 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;

- (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; and
- (i) Status of **Governor Control System** and any **Load** limiters. (as proposed in OC4.3 and CC12.2 Frequency Control Modifications for SEM – Consultation Version 2)

(j) and (k) are applicable to **Demand Customers** only,

- (j) **MW** and +/- **Mvar** at the **HV** terminals of the **Grid Connected Transformer**; and
- (k) **Grid Connected Transformer** tap position.

(l), (m) and (n) are applicable to **Dispatchable Demand Customers** and **Demand Side Unit Aggregators** only,

- (l) **MW** and +/- **Mvar** at alternator terminals of each **Generator** where applicable;
- (m) Measured or derived **MW Output** for each **Generator** at the **HV** terminals of the **Grid Connected Transformer**; and
- (n) **Demand Reduction** aggregated at the **HV** terminals of the **Grid Connected Transformer**.

4.4 Proposed Modification to OC2, Operational Planning

The aim of OC2 is to promote the development and implementation of a co-ordinated Generation Outage Programme, consistent with security of supply and requirements for the secure and economic operation of the Transmission System and the Other Transmission System, and with the needs of Generators, in respect of Plant maintenance requirements and resource limitations. Therefore as Dispatchable Demand Customers and Demand Side Unit Aggregators are operating Demand Side Units which are being treated as Generators, it is appropriate that they are included in the Generation Outage Programme. Hence it is proposed that OC2 is modified to include

Dispatchable Demand Customers and Demand Side Unit Aggregators, the detailed changes are as per the OC2 document.

4.5 Proposed Modification to OC7, Notification of Events and Operations

The proposed modifications to OC7 are in sections **OC7.1.3 Scope** and **OC7.2 Operational Communication and Data Retention** of the EirGrid Grid Code. These modifications are required to ensure that Demand Side Units and Aggregated Demand Side Units are treated similarly to all other Price Making Generation Units. It ensures that the contact locations, communication methods and procedures between the TSO and the Dispatchable Demand Customer or Demand Side Unit Aggregator are specified. The communication of Dispatch Instructions shall normally be via Electronic Dispatch Instruction Logger (EDIL). The proposed changes to OC7 are detailed below:

OC7.1.3 SCOPE

OC7.1.3.1 OC7.1 applies to the **TSO** and to **Users**, which term in OC7.1 means:-

- (a) **Generators;**
- (b) **Dispatchable WFPSs;** (*as proposed in the Wind Modifications to the Grid Code for SEM Consultation Version 2*)
- (c) **Distribution System Operator;**
- (d) **Demand Customers;** and
- (e) **Dispatchable Demand Customers and Demand Side Unit Aggregators.**

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OC7.2.3 SCOPE

OC7.2.3.1 OC7.2 applies to the **TSO** and to **Users**, which term in OC7.2 means:

- (a) **Generators;**
- (b) **Dispatchable WFPSs;** (*as proposed in the Wind Modifications to the Grid Code for SEM Consultation Version 2*)
- (c) **Distribution System Operator;**
- (d) **Demand Customers;** and
- (e) **Dispatchable Demand Customers and Demand Side Unit Aggregators.**

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OC7.2.4.3 **Demand Customers**

OC7.2.4.3.1 The **Demand Customer's** contact locations and personnel referred to in this Section OC7.2.4.3 shall be notified by the **Demand Customer** to the **TSO** prior to connection and thereafter updated as appropriate.

OC7.2.4.3.2 The **Demand Customer** is required to provide the **TSO** with the contact information of a **Responsible Operator(s)** who shall respond to communications from the **TSO** without undue delay (except where otherwise provided for by agreement between the **Demand Customer** and the **TSO**, such agreement not to be unreasonably withheld) and are of suitable experience and training and are authorised to perform functions on behalf of the **Demand Customer**.

OC7.2.4.3.3 The **Responsible Operator** shall have the ability to attend the **Site** of the **Demand Customer** within 60 minutes of an instruction to do so being issued by the **TSO**.

OC7.2.4.3.4 At any point in time, a single person shall be designated by the **Demand Customer** and notified to the **TSO** as the **Responsible Manager**. The **Responsible Manager** shall be responsible for dealing with the **TSO** on matters relating to the **Grid Code** other than as provided for in OC7.2.4.3.2 and OC7.2.4.3.3. In the event that the **Responsible Manager** is not a person on duty at the **Site** of the **Demand Customer**, then the **Responsible Manager** must be capable of being contacted from the **Site** of the **Demand Customer** at all times, and in the event that the **TSO** issues a request to the **Site** of the **Demand Customer** requiring the **Responsible Manager** to contact the **NCC**, the **Responsible Manager** shall comply with the request without unreasonable delay and in any case within 15 minutes of the request.

OC7.2.4.3.5 **Dispatchable Demand Customers and Demand Side Unit Aggregators** are required to provide a **Control Facility**. The **Dispatchable Demand Customer** and **Demand Side Unit Aggregator** shall ensure acting in accordance with **Good Industry Practice** that the **Control Facility** is staffed with appropriate staffing levels at all times.

OC7.2.4.3.6 For **Dispatchable Demand Customers** and **Demand Side Unit Aggregators**, the **Control Facility** shall be staffed by a **Responsible Operator(s)** who shall respond to communications from the **TSO** without undue delay (except where otherwise provided for by agreement between the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** and the **TSO**, such agreement not to be unreasonably withheld) and are of suitable experience and training and are authorised to perform functions on behalf of the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** as follows:

- (a) to accept and execute **Dispatch Instructions**;
- (b) to receive and acknowledge receipt of requests, for amongst other matters, operation outside the **Declared** values of **Demand Reduction** and **Ancillary Service** capability.

OC7.2.4.3.3 The **Responsible Manager** shall be authorised by the **Demand Customer** to perform the following functions on behalf of the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator**:

- (a) to make estimates in accordance with **Good Industry Practice** as to the **Demand Reduction** and **Ancillary Service** capability;
- (b) to make **Declarations** of the **Demand Reduction** for each **Dispatchable Demand Customer**;

The **Dispatchable Demand Customer** may, from time to time, notify a replacement contact location and personnel which meets the foregoing requirements.

OC7.2.5.3 Supervisory Control and Data Acquisition (SCADA)

OC7.2.5.3.1 SCADA remote terminal equipment shall be required in the control room of the **Transmission Station** at the **User Site** for the transmission of signals and indications to and from the **NCC**. The signals and indications which must be provided by **Users** for transmission by SCADA equipment to the **NCC** are the signals and indications referred to under **Connection Conditions** together with

such other information as the TSO may from time to time by notice to Users reasonably require.

OC7.2.5.3.2 For **Dispatchable Demand Customers** and **Demand Side Unit Aggregators**, **SCADA** remote terminal equipment shall also be required at the **Control Facility** for the transmission of signals and indications to and from the **NCC**. The signals and indications which must be provided by **Dispatchable Demand Customers** and **Demand Side Unit Aggregators** for transmission by **SCADA** equipment to the **NCC** are the signals and indications referred to under **Connection Conditions** together with such other information as the TSO may from time to time, by notice to **Dispatchable Demand Customers** or and **Demand Side Unit Aggregators**, reasonably require.

OC7.2.5.3.3 Interface cabinets shall be installed in the control room of the **Transmission Station** at the **User Site** and also on the **User's Site** or, in the case of a **Dispatchable Demand Customer** or **Demand Side Unit Aggregator**, in the **User's Control Facility**. Provision and maintenance of wiring and signalling from the ~~Generator's~~User's **Plant** and **Apparatus** to the **User's** interface cabinet shall be the responsibility of the **User**. The **TSO** shall provide the cables to interconnect these interface cabinets.

4.6 Modifications to OC8, Monitoring, Testing and Investigation

The proposed modifications to OC8 are to ensure that the Dispatchable Demand Customers and Demand Side Unit Aggregators are bound by rules and procedures for Operational Testing. This will also ensure that Demand Side Units and Aggregated Demand Side Units are treated similarly to all other Price Making Generation Units. The detailed proposed modifications to this section of the Grid Code are contained in the OC8 document.

4.7 Modifications to OC10, Monitoring, Testing and Investigation

The proposed modifications to OC10 of EirGrid Grid Code are as detailed below. These changes are required to ensure that Demand Side Units and Aggregated Demand Side Units are treated

similarly to all other Price Making Generation Units, and that their performance can be monitored and where applicable appropriate actions taken.

OC10 MONITORING, TESTING AND INVESTIGATION

OC10.1 INTRODUCTION

OC10.1.1 In order to discharge its responsibilities in respect of the safe, secure and economic operation of the **Transmission System** and in respect of generation **Dispatch**, the **TSO** will need to carry out certain **Monitoring, Testing** and **Investigation** in respect of the performance of **Users' Plant**.

OC10.1.2 OC10 does not apply to **Operational Tests**, which may be required by the **TSO** or by **Users**. The procedures by which **Operational Tests** are notified, and approved, executed and reported, are covered under **Operational Testing** (OC8).

OC10.2 OBJECTIVE

OC10.2.1 The primary objectives of OC10 are to establish procedures for **Testing** that **Users** are operating within their design, operating and connection requirements, as specified in the **Grid Code, Connection Agreements, Ancillary Services Agreements and System Support Agreements** between **Users** and the **TSO**.

OC10.2.2 In order to achieve the primary objective set out in OC10.2.1, OC10 establishes procedures for **Monitoring, Testing** and **Investigation**. In particular, this facilitates adequate assessment of each of the following:

- (a) whether **Centrally Dispatched Generation Units (CDGU), Demand Side Units and Aggregated Demand Side Units** comply with **Dispatch Instructions**;
- (b) whether **Generators, Dispatchable Demand Customers and Demand Side Unit Aggregators** are in compliance with **Declarations** of **Availability, Ancillary Services** capabilities, **Operating Characteristics** and any other data required to be registered by those **Generators, Dispatchable Demand Customers and Demand Side Unit Aggregators** under the **Grid Code**;
- (c) whether **Power Quality** of **Users** conforms with International Electro technical Commission Standards: 'Electromagnetic Compatibility-Limits-Limitation of emission of harmonic currents for equipment connected to medium and high voltage power supply systems [IEC/TR3 61000-3-6] and

‘Electromagnetic Compatibility-Limits-Limitation of voltage fluctuation and flicker for equipment connected to medium and high voltage power supply systems ‘ [IEC/TR3 61000-3-7];

- (d) whether **Users** are in compliance with protection requirements and protection settings under the **Grid Code, Users' Connection Agreements, Ancillary Service Agreements** and **System Support Agreements** between **Users** and the **TSO**.

OC10.3 SCOPE

OC10 applies to the **TSO** and to the following **Users**

- (a) **Generators** which, for the purposes of OC10, include all **Generators** with **Generation Unit(s)** subject to **Central Dispatch** or with **Generation Unit(s)** that have a total **Registered Capacity** greater than 4 MW on a single **Site**;
- (b) The **Distribution System Operator**;
- (c) **Suppliers**;
- (d) **Demand Customers**;
- (e) **Dispatchable Demand Customers** in respect of their **Demand Side Units**; and
- (f) **Demand Side Unit Aggregators** in respect of the **Demand Side Units** which they represent.

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C10.4 MONITORING

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OC10.4.5 Monitoring systems and procedures

OC10.4.5.1 Procedures and systems used for assessment of compliance will be either generic procedures (which will be provided by the **TSO**) or otherwise agreed between the **TSO** and the **User**, such agreement not to be unreasonably withheld.

OC 10.4.5.2 Compliance of Demand Side Units or the Aggregated Demand Side Units with Dispatch Instructions

The following validation will be performed in real time:

- (i). For a **Demand Side Unit** or ~~a~~ **Aggregated Demand Side Unit** which achieves the **Demand Reduction** only by operating a generator, the **Demand Side Unit** or the **Aggregated Demand Side Unit** shall be deemed compliant if the **SCADA Signal** confirms that the increased output of the generation is within 5% of the **Demand Reduction**.

The following validation will be performed on a needs be basis and will not be performed in real time:

- (ii). For a **Demand Side Unit** or ~~the~~ **Aggregated Demand Side Unit** which achieves the **Demand Reduction** only by reducing their **Demand**, the **Demand Side Unit** or the **Aggregated Demand Side Unit** shall be deemed to be compliant with the **Dispatch Instruction** if the difference between the **Demand Profile** and the metered **Demand** plus the **Demand Reduction** is within 5%.
- (iii). For a **Demand Side Unit** or ~~the~~ **Aggregated Demand Side Unit** which achieves the **Demand Reduction** by reducing their **Demand** and operating a generator, the **Demand Side Unit** or the **Aggregated Demand Side Unit** shall be deemed to be compliant with the **Dispatch Instruction** if the difference between the **Demand Profile** and the metered **Demand** plus the **Demand Reduction** is within 5%.

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OC10.7 CONSEQUENCES OF MONITORING, TESTING AND INVESTIGATION

OC10.7.1 **Non-compliance with a Dispatch Instruction issued by the TSO to a Generator, Dispatchable Demand Customer or Demand Side Unit Aggregator.**

OC10.7.1.1 When the **TSO** considers that a **Generator**, a **Dispatchable Demand Customer** or a **Demand Side Unit Aggregator** is not in compliance with a **Dispatch Instruction** then the **TSO** shall inform the **Generator** , the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** by agreed methods, identifying the relevant **Generation Unit, Demand Side Unit** or **Aggregated Demand Side Unit**, and identifying the **Dispatch Instruction** and the time of issue of the **Dispatch Instruction** with which the **TSO** considers the **Generator**, the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** is not in compliance. This shall be known as a "**Warning** for non-compliance with a **Dispatch Instruction**". The **Warning** is to contain a **Dispatch Instruction** which may be identical to the original **Dispatch Instruction** or which may differ from it. The occurrence of the **Warning** shall be logged by the **TSO** and by the **Generator, the Dispatchable Demand Customer or the Demand Side Unit Aggregator**

OC10.7.1.2 On receipt of a **Warning** for non-compliance with a **Dispatch Instruction**, the **Generator, Dispatchable Demand Customer or Demand Side Unit Aggregator** must as soon as possible, and in any case within ten (10) minutes of the receipt of the **Warning**:

- (a) commence to comply with the **Dispatch Instruction** included with the **Warning** (this may be the original or a modified **Dispatch Instruction** as outlined in OC10.7.1.1); or
- (b) reply to the **TSO**, disputing in good faith the validity of the original **Dispatch Instruction**, detailing the grounds on which the validity is being disputed; or
- (c) reply to the **TSO**, disputing in good faith the validity of the assessment of non-compliance. In this event the **Generator, the Dispatchable Demand Customer or the Demand Side Unit Aggregator** must as soon as is reasonably practicable, inform the **TSO** in detail of the grounds on which the assessment of non-compliance is being disputed; or
- (d) reply to the **TSO**, giving a reason for inability to comply with the **Dispatch Instruction**, and making a revised **Declaration** in respect of

the **Availability, Ancillary Service** capabilities or **Operating Characteristics**, as appropriate.

OC10.7.1.3 If the **Generator, Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** complies in accordance with OC10.7.1.2 (a), no further action shall arise.

OC10.7.1.4 In the event of the **Generator, Dispatchable Demand Customer** or **Demand Side Unit Aggregator** making a revised **Declaration** under OC10.7.1.2 (d), the **TSO** shall then issue a new **Dispatch Instruction**, consistent with the revised **Declaration**. The revised **Declaration** will be backdated to the time of issue of the relevant **Dispatch Instruction**. Notwithstanding the backdating of the revised **Declaration**, the **Generator, Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** will still be deemed under OC10.7.1.1 as having failed to comply with a **Dispatch Instruction**.

OC10.7.1.5 In the event of OC10.7.1.2 (b) or OC10.7.1.2 (c) applying, the **TSO** shall consider the substance of the **Generator's, Dispatchable Demand Customer's** or the **Demand Side Unit Aggregator's** disputation. The **TSO** shall, where the **TSO** considers appropriate, communicate with the **Generator, Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** to clarify aspects relating to the issue and receiving of the **Dispatch Instruction**, and the **Generator's, Dispatchable Demand Customer's** or the **Demand Side Unit Aggregator's** actions. The **TSO** shall acting reasonably determine the validity of the **Generator's, Dispatchable Demand Customer's** or **Demand Side Unit Aggregator's** disputation, and shall inform the **Generator, Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** as to its decision. The **TSO** shall record both its decision, and also all pertinent information relating to the event, including the **Generator's, Dispatchable Demand Customer's** or the **Demand Side Unit Aggregator's** disputation and such information shall be deemed to be **Operational Data**.

OC10.7.1.6 Where the **TSO**, acting reasonably, is of the view that a disputation given by a **Generator, Dispatchable Demand Customer** or the **Demand Side Unit**

Aggregator is not valid or not wholly valid or if the **Generator, Dispatchable Demand Customer** or ~~the Demand Side Unit Aggregator~~ has not replied in accordance with OC10.7.1.2, the **TSO** shall inform the **Generator, Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** that it is overriding, by means of a **Post Event Notice**, the **Generator's, Dispatchable Demand Customer's** or the **Demand Side Unit Aggregator's Declaration** in respect of the **Availability, Ancillary Service capabilities** or **Operating Characteristics** of the **Generation Unit or Demand Side Unit**, as appropriate. The **Post Event Notice** shall govern until such times as the **Generator, Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** submits a revised Availability Notice~~makes a further Declaration~~.

OC10.7.1.7 Where the **TSO** gives a **Post Event Notice** under OC10.7.1.6, the **Post Event Notice** shall be backdated to the time of issue of the relevant **Dispatch Instruction**, or the latest time for which there exists compelling evidence that the **Generation Unit, Demand Side Unit** or the **Aggregated Demand Side Unit** was acting in compliance with the **Dispatch Instruction**, whichever is the later. The **Post Event Notice** shall set the level of **Declared Availability, Declared Ancillary Service capability** or **Declared Operating Characteristic**, as the case may be, at such level as the **Monitoring, Testing** or **Investigation** indicates the **Generation Unit** actually achieved. Notwithstanding the backdating of the **Post Event Notice**, the **UserGenerator** will still be deemed under OC10.7.1.1 as having failed to comply with a **Dispatch Instruction**.

OC10.7.1.8 In the event that the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** is deemed by the **TSO** in accordance with the provisions of this OC10 to be in non-compliance with its **Dispatch Instructions**, that is the **Demand Side Unit** or **Aggregated Demand Side Unit** failed to comply with three (3) **Dispatch Instructions** in a one calendar month period then the **TSO** shall notify the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** of the continued non-compliance. The **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** shall take immediate action to remedy such non compliance. The terms of this OC10.7.1.8 shall be without prejudice to the rights of the **TSO** to instruct the **Market Operator** that the

Demand Side Unit or Aggregated Demand Side Unit is in breach of the Grid Code and hence the SEM Trading and Settlement Code.

OC10.7.2 Non-compliance by a Generator with Declared Operating Reserve

OC10.7.2.1 In evaluating the adequacy of the performance of a **Generation Unit**, the **TSO** shall compare the actual performance as measured, with the expected performance for that **Generation Unit**. The expected performance from the **Generation Unit** shall be calculated based on the **Frequency** deviation from the **Pre-Incident Frequency**, and the **Generation Unit's** then **Declared** values of **Availability, POR, SOR, TOR1, TOR2** and Governor Droop;

OC10.7.2.2 Where the performance of a **Generation Unit** is deemed by the **TSO** to be in non-compliance with **Declared Operating Reserve**, then the **TSO** shall notify the **Generator** of the non-compliance, identifying the system or procedure by which non-compliance was measured. The **TSO** shall by means of a **Post Event Notice** override the **Generator's Declaration** in respect of **Operating Reserve**. The revised **Declaration** shall be effective from the time of commencement of the **Test** or **Event** on which the non-compliance has been assessed, or such later time as may, in the opinion of the **TSO** acting reasonably, be appropriate if the non-compliance did not apply to the full period of the **Test** or **Event**.

OC10.7.2.3 Following the notification of non-compliance, the **TSO** shall make available to the **Generator** within three **Business Days** relevant data in relation to the system **Frequency** and **Generation Unit** performance, that the **Generator** may reasonably require substantiating the assessment of non-compliance.

OC10.7.2.4 The consequences of non-compliance by a **Generator** with **Declared Operating Reserve** will be addressed in the **SEM Trading and Settlement Code** and other agreements as appropriate.

OC10.7.3 Non-compliance by a Generator, Dispatchable Demand Customer or Demand Side Unit Aggregator with ~~Declared~~ Availability Notice

OC10.7.3.1 In the event that the performance of a **Generation Unit, Demand Side Unit or Aggregated Demand Side Unit** is deemed by the TSO to be in non-compliance with its **Declared Availability**, then the TSO shall notify the **Generator, Dispatchable Demand Customer or the Demand Side Unit Aggregator** of the non-compliance.

OC10.7.3.2 Having so informed the **Generator, Dispatchable Demand Customer or the Demand Side Unit Aggregator**, the TSO shall, by means of a **Post Event Notice**, override the **Generator's Declaration in respect of Availability Notice**, with a value as appropriate to the outcome of the **Test or Investigation**. The revised **Declaration** shall be effective from the time of commencement of the **Test or Investigation** on which the non-compliance has been assessed, or such later time as may, in the opinion of the TSO acting reasonably, be appropriate if the non-compliance did not apply to the full period of the **Test or Investigation**.

OC10.7.3.3 The economic consequence of non-compliance by a **Generator, Dispatchable Demand Customer or the Demand Side Unit Aggregator** with **Declared Availability** will be addressed in the **SEM Trading and Settlement Code** and other agreements as appropriate.

OC10.7.4 Non-compliance by a Generator with Declared Ancillary Services or Declared Operating Characteristics

OC10.7.4.1 In the event that the performance of a **Generation Unit** is deemed by the TSO to be in non-compliance with its **Declared Ancillary Services capability or Operating Characteristics**, then the TSO shall notify the **Generator** of the non-compliance, and having so informed the **Generator** then the TSO shall by means of a **Post Event Notice** override the **Generator's Declaration** in respect of **Ancillary Services or Operating Characteristics** as appropriate.

OC10.7.4.2 The consequences of non-compliance by a **Generator with Declared Ancillary Services or Declared Operating Characteristics** will be addressed in the **SEM Trading and Settlement Code** and other agreements as appropriate.

OC10.7.5 Non-compliance by a GeneratorUser with a Connection Condition or Registered Operating Characteristics

OC10.7.5.1 In the event that the performance of a **Generation Unit**, is deemed by the **TSO** in accordance with the provisions of this OC10 to be in non compliance with its **Operating Characteristics** or with a **Connection Condition**, then the **TSO** shall notify the **Generator** of the non-compliance and the **Generator** shall take immediate action to remedy such non-compliance. The terms of this OC10.7.5 shall be without prejudice to the rights of the **TSO** to **De-energise** the **Generator's Plant** and **Apparatus** in accordance with the terms of OC9.6.

OC10.7.5.2 In the event that the performance of a **Demand Side Unit** or the **Aggregated Demand Side Unit** is deemed by the **TSO** in accordance with the provisions of this OC10 to be in non-compliance with its **Operating Characteristics**, including **Demand Profile**, or with a **Connection Condition**, then the **TSO** shall notify the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** of the non-compliance and the **Dispatchable Demand Customer** or the **Demand Side Unit Aggregator** shall take immediate action to remedy such non compliance. The terms of this OC10.7.5 shall be without prejudice to the rights of the **TSO** to **De-energise** the **Demand Site** and **Apparatus** in accordance with the terms of OC9.6.

4.8 Modifications to OC11, Safety Co-Ordination

The proposed modifications to OC11 of EirGrid Grid Code are as detailed below. This proposed change is required to ensure that Demand Side Units and Aggregated Demand Side Units are operated in accordance with approved safety rules.

OC11.3 SCOPE

OC11 applies to the **TSO** and to the following **Users**:

- (a) **Generators;**
- (b) the **Distributor System Operator;**
- (c) **Demand Customers;**

- (d) **Dispatchable Demand Customers and Demand Side Unit Aggregators;**
- (e) the **TAO**; and
- (f) agents of **the TSO** or agents of any **User** (as defined in OC 11.3 (a), (b), (c) and (d)).

4.9 Proposed Modifications to SDC1 and SDC2

The proposed modifications to the SDCs ensure that any Grid Code User, including Dispatchable Demand Customers and Demand Side Unit Aggregators that register under the SEM Trading and Settlement Code as Price-Makers, are required to submit the relevant data to enable the System Operators to produce the Indicative Operations Schedule and that under SDC2 the User can receive a dispatch instruction from the TSO via an electronic interface, which is currently EDIL.

Dispatchable Demand Customers and Demand Side Unit Aggregators will be also bound by SDC1 and SDC2. Please refer to the proposed modifications to the text of the SDC1 and SDC2 documents for more detail.

5 Conclusions

The System Operators are recommending the approval of the:

- modifications to the Grid Code to ensure that Dispatchable Demand Customers and Aggregated Demand Side Units are treated in the same manner as all Price Maker Generator Units;
- Threshold of 4 MW below which Users will not be dispatched. This will allow the System Operators to effectively dispatch all Predictable Price Maker Generator Units in merit, while maintaining Security of Supply and licence conditions; and
- method for monitoring compliance with the dispatch instructions for Demand Side Units and Demand Side Unit Aggregators.