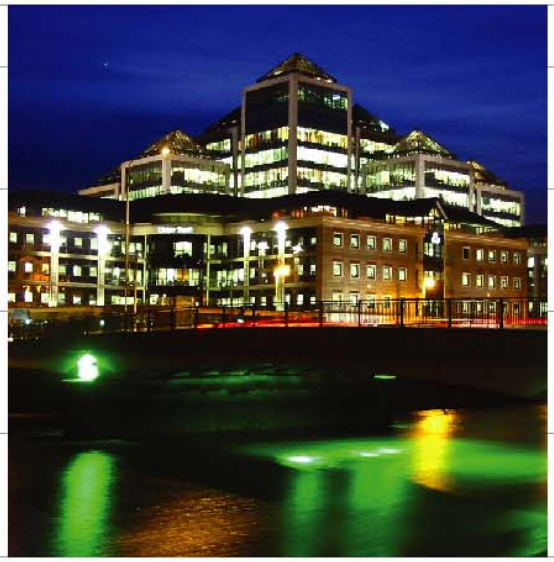




Grid Code

Version 1.2 May 2005

National Grid

www.eirgrid.com

Front Cover Images

1) George's Quay, Dublin. Photograph courtesy of Brian Fleming
2) The ESBNG's new Energy Management System in the National Control Centre, Dublin
3) Aughinish Alumina, Askeaton, Co. Limerick. Photograph courtesy of Aughinish Alumina
4) Kilkenny 110kV station
5) Cathaleen's Fall Hydro Generating Station, Donegal
6) Wind Turbine at Meentycat Wind Farm, Donegal

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GC GENERAL CONDITIONS

GC GENERAL CONDITIONS

GC.1 INTRODUCTION

GC.1.1 While each individual section of the **Grid Code** contains the rules and provisions relating specifically to that section of the **Grid Code**, there are provisions of more general application, which need to be included in the **Grid Code**. Such provisions are included in the **General Conditions**.

GC1.2 Terms which are capitalised and in bold type shall be interpreted according to the definition in the **Glossary** of the **Grid Code**. Where the **Glossary** refers to any word or term which is more particularly defined in a part of the **Grid Code**, the definition in that part of the **Grid Code** will prevail over the definition in the **Glossary** in the event of any inconsistency

GC.2 OBJECTIVE

GC.2.1 The objectives of the **General Conditions** are as follows:

(a) to ensure, insofar as it is possible, that the various sections of the **Grid Code** work together, and work in practice, for the benefit of the operation of the **Power System** and for the benefit of **ESBNG** and **Users;**

(b) to provide a set of principles governing the status and development of the **Grid Code** and related issues, as approved by the **Commission**.

GC.3 SCOPE

The **General Conditions** apply to **ESBNG**, the **Commission**, and to all **Users** (which expression in these **General Conditions** means all persons (other than **ESBNG**) to whom any individual section of the **Grid Code** applies).

GC.4 PURPOSE

GC.4.1 This **Grid Code** is designed to cover all material technical aspects relating to the operation and use of the **Transmission System,** and (insofar as relevant to the operation and use of the **Transmission System**) all material technical aspects relating to the use of **Plant** and or **Apparatus** connected to the **Transmission System** or to the **Distribution System.**

GC.5 GRID CODE REVIEW PANEL

GC.5.1 **ESBNG** shall establish and maintain the **Grid Code Review Panel** which shall be a standing body constituted to:

(a) generally review and discuss the **Grid Code** and its workings;

(b) review and discuss suggestions for amendments to the **Grid Code** which **ESBNG**, the **Commission**, or any **User** may wish to submit to **ESBNG** for consideration by the **Grid Code Review Panel** from time to time;

(c) discuss what changes are necessary to the **Grid Code** arising out of any unforeseen circumstances referred to it by **ESBNG** under GC.11; and

(d) publish recommendations and ensure that **User** consultation upon such recommendations has occurred through **Grid Code Review Panel** members.

GC.5.2 The **Grid Code Review Panel** shall be governed by a constitution, which defines its scope, membership, duties, and rules of conduct and operation as approved by the **Commission**.

GC.6 GRID CODE REVISIONS

GC.6.1 All revisions to the **Grid Code** must be reviewed by the **Grid Code Review Panel** prior to application to the **Commission** by **ESBNG.** All proposed revisions from **Users**, the **Commission**, or **ESBNG** will be brought before the **Grid Code Review Panel** by **ESBNG** for consideration. In the event that **ESBNG**, acting reasonably, considers that proposed revisions are frivolous or repeated, **ESBNG** may propose to the **Grid Code Review Panel** that these proposed revisions are not considered by the **Grid Code Review Panel**, but in the event that any member of the **Grid Code Review Panel** so decides, any proposed revision shall be reviewed by the **Grid Code Review Panel**. **ESBNG** will advise the **Grid Code Review Panel**, all **Users**, and the **Commission** of all proposed revisions to the **Grid Code** with notice of no less than 10 days in advance of the next scheduled meeting of the **Grid Code Review Panel**.

GC.6.2 Following review of a proposed revision by the **Grid Code Review Panel**, **ESBNG** will apply to the **Commission** for revision of the **Grid Code** based on the **ESBNG** recommendation and shall make representation of all other views or considerations including those of the **Grid Code Review Panel**. **ESBNG,** in applying to the **Commission,** shall also notify each **User** of the proposed revision and other views expressed by the **Grid Code Review Panel** and **Users** so that each **User** may consider making representations directly to the **Commission** regarding the proposed revision.

GC.6.3 The **Commission** shall consider the proposed revision, other views, and any further representations and shall determine whether the proposed revision should be made and, if so, whether in the form proposed or in an amended form. Where amendments to the revision are contemplated by the **Commission**, the **Commission** shall consult the **Grid Code Review Panel**, **ESBNG**, and **Users** as appropriate.

GC.6.4 Having been so directed by the **Commission** that the applied for revision or amended revision shall be made, **ESBNG** shall notify each **User** of the revision at least 14 **Business Days** prior to the revision taking effect, and the revision shall take effect (and this **Grid Code** shall be deemed to be amended accordingly) from (and including) the date specified in such notification or other such date as directed by the **Commission**.

GC.7 GRID CODE INTERPRETATION

GC.7.1 In the event that any **User** requires additional interpretation of the intention and application of any provision of the **Grid Code**, it may apply to **ESBNG** for such interpretation. Provided that the request is reasonable **ESBNG** shall provide the **User** with an interpretation of the relevant provision.

GC.7.2 In the event that the **User**, acting reasonably, considers that an interpretation provided by **ESBNG** pursuant to GC.7.1 is incomplete, the **User** may request additional clarification from **ESBNG**.

GC.7.3 In the event that the **User**, acting reasonably, considers that an interpretation provided by **ESBNG** pursuant to GC.7.1 is unreasonable or incorrect, the **User** may require **ESBNG** to refer the matter to the **Grid Code Review Panel** for consideration, in which case **ESBNG** shall refer the matter to the **Grid Code Review Panel** for consideration at the next scheduled meeting of the **Grid Code Review Panel** (or in the event that there is insufficient time before the next scheduled meeting, then at the meeting immediately following the next scheduled meeting).

GC.8 DEROGATIONS

GC.8.1 If a **User** finds that it is, or will be, unable to comply with any provision of the **Grid Code**, then it shall without delay report such non-compliance to **ESBNG** and shall, subject to the provisions of GC.8.2 make such reasonable efforts as are required to remedy such non-compliance as soon as reasonably practicable.

GC.8.2 Where the non-compliance is:

(a) with reference to **Plant** and/or **Apparatus** connected to the **Transmission System** and is caused solely or mainly as a result of a revision to the **Grid Code**; or

(b) with reference to **Plant** and/or **Apparatus** which is connected, approved to connect, or for which approval to connect to the **Transmission System** is being sought,

and the **User** believes either that it would be unreasonable (including cost and technical considerations) to require it to remedy such non-compliance or that it should be granted an extended period to remedy such non-compliance, it shall promptly submit to the **Commission** a request for a derogation from such provision in accordance with the requirements of GC.8.3 and shall provide **ESBNG** with a copy of such a request.

GC.8.3 A request for derogation from any provision of the **Grid Code** shall contain:

(a) the version number and the date of the **Grid Code** which includes the provision against which the non-compliance or predicted non-compliance was identified;

(b) identification of the **Plant** and/or **Apparatus** in respect of which a derogation is sought and, if relevant, the nature and extent to which the non-compliance exists;

(c) identification of the provision with which the **User** is, or will be, unable to comply;

(d) the reason for the non-compliance; and

(e) the date by which compliance will be achieved (if remedy of the non-compliance is possible) subject to GC.8.2.

GC.8.4 If **ESBNG** finds that it is, or will be, unable to comply with any provision of the **Grid Code**, then it shall, subject to the remaining provisions of GC.8 make such reasonable efforts as are required to remedy such non-compliance as soon as reasonably practicable.

GC.8.5 In the case where **ESBNG** requests derogation, **ESBNG** shall submit the information set out in GC.8.3 to the **Commission**.

GC.8.6 On receipt of any request for derogation, the **Commission** shall promptly consider such request and provided that the **Commission** considers that the grounds for the derogation are reasonable, then the **Commission** shall grant such derogation unless the derogation would, or it is likely that it would, have a material adverse impact on the security and stability of the **Transmission System** or impose unreasonable costs on the operation of the **Transmission System** or on other **Users**. In its consideration of a derogation request by a **User**, the **Commission** may contact the relevant **User** and or **ESBNG** to obtain clarification of the request or to discuss changes to the request.

Derogations from any provision of the **Grid Code** shall contain:

(a) the version number and the date of the **Grid Code** which includes the provision against which the derogation applies;

(b) identification of the provision with which the derogation applies;

(c) identification of the **Plant** and/or **Apparatus** in respect of which a derogation applies and, if relevant, the nature and extent to which the derogation applies including alternate compliance provisions;

(d) the reason for the non-compliance requiring derogation;

(e) the date by which the derogation ends if compliance will be achieved, or by which such derogation expires.

GC.8.7 To the extent of any derogation granted in accordance with this GC.8, **ESBNG** and/or the **User** (as the case may be) shall be relieved from its obligation to comply with the applicable provision of the **Grid Code** and shall not be liable for failure to so comply but shall comply with any alternate provisions as set forth in the derogation.

GC.8.8 **ESBNG** shall:

(a) keep a register of all derogations which have been granted, identifying the name of the person in respect of whom the derogation has been granted, the relevant provision of the **Grid Code** and the period of the derogation; and

(b) on request from any **User**, provide a copy of such register of derogations to such **User**

GC.8.9 Where a material change in circumstance has occurred a review of any existing derogations, and any derogations under consideration, may be initiated by the **Commission** at the request of the **Commission**, **ESBNG**, or **Users**.

GC.9 PLANT FAILURES

GC.9.1.1 When partial breakage or partial failure of a **Plant** and/or **Apparatus** occurs which causes a non-compliance but does not necessarily prevent the **Plant** and/or **Apparatus** being operated safely or securely then the **User** shall promptly notify **ESBNG** of the non-compliance and the **User's** proposed programme for remedying the non compliance.

GC.9.1.2 Where time permits and if **ESBNG** reasonably considers that a non-compliance of a **User** as described in GC.9.1.1 may have a materially adverse impact on another **User** or **Users**, **ESBNG** will consult the affected **User** or **Users** as to the impact of the intended non-compliance on the **User** or **Users**.

GC.9.1.3 If **ESBNG,** acting reasonably, and taking into account the operation of the **Transmission System** and the consultation with any affected **Users** in GC.9.1.2, is satisfied as to the **User's** programme for remedying the non-compliance, and the breakage or failure is not causing or is not likely to cause the **Plant** and/or **Apparatus** to materially affect the security and stability of the **Transmission System** or other **Users** and is not likely to impose unreasonable and unforeseen costs on the operation of the **Transmission System** or other **Users**, then **ESBNG** may, for so long as **ESBNG** is so satisfied, treat the **User** as being in compliance with the relevant provision of the **Grid Code**, and the **User** will be deemed to be so compliant.

GC.9.1.4 If **ESBNG,** at its discretion, taking into account the operation of the **Transmission System** and the consultation with any affected **Users** in GC.9.1.2, is not satisfied as to the **User's** programme for remedying the non compliance, the **User** shall apply for a derogation under the terms of GC.8.

GC.9.2 When breakage or failure of a **Plant** and/or **Apparatus** occurs which causes a non-compliance which prevents the **Plant** and/or **Apparatus** being operated safely or securely then the **User** shall promptly notify **ESBNG** of the non-compliance and reflect such non-compliance in **Declarations** (pursuant to SDC1) until such time as the non-compliance has been remedied.

GC.9.3 Failing agreement between the **User** and **ESBNG**, the **User** shall immediately apply for derogation in accordance with GC 8.2.

GC.10 ASSISTANCE IN IMPLEMENTATION

GC.10.1 **ESBNG** has a duty to implement, and comply with, the **Grid Code** as approved by the **Commission**.

GC.10.2 In order to fulfil its duty to implement the **Grid Code ESBNG** may, in certain cases, need access across boundaries, or may need services and/or facilities from **Users**. This could, for example, include **De-Energising** and/or disconnecting **Plant** and/or **Apparatus**. It is hoped that these cases would be exceptional and it is not, therefore, possible to envisage precisely or comprehensively what **ESBNG** might reasonably require in order to put it in a

position to be able to carry out its duty to implement the **Grid Code** in these circumstances.

GC.10.3 Accordingly, all **Users** are required not only to abide by the letter and spirit of the **Grid Code**, which shall include providing **ESBNG** with such rights of access, services and facilities as provided for in appropriate agreements, and complying with such instructions as **ESBNG** may reasonably require in implementing the **Grid Code**.

GC.11 UNFORESEEN CIRCUMSTANCES

GC.11.1 If circumstances arise which the provisions of the **Grid Code** have not foreseen, **ESBNG** shall to the extent reasonably practicable in the circumstances consult promptly and in good faith with all affected **Users** in an effort to reach agreement as to what should be done.

GC.11.2 If agreement between **ESBNG** and those **Users** as to what should be done cannot be reached in the time available, **ESBNG** shall determine what should be done. Whenever **ESBNG** makes such a determination it shall have regard wherever practicable in accordance with this GC.11.2 to the views expressed by **Users** and, in any event, **ESBNG** will act reasonably and in accordance with **Prudent Utility Practice** in all circumstances. In addition **ESBNG** will, following such a determination and upon request, make available to any affected **User** its reasons for the determination.

GC.11.3 Each **User** shall comply with all instructions given to it by **ESBNG** following such a determination provided the instructions are consistent with the then current technical parameters of the **User System** as notified under the **Grid Code**. **ESBNG** shall promptly refer all such unforeseen circumstances, and any such determination, to the **Grid Code Review Panel** for consideration in accordance with GC.5.1(c).

GC.12 HIERARCHY

In the event of any conflict between the provisions of the **Grid Code** and any contract, agreement, or arrangement between **ESBNG** and a **User**, the provisions of the **Grid Code** shall prevail unless the **Grid Code** expressly provides otherwise.

GC.13 OWNERSHIP OF PLANT AND/OR APPARATUS

References in the **Grid Code** to **Plant** and/or **Apparatus** of a **User** include **Plant** and/or **Apparatus** used by a **User** under any agreement with a third party.

GC.14 SYSTEM CONTROL

Where a **User System** (or part thereof) is, by agreement, under **ESBNG's** control, then for the purposes of communication and the co-ordination of operational time scales **ESBNG** can (for these purposes only) treat that **User System** (or part thereof) as part of the **Transmission System**, but as between **ESBNG** and other **Users** it will continue to be treated as the **User System**.

GC.15 ILLEGALITY AND PARTIAL INVALIDITY

GC.15.1 If any provision of the **Grid Code** should be found to be illegal or partially invalid for any reason, the legality and validity of all remaining provisions of the **Grid Code** shall not be affected.

GC.15.2 If part of a provision of the **Grid Code** is found to be unlawful or invalid but the rest of such provision would remain valid if part of the wording were deleted, the provision shall apply with such modification as may be necessary to make it valid and effective, but without affecting the meaning or validity of any other provision of the **Grid Code**.

PC PLANNING CODE

PC PLANNING CODE

PC.1 INTRODUCTION

Development of the **Transmission System** will arise for a number of reasons including, but not limited to:

(a) development on a **User System** already connected to the **Transmission System**;

(b) the introduction of a new **Connection Site** or the **Modification** of an existing **Connection Site** between a **User System** and the **Transmission System**;

(c) changing requirements for electricity transmission facilities due to changes in factors such as **Demand**, **Generation**, technology reliability requirements, and/or environmental requirements; and

(d) the cumulative effect of a number of such developments referred to in (a), (b), and (c) by one or more **Users**.

Accordingly, the development of the **Transmission System** may involve work:

(a) at a new or existing **Connection Site** where **User's Plant** and/or **Apparatus** is connected to the **Transmission System**;

(b) on new or existing transmission circuits or other facilities which join that **Connection Site** to the remainder of the **Transmission System**; and

(c) on new or existing transmission circuits or other facilities at or between points remote from that **Connection Site**.

The time required for the planning and subsequent development of the **Transmission System** will depend on the type and extent of the necessary work, the time required for obtaining planning permission and wayleaves, including any associated hearings, and the degree of complexity in undertaking the new work while maintaining satisfactory security and quality of supply on the existing **Transmission System**.

PC.2 OBJECTIVES

The objectives of the **Planning Code** are to provide for:

(a) **ESBNG/User** interaction in respect of any proposed development on the **User System** that may impact on the performance of the **Transmission System** or the direct connection with the **Transmission System**;

(b) the supply of information required by **ESBNG** from **Users** in order for **ESBNG** to undertake the planning and development of the **Transmission System** in accordance with the **Transmission Planning Criteria** and relevant standards; and

(c) the supply of information required by **ESBNG** for the purposes of the **Forecast Statement**.

PC.3 SCOPE

The **Planning Code** applies to **ESBNG** and to the following **Users:**

(a) **Generators** with **Registered Capacity** greater than 10MW

(b) all **Generators** connected to the **Transmission System**

(c) **Distribution System Operator;** and

(d) **Grid Connected Customers**.

The above categories of **User** will become bound by the **Planning Code** prior to generating, distributing or consuming electricity, as the case may be, and references to the various categories (or to the general category) of **User** should, therefore, be taken as referring to a prospective **User** in that role as well as to **Users** actually connected.

PC.4 PLANNING PROCEDURES FOR CONNECTION

PC.4.1 Information

Users and prospective **Users** of the **Transmission System** are able to assess opportunities for connecting to, and using, the **Transmission System**, through:

(a) the statement, prepared by **ESBNG**, enabling prospective **Users** to assess for each of the seven succeeding years, the opportunities available for connecting to and using the **Transmission System** and to assess those parts of the **Transmission System** most suited to new connections and transport of further quantities of electricity;

(b) a **Connection Offer** by **ESBNG** to enter into or amend a **Connection Agreement**; and

(c) published **Use of System Tariffs**.

PC.4.2 Application for Connection

PC.4.2.1 **Users** proposing a new **Connection Site** or **Modification** of an existing **Connection Site** shall send an application form to **ESBNG**.

PC.4.2.2 The application form to be submitted by a **User** when making an application for a **Connection Offer** shall include:

(a) a description of the **Plant** and/or **Apparatus** to be connected to the **Transmission System** or, as the case may be, of the **Modification** relating to the **User's Plant** and/or **Apparatus** already connected to the **Transmission System,** each of which shall be termed a **"User Development"** in the **Planning Code**;

(b) the relevant data as listed in the **Planning Code** Appendix; and

(c) the desired **Connection Date** and **Operational Date** of the proposed **User Development**.

PC.4.2.3 The application form for a **Connection Offer** shall be sent to **ESBNG** as more particularly provided in the connection offer process documentation.

PC.4.2.4 Data supplied in the application form or data submitted along with the application form which is directly relevant to the application and has been submitted in support of it will be treated as **Preliminary Project Planning Data** until such time as the **Connection Offer** has been made and accepted.

PC.4.3 Connection Offer

PC.4.3.1 A **Connection Offer** shall include, but shall not be limited to, the following:

(a) details of how the connection is to be made, including details of the **Plant** and **Apparatus** that will be required to implement the connection;

(b) a description of any **Modification** that the applicant **User** is required to pay for;

(c) an indication of the **Connection Date** and the **Operational Date**; and

(d) an estimate of the charges for connection.

PC.4.3.2 Any **Connection Offer** will provide that it must be accepted by the applicant **User** within the period stated in the **Connection Offer**, after which the **Connection Offer** will automatically lapse. Acceptance of the **Connection Offer** shall be effected by execution of the **Connection Agreement** by both parties which renders the **ESBNG** works relating to that **User Development** committed and binds both parties in accordance with its terms. Within 60 **Business Days** (or such longer period as **ESBNG** may agree in any particular

case) of acceptance of the **Connection Offer** the **User** shall supply the data pertaining to the **User Development** as listed in the Appendix to this **Planning Code**.

PC.4.3.3 Once a **Connection Offer** has been accepted then all data supplied in the application form and any data submitted along with the application form will be treated as Committed Project Planning Data.

PC.4.4 Complex Connections

PC.4.4.1 The magnitude and complexity of any **Transmission System** development will vary according to the nature, location and timing of the proposed **User Development** which is the subject of the application and it may, in certain circumstances, be necessary for **ESBNG** to carry out additional or more extensive system studies to evaluate more fully the impact of the proposed **User Development** on the **Transmission System**. Where **ESBNG** judges that such additional or more extensive studies are necessary the **Connection Offer** may indicate the areas that require more detailed analysis and before such additional studies are carried out, the **User** shall indicate whether it wishes **ESBNG** to undertake the work necessary to proceed to make a revised **Connection Offer** within the period allowed or such extended time as **ESBNG**, acting reasonably considers is necessary.

PC.4.4.2 To enable **ESBNG** to carry out any of the above detailed system studies, the **User** may, at the request of **ESBNG,** be required to supply some or all of the data items listed in the Appendix to this Planning Code as **Committed Project Planning Data** in advance of the normal time-scale, provided that **ESBNG** considers that it is relevant and necessary. In the event that such data items are supplied they will be treated as **Preliminary Project Planning Data** submitted in support of the application as outlined in PC.4.2.4.

PC 4.4.3 Any **User** proposing to de-rate, close, retire, withdraw from service or otherwise cease to maintain and keep available for **Dispatch** in accordance with **Good Industry Practice** any **Generation Unit** or **Generation Units** with **Registered Capacity** greater than 10 MW in aggregate shall give **ESBNG** at least 24 calendar months notice of such **action**.

PC.5 SYSTEM PLANNING

PC.5.1 In order for **ESBNG** to undertake the planning and development of the **Transmission System,** in accordance with the relevant standards as provided for in **PC.7, ESBNG** will require **Users** to provide data and information on a regular basis. Information received for this purpose will be treated as **System Planning Data**.

PC.5.2 **ESBNG** may also require additional data or information from a **User**. Where **ESBNG** considers that this information is required then the **User** where reasonable shall submit the information to **ESBNG** without delay. Such information may be required so that **ESBNG** can:

(a) plan and develop the **Transmission System** in accordance with the relevant standards;

(b) monitor **Power System** adequacy and **Power System** performance and project future **Power System** adequacy and **Power System** performance; and

(c) fulfil its statutory and regulatory obligations.

PC.5.3 In planning for the development of the **Transmission System**, **ESBNG** may require an individual **User**, or group of **Users**, to modify or install new **Plant** or **Apparatus**, where **ESBNG** can reasonably show that it is prudent or necessary to do so. A **User** may object on grounds that to modify or install new **Plant** or **Apparatus** as required, in accordance with **Good Industry Practice,** would be technically infeasible. This may include, but shall not be limited to, for example, the installation of **Power System Stabilisers**.

PC.6 DATA

PC.6.1 As far as the **Planning Code** is concerned, there are three relevant types of data; **Preliminary Project Planning Data, Committed Project Planning Data** and **System Planning Data**.

PC.6.1.1 These three types of data, which relate to differing levels of confidentiality, commitment and validation, are described below.

PC.6.1.2 **Preliminary Project Planning Data** and **Committed Project Planning Data** relate to the data required from a **User** at various stages during the process for introduction of a new **Connection Site** or **Modification** of an existing **Connection Site** as outlined in **PC.4**, and more specifically in the Application form for a Connection or Modification**. System**

Planning Data relates to the data that must be submitted at regular periods by all **Users,** or other such data or information as requested by **ESBNG** under **PC.6**

PC.6.2 An existing **User** proposing a new **Connection Site** will need to supply data both in an application for a **Connection Offer** and under the **Planning Code** in relation to that proposed new **Connection Site** and such information will be treated as **Preliminary Project Planning Data** or **Committed Project Planning Data** (as the case may be), but the data an existing User supplies under the **Planning Code** relating to its existing **Connection Sites** will be treated as **System Planning Data**

PC.6.3 **Preliminary Project Planning Data**

PC.6.3.1 At the time the **User** applies for a **Connection Offer** but before such an offer is made by **ESBNG**, the data relating to the proposed **User Development** will be considered as **Preliminary Project Planning Data**. This data will be treated as confidential within the scope of the provisions relating to confidentiality in **ESBNG** policy on confidentiality.

PC.6.3.2 **Preliminary Project Planning Data** contains such data as may be reasonably required by **ESBNG** to evaluate the connection application/ as outlined in **PC.4.2** and, if applicable, any other data directly relevant to, and submitted in support of, the application.

PC.6.4 **Committed Project Planning Data**

PC.6.4.1 Once the **Connection Offer** has been formally accepted by the prospective **User**, the data relating to the **User Development,** already submitted as **Preliminary Project Planning Data**, and any subsequent data required by **ESBNG** under this **Planning Code**, will become **Committed Project Planning Data**. This data, together with other data held by **ESBNG** relating to the **Transmission System,** will form the basis from which new applications by any **User** will be considered and from which planning of the **Transmission System** and power system analysis will be undertaken. Accordingly, **Committed Project Planning Data** will not be treated as confidential to the extent that **ESBNG** is obliged:

(a) to use it in the preparation of the **Forecast Statement** and in any further information given pursuant to the **Forecast Statement**;

(b) to use it when considering and/or advising on applications (or possible applications) of other **Users** (including making use of it by giving data from it, both orally and in writing, to other **Users** making an application (or considering or discussing a possible application) which is, in **ESBNG's** view, relevant to that other application or possible application);

(c) to use it for **ESBNG** planning purposes;

(d) under the terms of an **Interconnection Agreement** to pass it on as part of system information on the **Power System**.

PC.6.5 To reflect different types of data, **Preliminary Project Planning Data** and **Committed Project Planning Data** are themselves divided into those items of Data which:

(a) will always be forecast, known as **Forecast Data**;

(b) upon connection become fixed (subject to any subsequent changes), known as **Registered Data**; and

(c) relate to **Plant** and/or **Apparatus** which upon connection will become **Registered Data**, but which prior to connection will be an estimate of what is expected, known as **Estimated Registered Data.**

PC.6.6 **System Planning Data**

PC.6.6.1 The **Planning Code** requires that, as soon as is practical, and not later than the **Operational Date** all data requirements as stated in the Appendix to the Planning Code, not previously requested by **ESBNG** and supplied by the **User**, will be submitted by the **User** to **ESBNG.** This will include confirming any estimated values assumed for planning purposes or, where practical, replacing them by validated actual values and by updated estimates for the future and by updating forecasts for **Forecast Data** items such as **Demand**.

PC.6.6.2 The **Planning Code** requires that **Users** submit to **ESBNG**, each year, the **System Planning Data** as listed in section PC.A3.3 of the Appendix to the Planning Code. This data should be submitted by calendar week 9 of each year and should cover each of the ten succeeding years (and in certain instances the current year). Where from the date of one submission to the/a subsequent date submission there is no change in the data to be submitted for any given year, instead of resubmitting the data, a **User** may submit a written statement that there has been no change from the data submitted the previous time, pertaining to the particular year specified.

PC.6.7 **System Planning Data**, together with other data held by **ESBNG** relating to the **Transmission System**, will form the basis from which new applications by any **User** will be considered and from which planning of the **Transmission System** will be undertaken. Accordingly**, System Planning Data** will not be treated as confidential to the extent that **ESBNG** is obliged:

(a) to use it in the preparation of the **Forecast Statement** and in any further information given pursuant to the **Forecast Statement**;

(b) to use it when considering and/or advising on applications (or possible applications) of other **Users** (including making use of it by giving data from it, both orally and in writing, to other **Users** making an application (or considering or discussing a possible application) which is, in **ESBNG's** view, relevant to that other application or possible application);

(c) to use it for **ESBNG** planning purposes; and

(d) under the terms of an **Interconnection Agreement** to pass it on as part of system information on the **Power System**.

To reflect the different types of data referred to above **System Planning Data** is itself divided into those terms of data:

(a) which will always be forecast, known as **Forecast Data**;

(b) which upon connection become fixed (subject to any subsequent changes), known as **Registered Data**; and

(c) which relate to **Plant** and/or **Apparatus** which for the purposes of the **Plant** and/or **Apparatus** concerned as at the date of submission are **Registered Data** but which for the ten succeeding years will be an estimate of what is expected, known as **Estimated Registered Data.**

PC.7 PLANNING STANDARDS

PC.7.1 **ESBNG** shall apply the **Transmission Planning Criteria** and relevant standards in the planning and development of the **Transmission System**.

PC.7.2 In assessing the technical requirements of a **User's** connection, **ESBNG** shall not unfairly discriminate between **Users** of a similar category, location or size although it will not be technically or economically practicable to achieve uniformity of method of connection at all times.

PC.7.3 The **Transmission System Voltage** level at which a **User's System** will be connected and the busbar configuration which a **User's System** uses will depend upon but shall not be limited to the following:

(a) the size of the **Generation Units** and the number of **Generation Units** comprising the **User's System;**

(b) consistency with future development of the **Transmission System**;

(c) proximity to the existing **Transmission System**; and

(d) the cost of the proposed connection.

PC.7.4 The **Transmission System Voltage** level at which a **Grid Connected Customer** will be connected to the **Transmission System** will depend upon but shall not be limited to the following:

a) the size of the **MW Demand** at the **Connection Point;**
b) consistency with future development of the **Transmission System;**
c) proximity to the existing **Transmission System**.; and
d) the cost of the proposed connection.

PC.7.5 The **Transmission System Voltage** level at which the **Distribution System Operator** will be connected to the **Transmission System** will depend upon but shall not be limited to the following:

(a) the size of the **MW Demand** at the **Connection Point;**
(b) consistency with future development of the **Transmission System;**
(c) consistency with co-ordinated planning of the **Transmission System** and of the **Distribution System**;
(d) proximity to the existing **Transmission System**; and
(e) the cost of the proposed connection.

PC.7.6 The method of connection used may exceed the relevant standards where this is required by the **User** and is acceptable to **ESBNG**.

PC.8 VALIDATION AND VERIFICATION OF DATA

PC.8.1 Where a **User** submits data, which in the opinion of **ESBNG** is incorrect then **ESBNG** may request that that **User** supply such additional information as **ESBNG** deems necessary to verify the accuracy of the data.

PC.8.2 Where, following consideration of such information submitted under PC.8.1, **ESBNG** maintains, acting reasonably, that the additional information is insufficient to verify the accuracy of the original data then **ESBNG** may request that the **User** carry out specific **Tests** to verify the data. Where such a **Test** or **Tests** are requested, they will be subject to the provisions of the relevant operational codes.

PC.8.3 In the event that the data as submitted by the **User** is verified by the **Test** or **Tests** to be correct then all costs reasonably incurred as a result of such **Test** or **Tests** as agreed will be borne in full by **ESBNG**.

P.C.8.4 In the event that any of the data items submitted are shown to be incorrect or inaccurate then the **User** will bear the cost of the **Test** in full and the data values as ascertained by the **Tests** will be the values used in the data. If, as a result of the changes to the data arising from the **Test** or **Tests**, **ESBNG** have to redo or perform additional system studies then the **User** will also bear the cost reasonably incurred as a result of this additional work.

GRID CODE - PLANNING CODE APPENDIX

Statistical and Forecast Information Requirements

INTRODUCTION

This appendix specifies data to be submitted to **ESBNG** by **Users** or prospective **Users** of the **Transmission System**. The requirement to provide data is governed by the Planning Code (PC4.2, PC4.3, PC4.4, PC5 and PC6).

The specific data requirements depend on whether the **User** is a **Customer** or a **Generator** or both. PC.A1 and PC.A2 apply to all **Users**. PC.A3 applies to demand **Users**. PC.A4 applies to **Generators**.

Any material changes to the data specified in PC.A3 or PC.A4 must be notified to **ESBNG** as soon as practicable.

PC.A1: General Information

PC.A1.1. Full name of the User (s)_____

_____

PC.A1.2. Address of the User (s)

_____

_____

_____

_____

PC.A1.3. Contact Person _____

PC.A1.4. Telephone Number _____

PC.A1.5. Telefax Number _____

PC.A1.6. Email Address _____

PC.A2: New Connections

PC.A2.1 General Details

PC.A2.1.1 Projected or target **Operational Date**.

PC.A2.1.2 Target **Connection Date**

PC.A2.1.3 Reliability of connection requested (number of connecting circuits e.g. one, two?): (subject to technical and system security and reliability standards)

PC.A2.2 Map and Diagrams:

PC.A2.2.1: Provide a 1:50,000 "Discovery Series" Ordnance Survey map, with the location of the facility clearly marked with an "X". In addition, please specify the Ordnance Survey Grid Co-ordinates of the electrical connection point which is assumed to be at the HV bushings of the Grid Connected Transformer. See Figure 1 for an example of how to correctly specify the grid co-ordinates.

PC.A2.2.2: Provide a plan of the site (1:200 or 1:500) of the proposed facility, indicating the proposed location for a transmission station compound, location of the connection point, generators, transformers, site buildings etc. The plan is to be submitted in hard copy format. A digitised format may be required and should also be provided if available.

PC.A2.2.3: Provide an electrical single line-diagram of the proposed facility detailing all significant items of plant. The plan is to be submitted in hard copy format. A digitised format may be required and should also be provided if available.

PC.A2.3 Generation Licensing and Authorisation (For generation applications only)

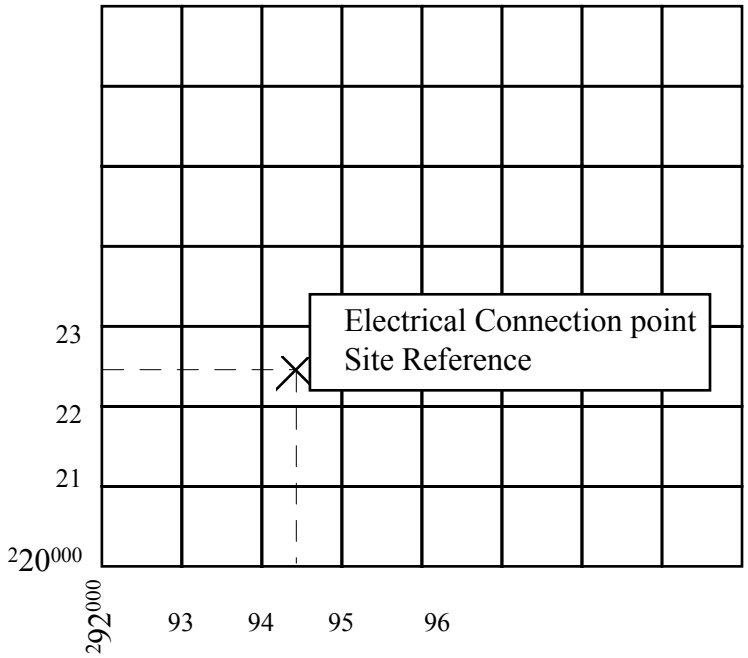
PC.A2.3.1 Generation Licence:

Details of any generation **Licence** held by the applicant, or of any application for a generation **Licence**.

PCA2.3.2 Authorisation:

Details of any authorisation or application for authorisation to construct or reconstruct the generation station for which the connection is being sought.

Figure 1: Example of a Discovery Series Map grid



Site co-ordinates: Easting 294500, Northing 222500

Easting and Northing co-ordinates should be stated to six digits.
The co-ordinates should be labelled clearly so as to identify which is Easting and which is Northing.
The numbers on the horizontal axis are Easting co-ordinates.
The numbers on the vertical axis are Northing co-ordinates.

Example:

The **Easting** site co-ordinates are QYYZZZ, where:

Q refers to the first number (in superscript) of the bottom left hand corner of the map (i.e. $^{2}92^{000}$ Q=2),
YY are the numbers on the horizontal axis directly below the site to the left (i.e. 94)

ZZZ is the actual position in the grid expressed from 0 to 999 (e.g. if half way horizontally within the grid square, the Easting number is approximately 500.

The **Northing** co-ordinates are similarly identified, except the vertical axis rather than the horizontal axis is used.

PC.A3: Demand Data Requirements

PC.A3.1 Treatment of Demand Data

At the time the **User** applies for a connection offer but before an offer is made by **ESBNG** and accepted by the applicant **User** the above data will be considered as **Preliminary Project Planning Data** as described in **PC 6.3**.

Once the **Connection Offer** has been formally accepted by the prospective **User** all data shall be provided by the **User** and treated as **Committed Project Planning Data** as discussed in **PC 6.4**.

Following the **Operational Date** or **Modification Date** as appropriate, all data requirements as listed in this appendix shall be submitted by the **User** to **ESBNG** and shall be treated as **System Planning Data** as discussed in **PC 6.6**. This will include confirming any estimated values assumed for planning purposes and replacing them by validated actual values and by updated estimates for future **Forecast Data**.

PC.A3.2 Registered Connection Capacity

The registered connection capacity is required in MW and Mvar, corresponding to the maximum MVA. It should be stated whether the **User** is producing or absorbing Mvar.

PC.A3.3 Measured and Forecast Data

This section details the measurements of demand and 10-year demand forecasts that are required from each **User** of the **Transmission System** who is a **Demand Customer** in respect of each infeed from the **Transmission System** to the Customer's network(s)**.** This section applies equally to the **Distribution System Operator (DSO).**

The **TSO** shall notify each **User** who is a **Demand Customer** in advance of each load reading day. These load reading days are winter peak, summer and summer minimum as specified in sections **PC.A3.3.2**, **PC.A3.3.3** and **PC.A3.3.4** respectively.

The measurements of demand and 10-year demand forecasts should be submitted by the end of calendar week 9 of each year.

PC.A3.3.1 Measurement Point

Demand measurements and forecasts for each infeed from the **Transmission System** shall relate to the appropriate **Measurement Point**.

PC.A3.3.2 Winter 12.30 and 18.00 - Load Readings and Forecast

A coincident set of measurements of MW and Mvar values both at 12.30 and 18.00 hours on the second Thursday in December is required. If the second Thursday in December is the 8th, then the measurements should be taken on the following Tuesday, December 13th. The readings should be taken with both the transmission and distribution networks intact, and with normal sectionalising of the **Distribution System**, i.e. under normal feeding conditions. The load reading shall take account of embedded generation as detailed in section **PC.A3.3.6**.

A forecast of the expected MW and Mvar winter peak demand at the **Measurement Point** at 12.30 and 18.00 hours for the next ten (10) years is required. For example, the forecasts to be received by calendar week 9 of 2003 should cover years 2003 through 2012. The load forecast shall take account of sections **PC.A3.3.6** through **PC.A3.3.9** dealing with embedded generation, description of forecast methodology, transformer reinforcements and permanent load transfer.

The **DSO,** in preparing the forecast for winter peak load, shall bear in mind that the coincident load readings taken on the second Thursday in December may be lower than at system peak.

PC.A3.3.3 Summer 12.30 - Load Readings and Forecast

A coincident set of measurements of MW and Mvar values at 12.30 hours on the fourth Thursday in June is required. The load reading shall take account of embedded generation as detailed in section **PC.A3.3.6**.

A corresponding 10-year forecast of the MW and Mvar demand at the **Measurement Point** in June at 12.30 hours for the next ten (10) years is also required. For example, the forecasts to be received by calendar week 9 of 2003 should cover years 2003 through 2012. The load forecast shall take account of sections **PC.A3.3.6** through **PC.A3.3.9** dealing with embedded generation, description of forecast method, transformer reinforcements and permanent load transfer.

PC.A3.3.4 Summer Night Valley - Load Reading and Forecast

A coincident set of measurements of MW and Mvar values at 06.00 hours on the Sunday preceding the early August Monday Public Holiday is required. The load readings shall take account of embedded generation as detailed in section **PC.A3.3.6**.

A corresponding 10-year forecast of the MW and Mvar minimum demand at the **Measurement Point** in August at 06.00 hours for the next ten (10) years is also required. For example, the forecasts to be received by calendar week 9 of 2003 should cover years 2003 through 2012. The load forecast shall

take account of sections **PC.A3.3.6** through **PC.A3.3.9** dealing with embedded generation, description of forecast method, transformer reinforcements and permanent load transfer.

PC.A3.3.5 Non Coincident Peak Demand - Load Reading and Forecast

Each **User** of the **Transmission System** who is a **Demand Customer**, including the **DSO**, is required to specify by calendar week 9 of each year, the MW and Mvar values corresponding to the maximum MVA demand which occurred at the **Measurement Point** during the previous year. The date and time of the occurrence of this maximum demand should be stated by the **User**.

PC.A3.3.6 Embedded Generation

All load readings shall specify, separately, the MW and Mvar contribution from significant embedded generation. The **User** should indicate whether the generator is producing or absorbing Mvar from the system. The type or types of significant embedded generation should be specified – hydro, wind, CHP, biomass, diesel or other.

All load forecasts shall specify, separately, the installed capacity of existing and projected significant embedded generation. Both MW and Mvar capability should be given, indicating the Mvar limits both for production and absorption. The type or types of embedded generation should be specified – hydro, wind, CHP, biomass, diesel or other.

PC.A3.3.7 Load Forecast - Methodology

The **User** shall provide, with the forecast data, a brief description of the basis for the forecast.

PC.A3.3.8 Load Forecast - Transformer Reinforcements

The **User** shall provide, with the forecast data, details of planned changes in transformer capacity between the **Measurement Point** and the **Connection Point**.

PC.A3.3.9 Load Forecast - Permanent Load Transfer

There are two separate characteristics of **Distribution System** load forecasts; expected load growth and expected permanent load transfer between infeeds from the **Transmission System**. In order to

identify separately the load growth, the **DSO** demand forecasts shall be prepared for the load at each **Measurement Point** without taking account of any proposed load transfers.

Then, in order to identify separately the proposed load transfer, the **DSO** shall provide, with the forecast data, details of each planned load transfer as follows:-

- Date of transfer
- Reason for transfer, e.g. proposed 110kV station, transformer capacity, etc.
- MW and Mvar at each of the measurement points expected to be transferred
- Existing source of supply for the load to be transferred.

Only proposed permanent load transfers for which there is a firm commitment should be included. For example, proposed 110kV stations should be included only where there is a connection agreement between **ESBNG** and the **DSO.**

For a proposed new 110kV station which will supply new load and for which there is a connection agreement between **ESBNG** the **DSO**, a load forecast is required.

PC.A3.3.10 Special Load Reading

The **DSO** shall continue to provide **ESBNG** with the **DSO** special load readings.

PC.A3.3.11 Data Templates

For uniformity of data capture, and to facilitate **Users** of the **Transmission System** who are **Demand Consumers**, **ESBNG** will provide to each such **User** prepared templates with data validation to facilitate entry of the required data.

Users shall provide data to **ESBNG** using these data templates or in such other form as may be agreed by **ESBNG**.

PC.A3.4 User Network Data

Single-line diagram of user network to a level of detail to be agreed with **ESBNG**.
Electrical characteristics of all 110 kV circuits and equipment (R, X, B, R_0, X_0, $B_{0,}$) continuous and overload ratings.
Contribution from **User** network to a three-phase short circuit at connection point.

Connection details of all 110 kV-connected transformers, shunt capacitors, shunt reactors etc. (star, delta, zigzag, etc.)

Electrical characteristics of all 110kV circuits and equipment at a voltage lower than 110 kV that may form a closed tie between two connection points on the **Transmission System**.

PC.A3.5 Standby Supply Data

For each **User** who is a **Demand Customer**, that can take supply from more than one supply point, the following information is required:

Source of the standby supply (alternative supply point(s))
Standby capacity required (MW and Mvar)

PC.A3.6 Fluctuating Loads

For each demand that can fluctuate by more than 5 MVA at the point of connection to the **Transmission System**, the following information is required:

PCA3.6.1. Rate of change of **Active Power** and **Reactive Power**, both increasing and decreasing (kW/s. kvar/s)

PCA3.6.2. The shortest repetitive time interval between fluctuations in Active Power and **Reactive Power Demand** (Seconds)

PCA3.6.3. The magnitude of the largest step changes in **Active Power** and **Reactive Power Demand** (kW, Kvar)

PC.A3.7 Disturbing Loads

Description of any **Disturbing Load** to be connected to the **Transmission System**.

PC.A3.8 Grid Connected Transformer

	Symbol	Units
Number of windings		
Vector Group		
Rated current of each winding		A
Transformer Rating		MVA_{Trans}
Transformer nominal LV voltage		kV
Transformer nominal HV voltage		kV
Tapped winding		
Transformer Ratio at all transformer taps		
Transformer Impedance (resistance R and reactance X) at all taps	R+jX	% on rating MVA_{Trans}
For 3 winding transformers, where there are external connections	$Z_{HV:LV1}$	% on rating MVA_{Trans}
to all 3 windings, the impedance (resistance R and reactance X)	$Z_{HV:LV2}$	% on rating MVA_{Trans}
between each pair of windings is required, measured with the	$Z_{LV1:LV2}$	% on rating MVA_{Trans}
third set of terminals open-circuit.		
Transformer zero sequence impedances at nominal tap		
Zero Phase Sequence impedance measured between the HV	$Z_{HT\,0}$	Ohm
terminals (shorted) and the neutral terminal, with the LV terminals open-circuit.		
Zero Phase Sequence impedance measured between the HV	$Z_{HL\,0}$	Ohm
terminals (shorted) and the neutral terminal, with the LV terminals short-circuited to the neutral.		
Zero Phase Sequence impedance measured between the LV	$Z_{LT\,0}$	Ohm
terminals (shorted) and the neutral terminal, with the HV terminals open-circuit.		
Zero Phase Sequence impedance measured between the LV	$Z_{LH\,0}$	Ohm
terminals (shorted) and the neutral terminal, with the HV terminals short-circuited to the neutral.		
Zero Phase Sequence leakage impedance measured between	$Z_{L\,0}$	Ohm
the HV terminals (shorted) and the LV terminals (shorted), with the Delta winding closed.		
Earthing Arrangement including LV neutral earthing resistance & reactance		
Core construction (number of limbs, shell or core type)		
Open circuit characteristic		Graph

PC.A3.9 Shunt Capacitor / Reactor Data

For each shunt capacitor or reactor with a rating in excess of 1 Mvar connected to or capable of being connected to a user network, the following information shall be provided.

PCA3.9.1 Rating (Mvar)

PCA3.9.2 Resistance / Reactance / Susceptance of all components of the capacitor or reactor bank

PCA3.9.3 Fixed or switched.

PCA3.9.4 If switched, control details (manual, time, load, voltage, etc.)

PCA3.9.5 If automatic control, details of settings.

PC.A4: Generator Data Requirements

PC.A4.1 General Details

Each **Generator** shall submit to **ESBNG** detailed information as required to plan, design, construct and operate the **Transmission System**.

Station Name _____

Number of Generating units _____

Primary Fuel Type / Prime Mover (e.g. gas, hydro etc.) _____

Secondary Fuel Type (e.g. oil) _____

Generation Export Connection Capacity Required (MW) _____

PC.A4.2 Treatment of Generator Data

* data item which must be provided by the applicant and which shall be treated as **Preliminary Project Data** as discussed in **PC 6.3.**

§ data item which, if not provided by the applicant as **Preliminary Project Data,** will be estimated by **ESBNG** at the applicant's sole risk. **ESBNG** puts the applicant on notice that this data estimate shall be treated as **Preliminary Project Data** as discussed in **PC 6.3**.

Once the **Connection Offer** has been formally accepted by the prospective **User** all data shall be provided by the **User** and treated as **Committed Project Planning Data** as discussed in **PC 6.4**.

Following the **Operational Date** or **Modification Date** as appropriate, all data requirements as listed in this appendix shall be submitted by the **User** to **ESBNG** and shall be treated as **System Planning Data** as discussed in **PC 6.6**. This will include confirming any estimated values assumed for planning purposes and replacing them by validated actual values and by updated estimates for future **Forecast Data**.

PC.A4.3 Generator Operating Characteristics And Registered Data

Minimum requirements for generator operating conditions are specified in the **Connection Conditions**.

* For thermal plant, provide a functional block diagram of the main plant components, showing boilers, alternators, any heat or steam supplies to other processes etc. indicate whether single shaft or separate shaft.

For each individual unit fill in the following:

Unit Number ____

Registered Capacity (MW) ____

	Symbol	Units
* Normal Maximum Continuous Generation Capacity:		MW
* Normal Maximum Continuous Export Capacity		MW
* Power Station auxiliary load		MW
§ Power Station auxiliary load		Mvar
* Maximum (Peaking) Generating Capacity		MW
* Maximum (Peaking) Export Capacity		MW
* Normal Minimum Continuous Generating Capacity		MW
* Normal Minimum Continuous Export Capacity		MW
* Generator Rating:	Mbase	MVA
* Normal Maximum Lagging Power Factor		Mvar
* Normal Maximum Leading Power Factor		Mvar
§ Governor Droop	R	
§ Forbidden zones		MW
§ Terminal Voltage adjustment range		kV
§ Short Circuit Ratio		
§ Rated Stator Current		Amps

Description	
§ Capability Chart showing full range of operating capability of the generator including thermal and excitation limits.	Diagram
§ Open Circuit Magnetisation Curves	Graph
§ Short Circuit characteristic	Graph
§ Zero power factor curve	Graph
§ V curves	Diagram

	Symbol	Units
§ Time to synchronise from warm		Hour
§ Time to synchronise from cold		Hour
§ Minimum up-time		Hour
§ Minimum down-time		Hour
§ Normal loading rate		MW / min
§ Normal deloading rate		MW / min
§ Can the generator start on each fuel		
§ Ability to change fuels on-load		
§ Available modes (lean burn, etc.)		
§ Time to change modes on-load		
§ Control range for SFRS operation		MW
Other relevant operating characteristics not otherwise provided....		

§ **Reserve Capability**

Primary Spinning Reserve

Secondary Spinning Reserve

Tertiary Reserve

Give details of reserve capability of the generator in different operating modes:
Unit co-ordinating, turbine follow, recirculation, base load, etc.

What reserve, if any, is available when the unit is off load?

PC.A4.4 Generator Parameters

	Symbol	Units
* direct axis Synchronous reactance	X_d	% on rating
* direct axis Transient reactance saturated	$X'_{d\ sat}$	% on rating
* direct axis Transient reactance unsaturated	$X'_{d\ unsat}$	% on rating
* Sub-transient reactance unsaturated	$X''_d = X''_q$	% on rating
§ quad axis Synchronous reactance	X_q	% on rating
§ quad axis Transient reactance unsaturated	$X'_{q\ unsat}$	% on rating
§ Negative Phase Sequence Synchronous reactance	X_2	% on rating
§ Zero phase sequence reactance	X_0	% on rating

* Turbine generator Inertia constant for entire rotating mass	H	MW s/MVA

§ Stator resistance	Ra	% on rating
§ Stator Leakage reactance	X_L	% on rating
§ Poiter reactance	X_P	% on rating

Generator Time Constants

	Symbol	Units
§ Direct axis open Circuit Transient	Tdo’	sec
§ Direct axis open Circuit sub-Transient	Tdo’’	sec
§ Quad axis open Circuit Transient	Tqo’	sec
§ Quad axis open Circuit sub-Transient	Tqo’’	sec
§ Direct axis short Circuit Transient	Td’	sec
§ Direct axis short Circuit sub-Transient	Td’’	sec
§ Quad axis short Circuit Transient	Tq’	sec
§ Quad axis short Circuit sub-Transient	Tq’’	sec

PC.A4.5 § Excitation System:

Fill in the following parameters or supply a Laplace-domain control block diagram in accordance with IEEE standard excitation models (or as otherwise agreed with ESB National Grid) completely specifying all time constants and gains to fully explain the transfer function from the compensator or generator terminal voltage and field current to generator field voltage.

Description	Symbol	Units
Excitation system type (AC or DC)		Text
Excitation feeding arrangement (solid or shunt)		Text
Excitation system Filter time constant	Tr	sec
Excitation system Lead time constant	Tc	sec
Excitation system Lag time constant	Tb	sec
Excitation system Controller gain	Ka	
Excitation system controller lag time constant	Ta	sec
Excitation system Maximum controller output	Vmax	p.u.
Excitation system minimum controller output	Vmin	p.u.
Excitation system regulation factor	Kc	
Excitation system rate feedback gain	Kf	
Excitation system rate feedback time constant	Tf	sec

PC.A4.6 § Speed Governor System:

Supply a Laplace-domain control block diagram in accordance with IEEE standard prime mover models for thermal and hydro units (or as otherwise agreed with ESB National Grid) completely specifying all time constants and gains to fully explain the transfer function for the governor in relation to frequency deviations and setpoint operation.

PC.A4.7 § Control Devices (including Power System Stabilisers) and Protection Relays

Please supply any additional Laplace domain control diagrams for any outstanding control devices or special protection relays in the generating unit, which automatically impinge on its operating characteristics within 30 seconds following a system disturbance and which have a minimum time constant of at least 0.02 seconds.

PC.A4.8 § Environmental Impact

CO_2	tonne CO_2 / tonne fuel
	Unit CO_2 removal efficiency
SO_2	tonne SO_2 / tonne fuel
	Unit SO_2 removal efficiency
NO_X	tonne NO_X / exported MWh curve

PC.A4.9 § Pumped Storage

Reservoir Capacity	MWh pumping
Max Pumping Capacity	MW
Min Pumping Capacity	MW
Efficiency (generating / pumping ratio)	%

PC.A4.10 § Wind Turbine Generators and Mains Excited Asynchronous Generators

State whether turbines are Fixed Speed or Variable Speed:

Please provide manufacturer details on electrical characteristics and operating performance with particular reference to Flicker and Harmonic performance.

Please provide details of the anticipated operating regime of generation, i.e. continuous, seasonal etc. List the anticipated maximum export level in MW for each calendar month, and indicate how generation would vary over a typical 24 hour period during the month of maximum export.

Give details of expected rapid or frequent variations in output, including magnitude, max rate of change expected, frequency and duration.

For **Mains Excited Asynchronous Generators**, please state:

	Units
How the generator is run up to synchronous speed	
Magnitude of inrush / starting current	Amps
Duration of inrush / starting current	ms
Starting / paralleling frequency	Hz
Power factor on starting	
Reactive power demand at zero output ('no load')	kvar
Give details of reactive power compensation to be installed	

PCA.4.10.1 MODELLING REQUIREMENTS FOR WIND TURBINE GENERATORS

PCA4.10.1.1 INTRODUCTION

The **TSO** requires suitable and accurate dynamic models for all **Generators** connected to, or applying for a connection to, the transmission system in order to assess reliably the impact of the **Generator's** proposed installation on the dynamic performance and security and stability of the **Power System**.

Modelling requirements for thermal and hydro **Generators** are processed on the identification by the applicant of the relevant PSS/E library model and the provision of the applicable data parameters in the current, appropriate application form. Where there are no suitable library models available, specially written models are supplied. These are known in PSS/E as "user-written models".

Currently (September 2004) there are no suitable PSS/E library models for **Wind Turbine Generators**. As a result, the **TSO** requires **Wind Farm Power Stations** greater than 5MW to provide specially written models and associated data parameters specific to the **Wind Turbine Generators** and any associated controls and reactive compensation equipment to be used in the applicant's **Wind Farm Power Station** scheme. The requirements of these models are as outlined in this section of the **Planning Code** Appendix.

PCA4.10.1.2 WIND TURBINE GENERATOR DYNAMIC MODELS

PCA4.10.1.2.1 Requirement to provide a dynamic model

Each **Wind Farm Power Station** shall provide a dynamic model, or shall provide an unambiguous reference to a dynamic model previously provided to the **TSO**, appropriate for the **Wind Farm Power Station.** If all the **Wind Turbine Generators** in the **Wind Farm Power** Station are not identical, the model shall incorporate separate modules to represent each type of **Wind Turbine Generator**. Appropriate data and parameter values must be provided for each model. The model shall be provided in PSS/E format, or in such other format as may be agreed between the **Wind Farm Power Station** and the **TSO.**

The models for **Wind Turbine Generators** and the **Wind Farm Power Station** (computer software based on a mathematical representation of the behaviour of the machine) must be able to calculate how quantities such as **Active Power** output, **Reactive Power** output, turbine speed etc. vary as factors such as the **Voltage** at the **Connection Point** change. They must take account of the inherent characteristics of the machines and the actions of the **WTG** control systems and any relevant **Wind Farm Power Station** control systems.

The models provided shall be treated as **Preliminary Project Planning Data, Committed Project Planning Data** or **System Planning Data** as appropriate**,** as set out in **PC.6** of the **Planning Code.**

PCA4.10.1.2.2 Computer environment

These models must run on the PSS/E software for the Irish network. They must not require a simulation time step of less than 5ms. Details of the current PSS/E version, computer platform, compiler version etc, will be provided by the **TSO** upon request. The **TSO** may from time to time request that the models be updated to be compatible with changes in the **TSO's** computing environment. Each **Wind Farm Power Station** shall ensure that such updated models are provided without undue delay.

PCA4.10.1.2.3 Features to be represented in the dynamic model

The dynamic model must represent the features and phenomena likely to be relevant to angular and **Voltage** stability. These features include but may not be limited to:

a) the electrical characteristics of the **Generator**;
b) the separate mechanical characteristics of the turbine and the **Generator** and the drive train between them;
c) variation of power co-efficient with pitch angle and tip speed ratio;
d) blade pitch control;
e) converter controls;
f) reactive compensation;

g) protection relays.

PCA4.10.1.2.4 Model aggregation

For computational reasons, it is essential that the models of individual **WTGs** can be aggregated into a smaller number of models, each representing a number of **WTGs** at the same site. A representation of the collector network may be included in the aggregate model of the **Wind Farm Power Station.**

PCA4.10.1.2.5 Model documentation

The model should be fully documented. The documentation should describe in detail the model structure, inputs, outputs and how to set up and use the model and should be based on the documentation of standard PSS/E library models.

The **TSO** may, when necessary to ensure the proper running of its complete system representation or to facilitate its understanding of the results of a dynamic simulation, request additional information concerning the model, including the source code of one or more routines in the model. The **Wind Farm Power Station** shall comply with any such request without delay. Where the **Wind Farm Power Station** or any other party (acting reasonably) designates such information as confidential on the basis that it incorporates trade secrets, the **TSO** shall not disclose the information so designated to any third party.

PCA4.10.1.2.6 Time to Comply

Where a **User** requires reasonable time to develop the necessary model or models so as to comply fully with all the provisions in this section **PCA 4.10.1.2**, the **User** may apply to the **TSO** to be deemed compliant with the provisions of **PCA 4.10.1.2** on the basis of **GC.9.1.3** of the **General Conditions** of the **Grid Code.** The **TSO** shall consider any such application in accordance with **GC.9.1.3,** and if the **TSO** is satisfied as to the **User's** programme for developing and testing the necessary dynamic model, the **TSO** may, for so long as the **TSO** is so satisfied, treat the **User** as being in compliance with the provisions of this section**.** If the **TSO** decides, acting reasonably, that it is not satisfied as to the **User's** programme for developing and testing the necessary dynamic model and that the **User** cannot be deemed to be in compliance with **PCA 4.10.1.2**, the provisions of **GC.9.1.4** shall apply and the **User** shall apply for a derogation under the terms of GC.8.

PCA4.10.1.3 VALIDATION OF MODEL

All models provided to the **TSO** for use in dynamic simulations must be validated. The **TSO** must be satisfied that the behaviour shown by the model under simulated conditions is representative of the behaviour of the real equipment under equivalent conditions.

For validation purposes the **Wind Farm Power Station** shall ensure that appropriate tests are performed and measurements taken to assess the validity of the dynamic model. Where the validity of the model has not been confirmed prior to the commissioning of the **Wind Farm Power Station,** appropriate tests shall be carried out and measurements taken at the **Wind Farm Power Station** to assess the validity of the dynamic model. The tests and measurements required shall be agreed with the **TSO.**

The **Wind Farm Power Station** shall provide the **TSO** with all available information showing how the predicted behaviour of the dynamic model to be verified compares with the actual observed behaviour of a prototype or production **WTG** under laboratory conditions and/or actual observed behaviour of the real **WTG** as installed and connected to a transmission or distribution network.

If the on-site measurements or other information provided indicate that the dynamic model is not valid in one or more respects, the **Wind Farm Power Station** shall provide a revised model whose behaviour corresponds to the observed on-site behaviour as soon as reasonably practicable.

The conditions validated should as far as possible be similar to those of interest, e.g. low short circuit level at **Connection Point**, close up, severe faults, nearby moderate faults, remote faults, **Voltage** excursions, **Frequency** excursions, large wind speed variations.

PCA4.10.1.4 WIND FARM DATA

In order to construct a valid dynamic model of each **Wind Farm Power Station**, the following **Wind Farm Power Station** data is required:

Wind Turbine Generator (WTG) transformer

This is the transformer that connects the WTG with the internal **Wind Farm Power Station** network.

Rating of **WTG** transformer (MVA or kVA)

WTG transformer voltage ratio (kV)

WTG transformer impedance (%)

Internal **Wind Farm Power Station** network and corresponding data

Please describe how the **Wind Farm Power Station's** internal network structure (collector network) will be laid out (by means of a single-line diagram or other description of connections). The description should include a breakdown of how the individual **WTGs** are connected together aswell as how they are connected back to the **Wind Farm Power Station** substation. Please specify different cable or overhead line types and the individual length of each section of circuit.

	Type1	Type2	Type3	Extend Table as appropriate
Total length (m)				
Conductor cross section area per core (mm)				
Conductor type (Al, Cu, etc)				
Type of insulation				
Charging capacitance (μF/km)				
Charging current (Ampere/km)				
Positive sequence resistance (R1 Ohm/km)				
Positive sequence reactance (X1 Ohm/km)				

Grid connected transformer

This is the transformer that is connecting the **Wind Farm Power Station** site with the **Distribution/Transmission System (equivalent to the Generator Transformer of a conventional power station)**. Data is required for this transformer as follows:

Rating of grid transformer (MVA or kVA)

Transformer **Voltage** ratio (kV)

Transformer impedance (%)

Reactive compensation installed at site

Number of inductive devices

Indicate for each device the inductive **Mvar** capability. If the device has more than one stage please indicate the number of stages and the **Mvar** capability switched in each stage i.e. 0.5 **Mvar** in 5 steps etc.

Number of capacitive devices

Indicate for each device the Capacitive **Mvar** capability. If the device has more than one stage please indicate the number of stages and the **Mvar** capability switched in each stage i.e. 0.5 **Mvar** in 5 steps etc.

Method of voltage/reactive power control applied to each controllable reactive compensation device. This information should be provided in sufficient detail (e.g. transfer function block diagram, control system gain/droop, deadband and hysterisis characteristics, tap steps, etc.) to allow an appropriate PSS/E model to be developed.

PC.A4.11 § Generator Transformer

	Symbol	Units
Number of windings		
Vector Group		
Rated current of each winding		Amps
Transformer Rating		MVA_{Trans}
Transformer nominal LV voltage		kV
Transformer nominal HV voltage		kV
Tapped winding		
Transformer Ratio at all transformer taps		
Transformer Impedance at all taps[1]		% on rating MVA_{Trans}
Transformer zero sequence impedance at nominal tap	Z_0	Ohm
Earthing Arrangement including neutral earthing resistance & reactance		
Core construction (number of limbs, shell or core type)		
Open circuit characteristic		Graph

[1] For Three Winding Transformers the HV/LV1, HV/LV2 and LV1/LV2 impedances together with associated bases shall be provided.

PC.A4.12 Generator Forecast Data

PC.A4.12.1 § Expected Maintenance Requirements

Expected Maintenance Requirements weeks / year

PC.A4.12.2 § Forecast Availability

Apart from the expected scheduled maintenance requirements,

Availability	Reason	Available Exported MW	Time %
Full availability			
Partial availability			
Forced outage probability			
	Total		100%

Reasons for partial availability might include poor fuel, loss of mill, loss of burners, hydro flow restrictions, etc.

PC.A4.12.3 § Energy Limitations

Daily	GWh
Weekly	GWh
Monthly	GWh
Annual	GWh

PC.A4.12.4 § Hydro Expected Monthly GWh

January	GWh
February	GWh
March	GWh
April	GWh
May	GWh
June	GWh
July	GWh
August	GWh
September	GWh
October	GWh
November	GWh
December	GWh

CC CONNECTION CONDITIONS

CC CONNECTION CONDITIONS

CC.1 INTRODUCTION

CC.1.1 For the protection of the **Transmission System** and **Users' Plant** and **Apparatus** directly connected to the **Transmission System**, and in order to maintain, insofar as is possible by **Good Industry Practice,** stable and secure operation of the **Transmission System** for the benefit of all **Users**, it is necessary to require certain minimum technical, design and operational criteria to be met by **Users' Plant** and **Apparatus**

CC.1.2 These **Connection Conditions** establish certain principles and standards relating to connection, method of connection, **Plant** and **Apparatus** designation and nomenclature, technical standards, performance standards, data requirements.

CC.1.3 These **Connection Conditions** supply information as to the performance characteristics of the **Transmission System** at the **Connection Point**, in order to enable **Users** and prospective **Users** to design their **Plant** and **Apparatus** and to provide appropriate control systems and **Plant** protection schemes.

CC.1.4 In addition to the **Connection Conditions**, there are **Connection Agreements**, which are bilateral agreements between **ESBNG** and each **User** and which contain the detail specific to each **User's** connection to the **Transmission System**. The **Connection Agreement** requires the **User** and **ESBNG** to comply with the terms of the **Grid Code**, except to the extent that a derogation has been granted under the **General Conditions**.

CC.2 OBJECTIVE

CC.2.1 The **Connection Conditions** define the minimum standards for the method of connection to the **Transmission System**.

CC.2.2 The **Connection Conditions** define the technical, design and operational standards which must be complied with by any **User** connecting to the **Transmission System**.

CC.2.3 The **Connection Conditions** define the normal **Transmission System** performance standards at the **Connection Point**.

CC.2.4 The **Connection Conditions** outline the types of signals and indications that will be

required to be made available to **ESBNG** by each **User**.

CC.2.5 The **Connection Conditions** detail requirements for the designation and nomenclature of all **User Plant** and **Apparatus** connected to the **Transmission System.**

CC.3 SCOPE

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

(a) **Generators** with **Registered Capacity** greater than 2MW
(b) The **Distribution System Operator**
(c) **Grid Connected Customers**

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

CC.4 TRANSMISSION STATION COMPOUND

CC.4.1 The **User** shall provide a **Transmission Station** compound, as provided for in the **Connection Agreement**, immediately adjacent to the **User's** facility and otherwise acceptable to **ESBNG** for the erection of a **Transmission Station,** as necessary, for **ESBNG** and for installing other equipment required for connecting the **User's System** to the **Transmission System**.

CC.4.2 Connection to the **Transmission System** must meet the standards defined in the **Planning Code** and in these **Connection Conditions**. The method of connection used may exceed the standards where this is required by the **User** and is acceptable to **ESBNG**.

CC.5 PLANT DESIGNATIONS

CC.5.1 The name of the **User Site** shall be designated by the **User** and subsequently agreed with **ESBNG,** such agreement not to be unreasonably withheld.

CC.5.2 The designation and proposed nomenclature of **User Plant** and **Apparatus** connected to the **Transmission System** shall be in accordance with **ESBNG** standard practice which, in particular, is designed to ensure that designation and nomenclature avoids confusion. The **User** shall notify the designation and

proposed nomenclature of **Users' Plant** and/or **Apparatus** to **ESBNG** who may, if **ESBNG** determines that such proposed designation may lead to confusion or does not conform with **ESBNG** standard practice, notify substitute designation which shall apply to such **User Plant** and/or **Apparatus**.

CC.5.3 **ESBNG's** standard practice currently requires that, unless otherwise agreed with **ESBNG**, the following standard designations apply:

(a)	**Generation Units**:	for hydro and wind: G1, G2 etc. for thermal: U1, U2 etc.
(b)	**Generator transformers**: (i.e. transformers for **Generation Unit** production)	at 400 kV; T4001, T4002 etc. at 220 kV; T2001, T2002 etc. at 110 kV; T101, T102 etc.
(c)	**Power Station** transformers: (i.e. dedicated transformers supplying both the **Generation Unit** and the **Power Station** auxiliaries from the **HV** busbar)	at 400 kV; ST4001, ST4002 etc. at 220 kV; ST2001, ST2002 etc. at 110 kV; ST101, ST102 etc.
(d)	Unit transformers: (i.e. transformers supplying auxiliaries of a **Generation Unit**)	UT1, UT2 etc.
(e)	Load transformers:	for 400/110 kV; T4101, T4102 etc. for 220/110 kV; T2101, T2102 etc. for 110/38kV; T141, T142 etc. for 110/20kV; T121, T122 etc. for 110/11kV and below; T101, T102 etc.
(f)	Bus sections, conventional busbars:	single bus; A1, A2 etc. double bus; A1, A2, B1, B2 etc.
(g)	Bus sections, ring busbars:	each section identified by designation of **Plant** and/or **Apparatus** item connected to it.

(h)	Bus Couplers:	K1, K2 etc.
(i)	Lines and cables:	each line or cable at a station identified by name of station or stations at the remote end or ends of the line or cable in alphabetical order.
(j)	Circuit Breakers	CB.
(k)	Main Earth Disconnects	DE.
(l)	Line Disconnect	DL.
(m)	Busbar Disconnects	DA, DB, etc.
(n)	Coupler Disconnects	DA, DB, etc.

CC.5.4 Every **User** shall be responsible for the provision, erection and maintenance of clear and unambiguous labelling showing the designation and nomenclature of its **Plant** and **Apparatus** at the **User Site**.

CC.6 RELEVANT TECHNICAL STANDARDS APPLYING TO USER PLANT AND APPARATUS

CC.6.1 All **User Plant** and **Apparatus** associated with the connection to the **Transmission System** shall comply with the:

(a) relevant European standards; or

(b) if there is no relevant European standards, such other relevant standard which is in common use in the European Union;

in each case as current at the date of the **User's** applicable **Connection Agreement**. Where **ESBNG**, acting reasonably, determines that in order to ensure safe and co-ordinated operation of a **User's Plant** and/or **Apparatus** with the **Transmission System**, there is a requirement for supplemental specifications and/or standards to apply to the design of a **User's Plant** and/or **Apparatus, ESBNG** shall notify the **User** and the **User** shall comply with the additional requirements. On request from the **User**, **ESBNG** shall provide reasonable evidence as necessary to demonstrate the need for the supplemental specifications and/or standards.

CC.6.2 In the event that any standard or specification with which a **User's Plant** and/or **Apparatus** is required to comply under CC.6.1 is amended, **ESBNG** will, having consulted with the affected **Users** and with the **Grid Code Review Panel**, make a recommendation to the **Commission** as to what action should be taken.

CC.7 SPECIFIC DESIGN AND PERFORMANCE STANDARDS

CC.7.1 In order to facilitate secure and stable operation of the **Transmission System** for the benefit of all **Users**, it is necessary that **Users' Plant** and **Apparatus** is designed to be capable of sustained operation within a range of **Transmission System** conditions.

CC.7.2 All Users

CC.7.2.1 Earthing

CC.7.2.1.1 The earthing of all **Users Plant** and **Apparatus** and provision of an earthing system shall as a minimum requirement be in accordance with the recommendations contained in the "Guide for Safety in Alternating Current Substations", ANSI/IEEE No. 80, 1986.

CC.7.2.1.2 **ESBNG** shall consult with each **User** regarding the specification for the earthing grid to be provided.

CC.7.2.1.3 Each **User's** earth disconnects must be earthed directly to the main station earth grid.

CC.7.2.1.4 The **User** will be obliged to certify (by a competent body) that remote earths have been isolated from the **User's** site plus any other affected third parties sites and that adequate precautions shall be taken by the **User** to ensure that dangerous grid potential rises are not transferred outside the earthing zone. The **Transmission Station** cannot be energised until this certification has been received by the **ESBNG**.

CC.7.2.1.5 Each **User's** earthing system shall be bonded to the **Transmission Station** earth grid so that both earthing systems are effectively integrated.

CC.7.2.1.6 Each **User** shall ensure that all staff working on the **User's** earthing system shall be adequately trained to perform such work in a safe manner.

CC.7.2.2 Design

CC.7.2.2.1 **User Plant** and **Apparatus** shall be designed with the following minimum capabilities (at the applicable **Voltage** levels):

Parameter (Minimum)	**110kV**	**220kV**	**400kV**
Insulation Level; Impulse Level (kV) (1.2/50 μsec.)	550	1050	1550
Insulation Level; Power Frequency (kV) (50Hz for 1 min.)	230	460	620
Clearance outdoor in air of live metal parts (mm) phase to earth	1100	2400	4100
Height of live parts above pedestrian passageways (mm)	3400	4700	6400
Height of bottom of unscreened live bushings above ground (mm)	2300	2300	2300
Height of live conductors above roadways (mm)	8000	9000	10500

CC.7.2.2.2 **User Plant** and **Apparatus** shall be designed to withstand the short circuit levels specified in CC.8.6.

CC.7.2.3 LV cables and wiring

CC.7.2.3.1 All multi-core control and protection cables shall be provided with a suitable metallic screen. Facilities for earthing these screens at the base of cabinets shall be provided.

CC.7.2.3.2 **LV** supply cable and auxiliary wiring shall be routed from the **Transmission Station** to each **User's** control building through a mutually agreed cable corridor. The cables will be laid in concrete troughs with reinforced concrete covers, or as mutually agreed, to the **User's** marshalling rack, which will be situated near the **Transmission Station.**

CC.7.2.4 Locking

CC.7.2.4.1 The facility to lock in the open/closed position and interlocking facilities shall be

provided by each **User** on appropriate disconnects and/or circuit breakers (with withdraw facilities) in order to ensure that the incoming feeder(s) to the facility can be safely isolated when required by **ESBNG**. The specific details of this requirement will be outlined at the design phase.

CC.7.2.4.2 Existing **Power Stations** with **Safety Rules** 1991 (ELECTRICAL) (Generating Stations), in accordance with OC11, in operation will be deemed to comply with CC.7.2.4.1 subject to review by **ESBNG**.

CC.7.2.5 Grid Connected Transformers

CC.7.2.5.1 **Generators** shall provide on-load tap-changing (OLTC) facilities for all **Generator Transformers. Demand Users** are advised to provide on-load tap-changing (OLTC) facilities for all **Grid Connected Transformers**. All **Users** shall liaise with **ESBNG** on the design specification for the performance of the tap-changing facility on **Grid Connected Transformers**.

CC.7.2.5.2 **Generator Transformer** windings shall be connected in star (with the star point or neutral brought out) on the higher **Voltage** side and in delta on the lower **Voltage** side.

Other **Grid Connected Transformers** may be connected either

(a) in delta on the lower voltage side and in star (with the star point or neutral brought out) on the higher **Voltage** side; or
(b) in star on both higher and lower **Voltage** sides with a delta tertiary winding provided.

CC.7.2.5.3.1 Provision should be made for the earthing of the neutral of each **Transformer** connected to the 110kV **System** by bringing out the neutral and ensuring that the insulation is such that the transformer can be operated unearthed.

CC.7.2.5.3.2 Provision should be made for the earthing of the neutral of each **Transformer** connected to the 220kV **System** by bringing out the neutral**. ESBNG** will consider on a case by case basis if the **Transformer** is required to be operated with the 220kV neutral unearthed. Applicants will be advised of this at the time of the **Connection Offer**.

CC.7.2.5.3.3 The **HV** neutrals of all **Transformers** connected to the 400 kV **System** should be solidly earthed. The capability of being operated unearthed is unnecessary

CC.7.2.5.4 **ESBNG** will provide the facility for the tripping of **Grid Connected Transformer HV** circuit breakers from the **User's** transformer protection.

CC.7.3 Generators

CC.7.3.1 The conditions specified in this section of the code apply to **Generation Units** seeking new connections to the **Transmission System**. It is acknowledged that **Generation Units** currently connected to the **Transmission System** may have been designed to different standards and therefore may not comply in whole or in part with some or all of these conditions. In such cases derogation or exemption from the code is proposed.

CC.7.3.1.1 Each **Generation Unit,** shall, as a minimum, have the following capabilities:

(a) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5Hz to 50.5Hz;

(b) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.5Hz to 52.0Hz for a duration of 60 minutes;

(c) remain synchronised to the **Transmission System** at **Transmission System Frequencies** within the range 47.0Hz to 47.5Hz for a duration of 20 seconds required each time the **Frequency** is below 47.5Hz;

(d) remain synchronised to the **Transmission System** during rate of change of **Transmission System Frequency** of values up to and including 0.5 Hz per second;

(e) sustained operation at the specified **Minimum Generation** within the range 49.8 to 51.0 Hz;

(f) remain synchronised to the **Transmission System** at normal rated output at **Transmission System Voltages** within the ranges specified in CC.8.3.2 for step changes in **Transmission System Voltage** of up to 10%.

(g) sustained operation in accordance with the **Reactive Power** capability as required by CC.7.3.6 at **Transmission System Voltages** within the ranges specified in CC.8.3.2, unless otherwise specified;

(h) remain synchronised during **Voltage** dips at the **HV** terminals of the **Generator Transformer** of 95% of nominal **Voltage** (5% retained) for duration 0.2 seconds and **Voltage** dips of 50% of nominal **Voltage** (i.e. 50% retained) for duration of 0.6 seconds;

(i) remain synchronised to the **Transmission System** during a negative phase sequence load unbalance in accordance with IEC 60034-1

(j) The short circuit ratio of each **Generation Unit** shall be in accordance with IEC

60034-1

(k)	**Minimum Load**	not greater than 50% of **Registered Capacity** for **CCGTs** and not greater than 35% of **Registered Capacity** for all other **Generation Units**
(l)	**Ramp up capability**	not less than 1.5% of **Registered Capacity** per minute when the **Unit** is in the **Normal Dispatch Condition**.
(m)	**Ramp down capability**	not less than 1.5% of **Registered Capacity** per minute when the **Unit** is in the **Normal Dispatch Condition.**
(n)	**Minimum up-time**	not greater than 4 hours for **Thermal Units**
(o)	**Minimum down-time**	not greater than 4 hours for **Thermal Units**
(p)	**Forbidden Zones**	within the range between normal **Minimum Load** and **Registered Capacity**, not more than 2 specified zones each not greater than 10% of **Registered Capacity**
(q)	**Block Loading**	not greater than 10% of **Registered Capacity**
(r)	Time off-load before going into longer standby conditions	remain in a hot condition for at least 12 hours and remain in a warm condition for at least 60 hours
(s)	Time to **Synchronise** (from instruction)	hot : not greater than 3 hours warm : not greater than 8 hour cold : not greater than 12 hours
(t)	Time from **Synchronising** to **Minimum Load**	hot : not greater than 40 minutes warm : not greater than 90 minutes cold : not greater than 180 minutes

(u) Operating Reserve

(i) **POR** not less than 5% **Registered Capacity**

To be provided, at a minimum, at **MW Outputs** in the range from 50% to 95% **Registered Capacity**, with provision in the range of 95% to 100**% Registered Capacity** to be not less than that indicated by a straight line with unity decay from 5% of **Registered Capacity** at 95% output to 0 at 100% output.

(ii) **SOR** not less than 5% **Registered Capacity**

To be provided, at a minimum, at **MW Outputs** in the range from 50% to 95% **Registered Capacity**, with provision in the range of

95% to 100% **Registered Capacity** to be not less than that indicated by a straight line with unity decay from 5% of **Registered Capacity** at 95% output to 0 at 100% output.

(iii) **TOR1** not less than 8% **Registered Capacity**
To be provided, at a minimum, at **MW Outputs** in the range from 50% to 92% **Registered Capacity**, with provision in the range of 92% to 100% **Registered Capacity** to be not less than that indicated by a straight line with unity decay from 8% of Registered Capacity at 92% output to 0 at 100% output.

(iv) **TOR2** not less than 10% **Registered Capacity**
To be provided, at a minimum, at **MW Outputs** in the range from 50% to 90% **Registered Capacity**, with provision in the range of 90% to 100% **Registered Capacity** to be not less than that indicated by a straight line with unity decay from 10% of Registered Capacity at 90% output to 0 at 100% output.

(v) **ESBNG** may request **Generation Units** of **Registered Capacity** greater than or equal to 60MW to have the capacity to operate under **SFRS** at all loads between **SFRS Minimum Load** and **SFRS Maximum Load**

CC.7.3.1.2 **Users** shall install **Generation Unit** governors that comply with OC4.3.4. **Users** shall not change frequency or load related control settings of **Unit** governors without agreement with **ESBNG**.

CC.7.3.1.3 Notwithstanding CC.7.3.1.1 combustion turbine, hydro, or other technology based **Generation Units** shall as appropriate, register and perform to **Operating Characteristics** giving maximum flexibility of operation, consistent with their type and model of generation plant, in accordance with **Good Industry Practice**. Where appropriate, **Operating Characteristics** and in particular start times, should be registered separately for normal (planned) starts, and for starts required under conditions of system stress, such as following the loss of a **Generation Unit**. The **Generator** will maintain operational procedures and practices, which ensure that there are no unnecessary delays in responding to **Dispatch** instructions in accordance with the technical capabilities of the **Generation Plant**.

CC.7.3.1.4 Where **ESBNG** approaches a **Generator**, the **Generator** will co-operate with **ESBNG** in the development of procedures and facilities to improve the response of each **Generation Unit** during conditions of system stress, including, for example,

automatic start up of fast-start **Generation Units** following a loss of **Generation Unit(s)** or in advance of an anticipated loss of **Generation Unit(s)**. This shall be subject to the agreement of the **Generator** that the procedures are consistent with secure operation of the **Generator's Plant**, such agreement not to be unreasonably withheld.

CC.7.3.2 Where start-up time of **Generation Units** exceeds thirty minutes, they shall be designed to have the capability, where supply from the **Transmission System** is lost, to reduce output to match house load and sustain operation (i.e. tripping to **Auxiliaries**).

CC.7.3.3 **Control Synchronising** shall be provided by **Generators** at circuit breakers identified by **ESBNG**, which, depending on the **Plant** configuration may include:

(a) the **Generation Unit** circuit breaker;
(b) the **Generator Transformer LV** and **HV** circuit breakers;

ESBNG will provide to the **Generator** signals from **ESBNG** operated **Plant** and **Apparatus** as are required to facilitate synchronising on the **Generator Transformer HV** circuit breaker, in accordance with the relevant provisions of the **Connection Agreement**.

CC.7.3.4 The **Synchronising** facilities in CC.7.3.3 shall facilitate **Synchronising** under the following conditions:

(a) **Transmission System Frequency** within the limits 48.0 to 52.0 Hz;
(b) **Transmission System Voltage** within the limits as specified in CC.8.3.2, not withstanding CC.7.3.6;

CC.7.3.5 Each **Generation Unit** shall be designed, where practicable, to mitigate the risk of common mode failure with other **Generation Units**. In particular each **Generation Unit** shall be designed so that it can operate with its essential auxiliaries supplied through a unit transformer which shall be connected between the **Generation Unit** circuit breaker and the **Generator Transformer LV** terminals, or from another secure source as agreed with **ESBNG**. Auxiliary supplies may, provided that they are in accordance with **Good Industry Practice**, be taken from an alternative source during commissioning, testing, start-up or emergencies.

In the case of a **CCGT Module** this applies to the **Combustion Turbine Units** only.

CC.7.3.6 **Reactive Power** capability

CC.7.3.6.1 Each **Generation Unit** shall have the following **Reactive Power** capability as measured at their alternator terminals:

Voltage Range	Connected at:	At **Maximum Continuous Rating** between:	At 35% of **Maximum Continuous Rating** between:
100kV to 123kV	110kV	0.93 power factor leading to 0.85 power factor lagging	0.7 power factor leading to 0.4 power factor lagging
85kV to 100kV		Unity power factor to 0.85 power factor lagging	0.7 power factor leading to 0.4 power factor lagging
200kV to 245kV	220kV	0.93 power factor leading to 0.85 power factor lagging	0.7 power factor leading to 0.4 power factor lagging
190kV to 200kV		Unity power factor to 0.85 power factor lagging	0.7 power factor leading to 0.4 power factor lagging
360kV to 420kV	400kV	0.93 power factor leading to 0.85 power factor lagging	0.7 power factor leading to 0.4 power factor lagging
350kV to 360kV		Unity power factor to 0.85 power factor lagging	0.7 power factor leading to 0.4 power factor lagging

CC.7.3.6.2 At between **Maximum Continuous Rating** and 35% **Maximum Continuous Rating**, Mvar capability to be not less than indicated by a straight line drawn between the two points derived from the above, on a plot of Mvar capability against MW output.

CC.7.3.6.3 At below 35% **Maximum Continuous Rating**, Mvar capability to be not less than that at 35% **Maximum Continuous Rating**.

CC.7.3.6.4 The **Generator Transformer** shall be designed such that the **Reactive Power** capability is possible over the full range of **Transmission System Voltages** (specified in CC.7.3.6.1)

CC.7.3.6.5 **ESBNG** and the **Generator** will liaise on matters related to CC.7.3.6 at the design stage.

CC.7.3.7 Each **Generation Unit** must be fitted with a fast acting proportional turbine speed governor and unit load controller or equivalent control device to provide **Frequency** response under normal operating conditions in accordance with OC4. The governor must be designed and operated to the appropriate

(a) European Standards; or

(b) In the absence of a relevant European Standards, such other standard which is in common use within the European Union

as at the time when the installation of which it forms a part was designed. Normal governor regulation shall be between 3% and 5%.

CC.7.3.8 All **Generation Units** shall be capable of contributing to control of **Transmission System Voltage** by continuous modulation of **Generator Voltage** by means of a suitable continuously acting **Automatic Voltage Regulation (AVR)** which shall comply with **BS4999 part 140**, or equivalent European Standards and the characteristics of which have been accepted by **ESBNG** prior to the **Connection Date**, such acceptance not to be unreasonably withheld.

CC.7.3.9 Each **Generator Transformer** shall have on-load tap changing facilities (OLTC). The tap step shall not alter the **Voltage** ratio at the **HV** terminals by more than:

(a) 2.5% on the 110kV system

(b) 1.6% on the 220kV and 400kV systems

or as agreed with **ESBNG.**

CC.8 TRANSMISSION SYSTEM PERFORMANCE

CC.8.1 **ESBNG** shall in accordance with **Prudent Utility Practice** plan, design and operate the **Transmission System** so as to endeavour to maintain the performance targets at the **Connection Point** as set out in this CC.8.

CC.8.2 Transmission System Frequency.

CC.8.2.1 The **Transmission System Frequency** is nominally 50 Hz:

(a)	Normal operating range:	49.8 to 50.2 Hz.
(b)	During **Transmission System** disturbances:	48.0 to 52.0 Hz.
(c)	During exceptional **Transmission System** disturbances:	47.0 to 52.0 Hz.

CC.8.3 Transmission System Voltages.

CC.8.3.1 The **Transmission System Voltages** are nominally 400kV, 220kV and 110kV. Normal operating ranges are:

(a)	400kV system:	370kV to 410kV;
(b)	220kV system:	210kV to 240kV;
(c)	110kV system:	105kV to 120kV.

CC.8.3.2 During **Transmission System** disturbances or following transmission faults:

(a)	400kV system:	350kV to 410kV;
(b)	220kV system:	200kV to 240kV;
(c)	110kV system:	99kV to 123kV.

Some **Transmission System** disturbances (e.g. earth faults, lightning strikes) will result in short-term **Voltage** deviations outside the above ranges.

CC.8.4 The negative phase-sequence component of the phase **Voltage** of the **Transmission System Voltages** will generally not exceed 1% under normal operating conditions.

CC.8.5 The **Transmission System** is an effectively earthed neutral system with an earth fault factor less than 1.4.

CC.8.6 The **Transmission System** is designed and operated to maintain short circuit levels below the following:

(a) 50kA on the 400kV system;
(b) 40kA on the 220kV system;
(c) 26kA on the 110kV system within the Dublin region; and

(d) 25kA on the 110kV system outside the Dublin region.

CC.9 METERING

CC.9.1 **Metering Equipment** shall be installed at **User Sites** in accordance with the provisions of the **Connection Agreement** and to the standards defined in the **Metering Code**.

CC.10 USER PROTECTION AND POWER QUALITY

CC.10 shall apply to the **DSO, Generators** and **Grid Connected Customers**.

CC.10.1 Every **User** shall, acting in accordance with **Good Industry Practice**, be responsible, insofar as is reasonably practicable, for ensuring that faults on **Plant** and **Apparatus** cause minimal disturbance to the **Power System**. Faults on **Plant** and/or **Apparatus** connected to the **Transmission System** should be cleared as soon as possible with no deliberate time delay introduced and in any event should be cleared within a maximum time of:

(a) 120 milliseconds for the 110 kV system;
(b) 100 milliseconds for the 220 kV system; and
(c) 80 milliseconds for the 400 kV system.

These clearance times are from primary protection systems only. Without limiting this obligation, a **User** shall as a minimum prior to connection of the **User's System** to the **Transmission System** install and maintain, in accordance with **Good Industry Practice**, the protection equipment specified in CC.10.8 and CC.10.9.

CC.10.2 For the avoidance of doubt, the adequacy of protection equipment installed by the **User** for protecting the **User's Plant** and **Apparatus** against **Transmission System** disturbances is for the **User** to determine. It should also be noted that **ESBNG's** requirements are primarily intended to protect the **Transmission System** facilities, although they afford a level of protection to **Users** they are not primarily designed to protect **User's** facilities.

CC.10.3 For the purpose of CC.10.1 the minimum protection requirements for a **User** facility connecting to the **Transmission System** will vary according to type, size, earthing and method of connection. **User** protection required by **ESBNG** should always be

in service when associated plant is in service.

CC.10.4 It should be noted that high speed automatic reclosing (HSAR) is a feature of **Transmission System** operation. This feature is characterised by the sudden re-energisation of the power supply after a dead time of approximately 400 milliseconds. All tripping and high speed reclosing on the 110 kV and 220 kV **Systems** is three pole.

CC.10.5 It is recommended that **Users** take precautions against disturbances on the **Transmission System** including without limitation protection against:

(a) load unbalance (negative sequence) protection;
(b) over/under-voltage;
(c) over/under-frequency;
(d) a combination of (b) and (c) that may result in overfluxing; and
(e) high speed automatic reclosing (HSAR), where applicable.

Users may consult with **ESBNG** with respect to protection adequacy.

CC.10.6 In order to ensure secure operation of the **Transmission System** and correct co-ordination and discrimination between faults on the **Transmission System** and the **Distribution System** and **User Systems**, settings for **User's** protection systems that may have an **Operational Effect,** shall be notified to **ESBNG** and it will be necessary for **ESBNG** to, and **ESBNG** may, prohibit the settings of some **User** protection systems within certain ranges. Protection systems where such limitations will apply include, but are not limited to:

(a) **Generation Unit** under-frequency, over-current, or distance protection;
(b) transformer over-fluxing, over-current, or distance protection;
(c) loss-of-mains protection.

A mechanism for the notification, and where applicable approval and determination, of such settings will be set out in the **User's Connection Agreement** or other agreements.

CC.10.7 **ESBNG** shall provide to the **User** the information and signals necessary for the interface co-ordination and operation of the **User's** protection, in accordance with the relevant provisions of the **Connection Agreement**, other agreements and CC.7.2.5.4.

CC.10.8 Where it is feasible to do so, **ESBNG** shall provide circuit breaker fail protection on **Grid Connection Point** circuit breakers installed in new transmission stations.

CC.10.9 Generators

CC.10.9.1 **Generators** shall provide:

(a) differential protection on the **Generator Transformer**. The connections between the **Grid Connection Point** circuit breaker and the **HV** terminals of the **Generator Transformer** shall be included in the protected zone of this differential protection.
(b) backup protection (to the **Transmission System**) on **Generation Units. ESBNG** acting reasonably shall require one or more of the following to be installed: generator overcurrent protection, voltage controlled generator overcurrent protection or generator distance protection;
(c) under frequency protection; and
(d) **Generation Unit** loss of excitation protection.

CC.10.9.2 **ESBNG** may require an individual **Generator,** or group of **Generators**, to install additional protection and/or control schemes, where **ESBNG** can reasonably show that it is prudent or necessary to do so. These schemes may include but are not limited to the following:

(a) **Generation Unit** over/under-voltage protection.
(b) **Generation Unit** over-frequency protection.
(c) **Generation Unit** transformer neutral displacement voltage detection.
(d) loss-of-mains protection (rate of change of frequency or vector shift).
(e) **Generation Unit** pole slip protection.
(f) **Power System** stabiliser.

CC.10.9.3 Distance protection shall be provided by **ESBNG** on the **Grid Connection Point** circuit breaker of **Generator Transformers**.

CC.10.10 DSO

CC.10.10.1 The **DSO** shall provide differential-protection on **Grid Connected Transformers.**

CC.10.10.2 **ESBNG** may require the **DSO** to install additional protection schemes, where **ESBNG** can reasonably show that it is prudent or necessary to do so, such schemes may include but are not limited to the following:

(a) directional overcurrent protection or distance protection on **User's** transformer(s);
(b) direct intertripping between the **Grid Connection Point** circuit breaker and the **User Connection Point** circuit breaker;
(c) neutral voltage displacement protection on **HV** side of **User's** transformer(s);
(d) loss of mains protection;
(e) under/over voltage protection;
(f) under/over frequency protection;
(g) unit (differential) type protection on **Distribution System** lines or cables;
(h) distance protection on the **User Connection Point** circuit breaker on **Distribution** lines or cables;
(i) bus zone protection on 110 kV **Distribution System** busbars; and
(j) teleprotection channels (for use with distance protection) between the **Grid Connection Point** circuit breaker and **User Connection Point** circuit breaker.

CC.10.10.3 Distance protection or over-current protection shall be provided by **ESBNG** on **Grid Connection Point** circuit breaker(s) unless where otherwise agreed by **ESBNG** and **DSO.**

CC.10.11 Grid Connected Customers

CC.10.11.1 **Grid Connected Customers** shall provide differential-protection on **Grid Connected Transformers.**

CC.10.11.2 **ESBNG** may require **Grid Connected Customers** to install additional protection schemes, where **ESBNG** can reasonably show that it is prudent or necessary to do so, which may include the following:

(a) directional overcurrent protection or distance protection on **Grid Connected Transformer(s)** where the **User System** contains **Embedded Generation**;
(b) neutral voltage displacement protection on **HV** side of **Grid Connected Transformer(s)**;
(c) loss of mains protection where the **User System** contains **Embedded Generation**;

(d) under/over voltage protection where the **User System** contains **Embedded Generation**; and

(e) under/over frequency protection where the **User System** contains **Embedded Generation**.

CC.10.11.3 Distance protection or over-current protection shall be provided by **ESBNG** on the **Grid Connection Point** circuit breaker(s).

CC.10.12 Power Quality

Users shall ensure that their connection to the **Transmission System** does not result in the level of distortion or fluctuation of the supply **Voltage** on the **Transmission System**, at the **Connection Point**, exceeding that allocated to them following consultation with **ESBNG.** Distortion and fluctuation limits are outlined in IEC/TR3 61000-3-6 (Harmonics) and IEC/TR3 61000-3-7 (Voltage fluctuation). **Users** shall also operate their **Plant** in a manner which will not cause the requirements contained in CENELEC Standard EN 50160 to be breached.

CC.10.12.1 The aggregate power factor for a **Grid Connected Customer** is calculated in accordance with the following formula:

$$APF = \frac{Sum\ P}{((Sum\ P)^2 + (Sum\ Q)^2)^{0.5}}$$

where**:**

APF is the Aggregate Power Factor for the **Grid Connected Customer**

Sum P is the Energy exchanged with the **Grid Connected Customer** at the **Connection Point** for any half-hour period; and

Sum Q is the Reactive Energy exchanged with the **Grid Connected Customer** at the **Connection Point** for the same half-hour period.

CC.10.12.2 A **Grid Connected Customer** shall ensure that at any load above 50% of **Maximum Import Capacity** the aggregate power factor as determined at the **Connection Point** in any half-hour period shall be within the range 0.90 lagging to unity.

CC.11 COMMUNICATION FACILITIES

CC.11.1 The communication facilities required to be provided by **Users** are addressed in the **Operating Codes**.

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 **ESBNG** (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 circuit breaker is open) for each circuit breaker;
(b) kV at transformer low **Voltage** terminals;
(c) a minimum of four sets of normally open potential free auxiliary contacts in each transformer LV bay for fault indication.

*(d), (e), (f), and (g) 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; and
(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 ESBNG and the User that signals are not available on the HV terminals, +/- MW and +/- Mvar shall be provided at the transformer low Voltage terminals.*

CC.12.3 Where signals or indications required to be provided by the **User** under CC.12.2 become unavailable or do not comply with applicable standards due to failure of the **Users'** technical equipment or any other reason under the control of the **User**, the **User** shall, acting in accordance with **Good Industry Practice**, restore or correct the signals and/or indications as soon as possible.

CC.12.4 Signals to be provided by **Users** shall be presented in such form as is nominated by **ESBNG**.

CC.12.5 Where, **ESBNG**, acting reasonably, determines that because of a **Modification** to the **Transmission System** or otherwise to meet a **Transmission System** requirement, additional signals and/or indications in relation to a **User's Plant** and **Apparatus** are required, **ESBNG** shall notify that requirement to the **User**. On receipt of such a notification the **User** shall promptly, and in accordance with **Good**

Industry Practice, ensure that such signals and/or indications are made available at the relevant marshalling rack.

CC.13 POWER SUPPLIES

CC.13.1 Each **User** shall provide:

(a) 400 V ac / 230 V ac power supplies as required by **ESBNG** for **Transmission Station** facilities, the capacity and detail of which shall be as specified by **ESBNG** and provided for in the **User's Connection Agreement**.

(a) a standby supply for all ac power supplies for **Transmission Station** facilities by a diesel generator, unless alternative means are agreed with **ESBNG**, such agreement not to be unreasonably withheld. In the event of loss of mains, standby supplies shall be capable of being sustained for a minimum of 10 hours.

CC.14 RESPONSIBILITY FOR SAFETY

CC.14.1 A **Site Responsibility Schedule** shall be developed for each **User Site**

CC.14.2 The **Site Responsibility Schedule** shall detail the demarcation of responsibility for safety of persons carrying out work or testing at the **User's Connection Site** and on circuits which cross the **User's Site** at any point.

CC.14.3 More detailed information on procedures and responsibilities involved in **Safety Procedures** is set out in **OC11**

CC.15 COMMISSIONING AND NOTIFICATION

CC.15.1 **ESBNG** and the **User** shall, in accordance with the provisions set out in the **Connection Agreement**, meet to discuss **Commissioning,** including **Commissioning Tests** and **Grid Code Tests**. The **User's** obligations in relation to **Testing** set out in this CC.15 are in addition to the requirements under the **Connection Agreement**.

CC.15.2 **Users** are required to carry out such tests (which are defined to be **Grid Code Tests**) as are required in order to confirm that the **User's Plant** and **Apparatus**

meets all the requirements of the **Grid Code** which must be met prior to the **Operational Date**. **ESBNG** may, under the **Connection Agreement**, notify to the **User** such **Grid Code Tests** as it requires the **User** to carry out. **ESBNG** may not necessarily test for CC.7.3.1.1 (a), (b), (c), (d) and (e) but reserve the right to test to establish design and operational compliance. For the avoidance of doubt it is the responsibility of **Users** at all times to ensure their compliance with the **Grid Code** and testing successfully or otherwise shall not in any way diminish or reduce such responsibilities.

CC.15.3 Where **Commissioning** is likely to involve a requirement for **Dispatch** for **Test** purposes, the **User** shall, as soon as possible, notify **ESBNG** of this requirement, including reasonable details as to the duration and type of **Testing** required. **Users** shall give **ESBNG** reasonable advance notice (being not less than fifteen (15) **Business Days**) of the time of carrying out of the **Commissioning Tests**. The time and date of such commissioning shall be reconfirmed not less than three (3) **Business Days** before the time of carrying out such tests. In the event that, having given such confirmation the **User** (acting reasonably) determines that such tests must be carried out prior to the time and the date previously confirmed, then provided the **User** gives **ESBNG** reasonable notice of the re-scheduled tests, he shall not be deemed to have failed to give the notices required. The **User** shall as soon as it becomes aware of the same, subsequently notify **ESBNG** of any material changes in the requirement and details so notified.

CC.15.4 The information provided under CC.15.3 is for indicative purposes only, and the **User** shall subsequently make a formal request to **ESBNG** for a **Commissioning Test** requiring **Dispatch** in accordance with the following provisions of this CC.15, and shall not carry out such a **Commissioning Test** except as **Dispatched** in accordance with this CC.15.

CC.15.5 **Users** shall make a request in writing to **ESBNG** for every **Commissioning Test** requiring **Dispatch**, in accordance with CC.15.4. Such request to include the following information:

CC.15.5.1 details of the proposed **Commissioning Test**;

CC.15.5.2 **Dispatches,** where necessary, required by **Users** for completion of the **Commissioning Test**, if any, including the duration of the **Dispatch**. Where the **User** may not know the entire **Dispatches** required for completion of the **Test** until part of the **Test** is completed then the **User** when proposing the **Test** shall:

(a) divide the **Commissioning Test** into sections as appropriate;

(b) indicate and discuss which sections of the **Commissioning Test** can be completed in stages and which cannot;

(c) indicate possible variations of the **Commissioning Test** for the sections which can be completed in stages.

Additionally, the factors which influence the completion of the stages should be outlined to **ESBNG**, (namely, if the procedure to be followed for a certain stage depends on the outcome of a previous stage);

CC.15.5.3 the preferred time or times for the **Commissioning Test**;

CC.15.5.4 the milestones for individual sections of the **Commissioning Test** (if any) which can be completed separately, and/or do not require to be repeated if the **Commissioning Test** is interrupted by **ESBNG** after completion of each section.

CC.15.6 **Generators** will be subject to the **Scheduling** and **Dispatch Codes** a minimum of seven (7) days prior to the **Operational Date** and the **Generation Unit** will be available for **Dispatch** from the **Operational Date**.

CC.15.7 Following the **Connection Date** but not later than the **Operational Date Users** shall verify (by giving **ESBNG** such evidence as it may reasonably require including, without limitation, the results of the relevant **Commissioning Test** or **Grid Code Test**) technical data provided under the **Planning Code** and other technical data which **ESBNG** reasonably requires to be verified to assess compliance with the **Grid Code** or the **Connection Agreement.**

CC.15.8 The values as confirmed or verified under CC.15 shall be included in the **User's Registered Operating Characteristics** and **Registered Data**.

OC1 DEMAND FORECASTS

OC1 DEMAND FORECASTS

OC1.1 INTRODUCTION

OC1.1.1 OC1 is concerned with **Demand** forecasting for operational purposes. In order to match **Generation** with **Demand** for electricity it is necessary to undertake **Demand** forecasting. It is also necessary to undertake **Demand** forecasting of **Reactive Power**.

OC1.1.2 In the **Operational Planning Phase**, **Demand** forecasting shall be conducted by **ESBNG** taking account of **Demand** forecasts furnished by **Users** who shall provide **ESBNG** with **Demand** forecasts and other information in the form set out in this OC1.

OC1.1.3 In the **Programming Phase** and **Control Phase, ESBNG** will conduct its own **Demand** forecasting taking into account information to be furnished by **Users** and the other factors referred to in OC1.6.1.

OC1.1.4 In OC1.4, which relates to data required from **Users** in the **Operational Planning Phase**, **Demand** means demand of MW and Mvar of electricity relating to each **Grid Supply Point** plus that to be met by **Embedded Generation Plant**. **Reactive Power Demand** includes the series **Reactive Power** losses of the **User's System** but excludes any network susceptance and any **Reactive Power** compensation on the **User's System**. **ESBNG** will obtain the lumped network susceptance and details of reactive compensation from the requirements to submit data under the **Planning Code**.

OC1.1.5 OC1 deals with the provision of data on **Demand Control** in the **Operational Planning Phase**, the **Programming Phase**, the **Control Phase** and the **Post Control Phase**.

OC1.1.6 In this OC1, Year 0 means the current year at any time, Year 1 means the next year at any time, Year 2 means the year after Year 1, etc.

OC1.1.7 The reference in this OC1 to a "day" shall mean the period covered by **the Schedule Day**, even though that may not be a calendar day.

OC1.1.8 References in OC1 to data being supplied on a half hourly basis refer to it being supplied for each period of 30 minutes ending on the hour and half hour in each hour.

OC1.2 OBJECTIVES

The objectives of **OC1** are to:

OC1.2.1 Ensure the provision of data to **ESBNG** by **Users** in the **Operational Planning Phase**, **Programming Phase**, **Control Phase** and **Post Control Phase;** and

OC1.2.2 Describe the factors to be taken into account by **ESBNG** when **Demand** forecasting in the **Programming Phase** and **Control Phase**

OC1.3 SCOPE

OC1 applies to **ESBNG** and to all **Users**, which term in this OC1 means:

Generators;

The **Distribution System Operator**;

Suppliers; and

Grid Connected Customers.

OC1.4 DATA REQUIRED BY ESBNG IN THE OPERATIONAL PLANNING PHASE

OC1.4.1 Each **User** shall provide **ESBNG** with the data requested in the relevant parts of OC1.4 below (except **Demand** solely related to **Power Station Auxiliary Plant** when fed in accordance with pre-agreed feeding arrangements).

OC1.4.2 For year 1 the following shall be supplied to **ESBNG In Writing** by week 22 in year 0:

(a) The **DSO** and **Grid Connected Customers** shall supply typical profiles of the anticipated **Demand** (averaged over any half hour on any **Grid Supply Point**) on half hourly and **Grid Supply Point** basis for defined categories of day type as determined by **ESBNG**;

(b) The **DSO** and **Grid Connected Customers** shall supply MW profiles of the amount and duration of anticipated **Demand Control** which may result in a

Demand change of 10MW or more (averaged over any half hour on **any Grid Supply Point**) on half hourly and **Grid Supply Point** basis;

(c) The **DSO** shall supply typical MW profiles for the operation, or availability as appropriate, of **Embedded Generation** where the total **Registered Capacity** of **Generation Units** on a single **Site** exceeds 5MW for defined categories of day type as determined by **ESBNG**. The method for submitting MW schedules and/or availability shall be agreed between **ESBNG** and the **DSO**, such agreement not to be unreasonably withheld;

(d) Not withstanding OC1.4.2 (c), the DSO shall supply typical MW profiles for the operation, or availability as appropriate, of **Embedded Generation** where the total **Registered Capacity** of **Generation Units** on a single **Site** exceeds 2MW, for defined categories of day type as determined by **ESBNG**, if **ESBNG** considers the **Site** to be critical for **Transmission System** operation. The method for submitting MW schedules and/or availability shall be agreed between **ESBNG** and the **DSO**, such agreement not to be unreasonably withheld.

OC1.4.3 The **DSO** and **Grid Connected Customers** shall inform **ESBNG** of any changes to the information supplied under OC1.4.2 as soon as this information is available. This information will be provided **In Writing**, or as otherwise agreed between the **DSO** or **Grid Connected Customers** and **ESBNG**, such agreement not to be unreasonably withheld.

(a) In particular, the **DSO** and **Grid Connected Customers** shall provide to **ESBNG In Writing** information pertaining to new connections greater than 2MW immediately this information is available. This information must include: anticipated connection date, location of connection, size of connection category of connection (e.g. residential, industrial etc.) and the typical profiles of the anticipated **Demand** on half hourly basis for defined categories of day type as determined by **ESBNG**;

(b) In particular, the **DSO** and **Grid Connected Customers** shall provide to **ESBNG In Writing** information pertaining to disconnection of existing **Demand** immediately this information is available. This information must include: anticipated disconnection date, location of connection, size of connection, and the revised typical profiles of the anticipated **Demand** on a half hourly basis at the **Grid Supply Point** for defined categories of day type as determined by **ESBNG**;

OC1.4.4 On the 5th last **Business Day** of every month the **DSO and Grid Connected Customers** shall verify **In Writing** that the most recently submitted MW **Demand** profiles for the following two months are in accordance with their current best estimate of these values.

OC1.5. POST CONTROL PHASE

The following is required by **ESBNG In Writing** (or by such electronic data transmission facilities as have been agreed with **ESBNG**) by 14.00 hours each day in respect of **Active Power** data and **Reactive Power** data:

a) MW profiles for the previous **Schedule Day** of the amount and duration of **Demand** reduction achieved from the use of **Demand Control** of 10MW or more (averaged over any half hour on any **Grid Supply Point**), on a half hourly and **Grid Supply Point** basis, from the **DSO**;

b) MW profiles of the amount and duration of Demand reduction achieved from the use of **Customer Demand Management** of 10MW or more on a half hourly basis during the previous **Schedule Day**, from **Suppliers** and **Grid Connected Customers**;

c) Details of half hour **Active Power** output and **Reactive Power** produced or absorbed by **Embedded Generation**, with a single Site with **Registered Capacity** in excess of 2MW, during the previous **Schedule Day**, from the **DSO**;

d) (Where requested by **ESBNG**), details of half hour **Active Power** output and **Reactive Power** produced or absorbed by **Generation Plant** during the previous **Schedule Day**, from **Generators**.

OC1.6 ESBNG DEMAND FORECASTS

OC1.6.1 The following factors will be taken into account by **ESBNG** when conducting **Demand** forecasting in the **Programming Phase** and **Control Phase**:

a) Historic **Demand** data;
b) Weather forecasts and the current and historic weather conditions;
c) The incidence of major events or activities which are known to **ESBNG** in advance;

d) **Transmission System** losses;

e) **Embedded Generation**;

f) **Demand Control** of 10MW or more (averaged over any half hour at any **Grid Supply Point**) proposed to be exercised by the **DSO** and of which **ESBNG** has been informed,

g) **Customer Demand Management** of 10MW or more (averaged over any half hour) proposed to be exercised by **Suppliers** and of which **ESBNG** has been informed,

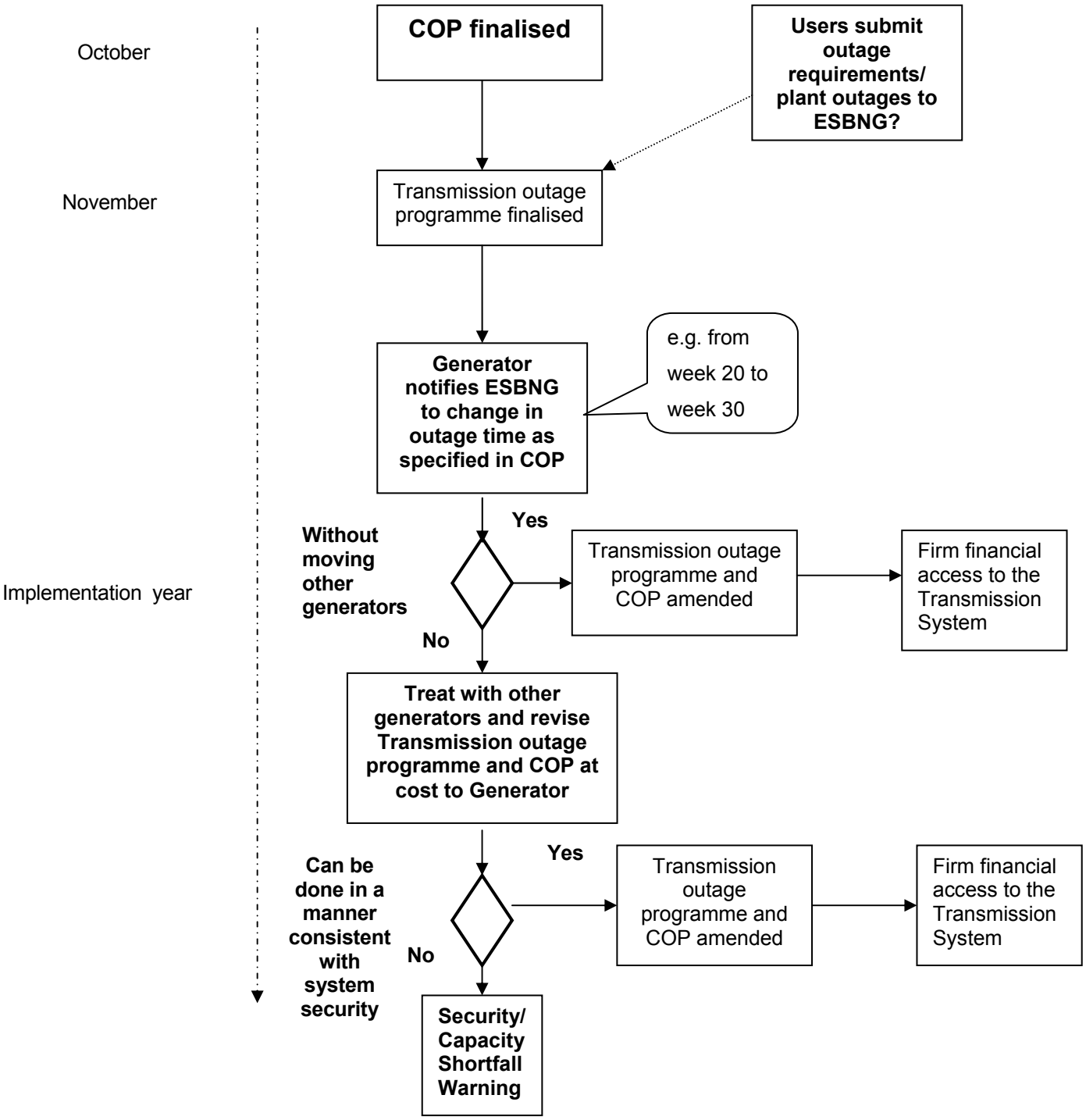
h) Other information supplied by **Users**, and

i) Growth rates.

OC1.6.2 Taking into account the factors specified in OC1.6.1 **ESBNG** uses **Demand** forecast methodology to produce forecasts of **Demand**.

OC1.6.3 The methodology will be based upon factors (a), (b),(c) and (d) above to produce, by statistical means, unbiased forecasts of **Demand** including that to be met by **Embedded Generation**. **Demand** will be calculated from these forecasts but will also take into account factors (e), (f), (g), (h) and (i) above.

OC2 OPERATIONAL PLANNING


October
November
Implementation year
COP finalised
Users submit outage requirements/ plant outages to ESBNG?
Transmission outage programme finalised
Generator notifies ESBNG to change in outage time as specified in COP
e.g. from week 20 to week 30
Without moving other generators
Yes
No
Transmission outage programme and COP amended
Firm financial access to the Transmission System
Treat with other generators and revise Transmission outage programme and COP at cost to Generator
Can be done in a manner consistent with system security
Yes
No
Transmission outage programme and COP amended
Firm financial access to the Transmission System
Security/ Capacity Shortfall Warning

OC2 OPERATIONAL PLANNING

OC2.1 INTRODUCTION

Secure operation of an electricity system requires that maintenance of production facilities (**Generation Units**) should be carried out in a timely and orderly fashion. This is essential in order to enable **ESBNG** to fulfil its obligations relating to operation of the **Transmission System**, and to enable **Generators** to plan their **Outages** in an orderly way with due regard to **Plant** requirements and resource limitations. The mechanisms by which this is achieved are formalised in this Operational Planning Code (Generation).

OC2.2 OBJECTIVE

The primary objective of OC2 is to promote the development and implementation of a **Generation Outage Programme**, consistent with security of supply and requirements for the secure and economic operation of the **Transmission System**, and with the needs of **Generators** in respect of **Plant** maintenance requirements and resource limitations.

In order to achieve this objective, OC2 defines:

(a) the procedure for formal notification of **Outages** by **Generators** to **ESBNG**; and

(b) the procedures by which the **Indicative**, **Provisional** and **Committed Outage Programmes** are reviewed by **ESBNG**, in consultation with **Generators**.

OC2 shall apply to all proposed **Outages** that may affect the ability of a **Generation Unit** to achieve its full **Registered Capacity** appropriate to each **Registered Fuel** in accordance with its **Registered Operating Characteristics**.

OC2.7 also requires **Generators** to inform **ESBNG** of other proposed maintenance of a **Generation Unit** or any associated **Power Station Plant** or **Apparatus**, where such maintenance will affect the availability of **Ancillary Services** in respect of that **Generation Unit**.

OC2.3 SCOPE

Operational Planning applies to **ESBNG** and to the following, each of which is a **User** under this OC2:

(a) **Generators** which for the purposes of OC2 includes all **Generators** with **Registered Capacity** greater than 5 MW or which are subject to **Central Dispatch**; and

(b) The **Distribution System Operator (DSO)**.

OC2.4 OUTAGE SCHEDULING

OC2.4.1 Throughout OC2 the current year shall be defined as year 0, the following year as year 1, and so on. The **Outage** planning process in respect of a **Generation Unit** shall commence not later than three (3) years prior to the **Scheduled Operational Date** or from the date of the relevant agreements, whichever is the later.

OC2.4.2 In rolling over the **Generation Outage Programme** from one year to the next, for every year except the first year of the planning process:

(a) submissions by the **Generator** for year 2 should reflect the current **Provisional Outage Programme** for year 3; and

(b) submissions by the **Generator** for year 1 should reflect the current **Provisional Outage Programme** for year 2.

except, in any such case, to the extent that the **Generator** is reasonably responding to changed circumstances. This does not require **Generators** to explain changes unless required to do so by **ESBNG**. The aggregate of all **Generators' Outage Programmes** is the **Generation Outage Programme** that will comprise the **COP**, **POP** and **IOP**.

OC2.4.3 By the end of March in year 0, **Generators** shall submit to **ESBNG**, for each **Generation Unit**, details of **Outages** and estimates of the **Forced Outage Probabilities** for inclusion in:

(a) the **Committed Outage Programme (COP)** for year 1. Other than in the first year after the planning process has commenced, this will be based on the previous year's **Provisional Outage Programme** for year 2, which period through the passage of time has now become year 1, and any changes may only reflect the **Generator's** reasonable response to changed circumstances;

(b) the **Provisional Outage Programme (POP)** for years 2 and 3; and

(c) the **Indicative Outage Programme (IOP)** for years 4 to 7.

Generators shall specify with regard to each of their **Generation Units**, the start date and time and the duration of each **Outage**.

OC2.4.4 In scheduling **Outages**, and in relation to all other matters under OC2, the **Generator** must act reasonably and in good faith. Without limitation to such obligation, each **Generator** should act in accordance with **Good Industry Practice** in planning their **Outages** and, in particular, so as to avoid a situation arising in which a **Generator** is obliged to schedule an **Outage** at short notice by reason of obligations imposed upon the **Generator** by statute as a consequence of the **Generator** not having planned in accordance with **Good Industry Practice**, for example, by not having planned sufficiently in advance its **Outages** for any statutory time limit.

OC2.4.5 When submitting proposed **Outages** for inclusion in the **COP**, **POP** and **IOP**, **Generators** shall, unless they reasonably substantiate that an **Outage** is inflexible, specify:

(a) an alternative preferred window, or alternative preferred windows, of opportunity within each year for any **Outage**;
(b) the minimum **Outage** duration which would be acceptable, if less than the scheduled **Outage** duration;
(c) situations where the paralleling of **Outages** of two or more of its **Generation Units** may be required, desirable, undesirable or not possible;
(d) a priority order associated with the various **Outages** scheduled by the **Generator**;
(e) any **Outages** where it is particularly desirable that they should take place within the year scheduled; or
(f) any **Outage** where its timing is dependent on **Generation Unit** run hours, equivalent run hours or starts.

OC2.4.6 Details of proposed **Outages** for years 4 to 7 are required to signal adequately in advance major **Outages** which could impact on capacity adequacy or on **ESBNG's** transmission outage maintenance and development programmes and are indicative only. In rolling over the **Generation Outage Programme** from one year to the next each **Generator** shall not be constrained in making any submission by any previous **Indicative Outage Programme**.

OC2.4.7 Between March and June of year 0, **ESBNG** shall carry out a security analysis of years 1 to 7 in light of proposed **Outages** and other relevant matters including **Outages** of other **Generation Units,** interconnection, transmission outages, load growth and fuel security. In the event that **Generator's Outages** as proposed have a detrimental effect on **Capacity Adequacy** or system security **ESBNG** will highlight the shortfall to all **Generators** and **Suppliers.**

OC2.4.8 Any concerns which **ESBNG** may have with the **Generation Outage Programme** must be notified to all **Generators** by the end of June in year 0.

OC2.4.9 Between the end of June in year 0 and the end of September in year 0 any concerns raised by **ESBNG** shall be notified to **Generators**. **ESBNG** will enter into discussions with **Generators** to find a resolution. If by the end of September in year 0 no resolution has been agreed and in the opinion of **ESBNG** there is a capacity shortfall in year 1, **ESBNG** will issue a **System Capacity Shortfall Warning** and notify the **Commission**.

OC2.4.10 **ESBNG** shall issue to each **Generator** a **Generation Outage Programme** for that **Generator** for years 1 to 3 by the fifth (5th) **Business Day** of October in year 0, including the **COP** for year 1.

OC2.5 ASSESSMENT OF CAPACITY ADEQUACY

In assessing **Capacity Adequacy ESBNG** shall estimate **Demand** growth, formulate **Demand** forecasts and consider **Generation Units' Outages** and **Forced Outage Probabilities**.

OC2.5.1 For years 4-7 **ESBNG** shall:

(a) use **Generators'** submissions for **Outages**;

(b) use **Generators'** submissions for **Forced Outage Probabilities**;

(ba) in a separate exercise, use **ESBNG**'s assessment of the **Generators**' **Forced Outage Probabilities**, **Generators**' submissions and historical data; and

(c) based on (a), (b), (ba) and **Demand** forecasts **ESBNG** shall promulgate an **Availability** forecast, a **Demand** forecast and a **Capacity Adequacy Indicator** for each weekly peak of each year.

OC2.5.2 For years 2-3 **ESBNG** shall:

(a) use **Generators'** submissions for **Outages**;

(b) use **Generators'** submissions for **Forced Outage Probabilities**;

(ba) in a separate exercise, use **ESBNG**'s assessment of the **Generators**' **Forced Outage Probabilities**, **Generators**' submissions and historical data; and

(c) based on (a), (b), (ba) and **Demand** forecasts **ESBNG** shall promulgate an **Availability** forecast, a **Demand** forecast, the capacity margin and a **Capacity Adequacy Indicator** for each weekly peak of each year.

If there is a deficit indicated in any week, **ESBNG** will issue a **System Capacity Shortfall Warning**.

OC2.5.3 For year 1 **ESBNG** shall:

(a) use **Generators'** submissions for **Outages**;

(b) use **Generators'** submissions for **Forced Outage Probabilities**;

(ba) in a separate exercise, use **ESBNG**'s assessment of the **Generators**' **Forced Outage Probabilities**, **Generators**' submissions and historical data; and

(c) based on (a), (b), (ba) and **Demand** forecasts **ESBNG** shall promulgate an **Availability** forecast, a **Demand** forecast, the capacity margin and a **Capacity Adequacy Indicator** for each daily peak of year 1. This information shall be published on the **ESBNG** website at 15.00 on the first **Business Day** of October in year 0 and will be updated on the first **Business Day** of each month until December of year 1**.**

If there is a deficit indicated in any week, **ESBNG** will issue a **System Capacity Shortfall Warning**.

OC2.5.4 Each day during year 0 after the fifth (5th) **Business Day** of January for a forecast period of four weeks, **ESBNG** shall:

(a) use **Generators'** submissions for **Outages**;

(b) use **Generators'** submissions for **Forced Outage Probabilities**;

(ba) in a separate exercise, use **ESBNG**'s assessment of the **Generators**' **Forced Outage Probabilities**, **Generators**' submissions and historical data; and

(c) based on (a), (b), (ba) and **Demand** forecasts **ESBNG** shall formulate an **Availability** forecast, a **Demand** forecast, the capacity margin and a **Capacity Adequacy Indicator** for each daily peak. This information shall be published on the **ESBNG** website at 15.00 each **Business Day.**

If there is a deficit indicated on any day, **ESBNG** will issue a **System Capacity Shortfall Warning**.

OC2.6 CHANGES TO THE COMMITTED OUTAGE PROGRAMME WITHIN THE IMPLEMENTATION YEAR (YEAR 0)

OC2.6.1 A request for a change to an **Outage** included in the **Committed Outage Programme** or an additional **Outage** may be initiated either by **ESBNG** or by a **Generator** at any time.

OC2.6.2 Request initiated by ESBNG

OC2.6.2.1 **ESBNG** may at any time request from a **Generator** a change in the timing or duration of any **Outage** of one of the **Generator's Generation Units** in the **Committed Outage Programme**.

OC2.6.2.2 A **Generator** may respond either by declining the request, or by agreeing to the request (in which case the **COP** shall be deemed to be amended accordingly). **Generators** shall make every reasonable effort to co-operate with changes requested by **ESBNG**.

OC2.6.2.3 If a **Generator** responds by agreeing to the request subject to specific conditions, **ESBNG** may respond by either confirming agreement to those conditions, in which case the conditions specified by the **Generator** shall be deemed to have been accepted, or by declining agreement. Where **ESBNG** agrees to the conditions the **COP** shall be deemed to be amended accordingly. Where **ESBNG** declines to agree to the conditions, then **ESBNG** may negotiate with the **Generator** as to revised or alternative conditions, which would be acceptable.

OC2.6.3 Outage change initiated by a Generator

OC2.6.3.1 **Generators** may at any time request **ESBNG** for a change in the timing or duration of any **Outage** of one of the **Generator's Generation Units** in the **Committed Outage Programme**.

OC2.6.3.2 Where a change to the **COP** is proposed by a **Generator**, **ESBNG** shall evaluate whether the change is likely to have a detrimental effect on **Capacity Adequacy** or on the secure operation of the **Transmission System.** This shall be done within a reasonable time frame, taking into consideration the extent of the change and the timing of the **Outage**

OC2.6.3.3 Where, in accordance with OC2.5, the request is not likely to have a detrimental effect on **Capacity Adequacy** or the secure operation of the **Transmission System** then **ESBNG** shall amend the **COP** accordingly. The **Generator** shall be advised by **ESBNG** that the change has been accepted.

OC2.6.3.4 Where, in accordance with OC2.5, the **Outage** change is likely to have a detrimental effect on **Capacity Adequacy** or requirements for the secure operation of the **Transmission System** then **ESBNG** shall not amend the **COP. ESBNG** shall contact the **Generator** and inform the **Generator** that the change to the **COP** has not been accepted, **ESBNG** shall at the Generator's request enter into discussions with the **Generator** to facilitate an alternative modification which may meet the requirements of the **Generator** while not having an unacceptable effect on **Capacity Adequacy** or requirements for secure operation of the **Transmission System.** In the event that the **Generator** wishes to avail of an alternative modification, it shall submit a change request in accordance with OC2.6.3.1.

OC2.6.3.5 Where the **Generator** has been notified that the change to the **COP** has not been accepted, but in the view of the **Generator** it must force the **Generation Unit** to be unavailable due to technical or safety issues, then the **Generator** shall inform **ESBNG** immediately in accordance with the requirements to submit **Declarations** of **Availability**.

OC2.7 OTHER INFORMATION TO BE NOTIFIED

OC2.7.1 **Generators** will inform **ESBNG** of any proposed maintenance, in addition to **Outages**, which will, or is likely to, affect the capability of the **Generation Unit** to provide **Ancillary Services**, as soon as is reasonably possible.

OC2.7.2 **ESBNG** may, where security of supply or the secure operation of the **Transmission System** would be at risk, request alterations to maintenance notified under Section OC2.7.1. **ESBNG** shall make reasonable endeavours to give as much notice as possible for such requests for alterations. Where **ESBNG**

makes such a request, the **Generator** shall use reasonable endeavours to comply with the request in arriving at the **Generator's** final programme for such maintenance.

OC2.7.3 The **DSO** shall co-operate with **ESBNG** and **Embedded Generators** in all phases of outage planning to promote **Capacity Adequacy** and ensure system security.

OC3 INTERCONNECTOR MANAGEMENT

OC3 INTERCONNECTOR MANAGEMENT

OC3.1 INTRODUCTION

OC3.1.1 Normal operation of the **Transmission System** by **ESBNG** is in accordance with the principles and procedures as set out in this **Grid Code**. OC3 addresses the operational requirements of the interconnector with respect to system security and defines certain rights, obligations and procedures in respect of trading across the interconnector between Ireland and Northern Ireland.

OC3.1.2 **ESBNG** has adopted the definitions agreed to by the European Transmission System Operators **(ETSO)** in OC3. Calculation of **ATC** is consistent with the principles adopted by **ETSO**.

OC3.2 OBJECTIVE

OC3.2.1 The primary objective of OC3 is to manage the day to day operation of the interconnector for the purpose of trade across the interconnector between Ireland and Northern Ireland in an open, transparent, non-discriminatory manner in so far as is practicable in accordance with **Prudent Utility Practice**.

OC3.3 SCOPE

OC3 applies to **ESBNG, Generators**, **Suppliers**, and other parties who have been authorised by **ESBNG** to access interconnector capacity for the purpose of trade across the interconnector with Northern Ireland.

OC3.4 NET TRANSFER CAPACITY DETERMINATION AND POSTING

OC3.4.1 **Total Transfer Capacity (TTC)** and **Transmission Reliability Margin (TRM)** will be calculated and posted to the Transmission System Operator's Internet web-site by no later than17:00 hours each day three days prior to the **Trading Day** ("D-3") for each **Trading Period** of that **Trading Day**. **TTC** and **TRM** will be evaluated based on **ESBNG's** best estimate of generation and demand patterns.

OC3.4.2 **Available Transfer Capacity** (**ATC**) and **Net Transfer Capacity** (**NTC**) will be calculated and posted to the **ESBNG** Internet web-site by no later than 17:00 hours each day three days prior to the **Trading Day** ("D-3") for each **Trading Period** of that **Trading Day**. For indicative purposes the **ATC** posted by **ESBNG** will

include both the **ATC** being made available to independent sector trading and the remaining **ATC** being afforded to franchise sector trading.

OC3.4.3 **Notified Transmission Flow (NTF)** and **Effect of Parallel Flows (EPF)** will be calculated and posted to the Transmission System Operator's Internet web-site by no later than 17:00 hours each day three days prior to the Trading Day ("D-3") for each Trading Day.

OC3.4.4 The methodology for calculating the above parameters will be published on the Transmission System Operator's Internet web-site and revised as required.

OC3.5 INDEPENDENT SECTOR ACCESS AND TRADING

OC3.5.1 **ESBNG** will receive all requests for interconnector access by **Independent Sector Users** and will process such requests in accordance with the procedures, rules, and forms required by **ESBNG**.

OC3.5.2 Requests for interconnector access must be submitted to **ESBNG** no later than later than 10:00 hours two days prior to the **Trading Day** ("D-2") unless otherwise noted in the Statement of Charges and Payments.

OC3.5.3 **ESBNG** will respond to all requests for interconnector access in accordance with OC3.5.2 no later than 16:00 hours two days prior to the **Trading Day** ("D-2") unless otherwise noted on the Statement of Charges and Payments.

OC3.5.4 **ESBNG** will receive all requests for assignment of previously granted interconnector access by **Independent Sector Users** and will process such assignment requests in accordance with the rules set forth by **ESBNG.**

OC3.5.5 Assignment requests must be submitted to **ESBNG** no later than 16:00 hours two days prior to the **Trading Day** ("D-2") unless otherwise noted in the Statement of Charges and Payments.

OC3.5.6 **Independent Sector Users** must submit their **Interconnector Energy Trades**, in accordance with the **Trading and Settlement Code**, to **ESBNG** by no later than 10:00 hours one day prior to the **Trading Day** ("D-1") unless otherwise noted in the **Trading and Settlement Code**.

OC3.5.7 **ESBNG** will process the **Interconnector Energy Trades** received pursuant to OC3.5.6 by no later than 14:00 hours one day prior to the **Trading Day** ("D-1") unless otherwise noted in the **Trading and Settlement Code**.

OC3.5.8 **ESBNG** will, by no later than 14:00 hours one day prior to the **Trading Day** ("D-1") prepare the **Interconnector Transfer Schedule**. The **Interconnector Transfer Schedule** for a **Trading Period** shall be the net sum of all **Independent Sector Users' Interconnector Energy Trades** in a **Trading Period** in either the import or export direction.

OC3.6 FRANCHISE SECTOR ACCESS

OC3.6.1 **ESBNG** may make use of all remaining capacity up to the **NTC**, following allocation to the Independent Sector two days prior to the **Trading Day** ("D-2") on the interconnector in order to facilitate trading on behalf of the Ireland franchise market.

OC3.6.2 **ESBNG**, on behalf of the Ireland franchise market, will prepare a schedule of **Interconnector Energy Trades** for the **Trading Day** in accordance with the rules set forth in relevant agreements.

OC3.7 INTERCHANGE SCHEDULE

OC3.7.1 **ESBNG** will manage the **Interchange Schedule** such that the **Interconnector Transfer Schedule** is met ahead of any franchise market trading.

OC3.7.2 **ESBNG** will co-ordinate with externally connected parties as required in setting the final **Interchange Schedule** for each **Trading Period** prior to commencement of the **Trading Day**.

OC3.7.3 **ESBNG** will co-ordinate with externally connected parties as required in revising the final **Interchange Schedule** for each **Trading Period** prior to commencement of each **Trading Period**.

OC4 SYSTEM SERVICES

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, **ESBNG** shall have control over all **System Services**; i.e. **ESBNG** shall specify what **System Services** are to be provided when and by whom.

OC4.2 SCOPE

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

(a) **Grid Connected Generators** with **Registered Capacity** greater than 2MW;

(b) **Grid Connected 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 **ESBNG** 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 **ESBNG** so as to achieve the applicable limits; and

(b) to set out the procedures required to enable **ESBNG** 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 **ESBNG**, with characteristics within the appropriate ranges as specified in **Connection Conditions**;
(b) no time delays other than those necessarily inherent in the design of the **Governor Control System** shall be introduced;

(c) no **Frequency** deadbands shall be applied to the operation of **Governor Control Systems**.

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 **ESBNG** 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 **ESBNG** and the **Generator** in advance; or
(d) the restriction is in accordance with a **Dispatch Instruction** given by **ESBNG**.

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

OC4.3.5 SECONDARY FREQUENCY REGULATION SYSTEM (SFRS)

OC4.3.5.1 The secondary **Frequency** regulation system operational on the **Transmission System** is known as the "**Secondary Frequency Regulation System**" (**SFRS**).

OC4.3.5.2 **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**.

OC4.3.5.3 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**.

OC4.3.5.4 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 **ESBNG** of this without delay. **Generators** shall also inform **ESBNG** 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 **ESBNG** to arrange for the **Generation Unit** to return to operation under the control of **SFRS**.

OC4.3.5.5 **ESBNG** may issue a **Dispatch Instruction** to a **Generator** to prevent a **Generation Unit**

(fitted with **SFRS**) from operating under **SFRS**, in accordance with **SDC2**.

OC4.3.5.6 **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.

OC4.4 VOLTAGE CONTROL

OC4.4.1 INTRODUCTION

OC4.4.1.1 In order to maintain security and integrity of the **Transmission System**, to avoid damage to the **Transmission System** and to **User Plant**, and to maintain **Voltages** at **User Connection Points** within the limits specified in the **Connection Conditions**, it is necessary for **ESBNG** to control **Transmission System Voltages**.

OC4.4.1.2 **Voltage** control of power systems requires that a Mvar demand is met and that sufficient dynamic **Voltage** control capability is available on the **Transmission System** to cover changes in the Mvar demand such as result from **Demand** variations, to facilitate controlled **Voltage** adjustment and to limit the duration and extent of **Voltage** fluctuations under fault conditions. In order to do this, static and dynamic reactive reserve capability is required. To control **Transmission System Voltages**, **ESBNG** will utilise a variety of methods of dynamic and static control.

OC4.4.1.3 **Voltage** control strategies used by **ESBNG** include:

(a) transformer tap-changing, cable switching, reactor and capacitor switching, and other control methods which involve utilisation of **Transmission System Plant** only;
(b) tap-changing on **Generator Transformers**;
(c) **Demand** power factor correction;
(d) utilisation of **Generation Unit Reactive Power** capability, both by means of **AVR** control and also **Mvar Dispatch Instructions** issued by **ESBNG** to **Generators**.

OC4.4.2 OBJECTIVES

OC4.4.2.1 The objective of OC4.4 is to set out the control strategies used by **ESBNG**, in conjunction with **Users** where appropriate, in controlling **Transmission System Voltages**.

OC4.4.2.2 OC4.4 sets out the procedures required (in conjunction with those in SDC2 to enable **ESBNG** to:
(a) maintain voltage stability of the **Transmission System;**
(b) maintain **Transmission System Voltages** at **User Connection Points** within operational limits as specified in the **Connection Conditions**.

OC4.4.2.3 OC4.4 sets out the procedures for the utilisation of **User Plant** or facilities by **ESBNG** for the purposes of **Transmission System Voltage** control, where appropriate.

OC4.4.2.4 Some procedures for implementation of **Voltage** control strategies (e.g. **Generation Unit** Mvar **Dispatch**) are addressed under the provisions of SDC2 and therefore this OC4.4 shall be read in conjunction with these provisions.

OC4.4.3 DESCRIPTION OF VOLTAGE CONTROL

OC4.4.3.1 **Voltage Control** is achieved by ensuring sufficient availability of dynamic and static reactive power from contributions listed in OC4.4.3.2. The factors, which are obviously most readily subject to control by **ESBNG**, are the Mvar produced/absorbed by **Generation Units** and installed dedicated **Voltage Control** facilities.

OC4.4.3.2 **ESBNG** shall endeavour to maintain sufficient availability of dynamic and static reactive power in order to operate **Transmission System Voltages** at **Connection Points** within the levels specified in CC.8.3, at all times. Factors, which will influence the required Mvar capacity, include the following:

OC4.4.3.2.1 The charging capacitance of the **Transmission System**.

OC4.4.3.2.2 **Customer** Mvar **Demand**.

OC4.4.3.2.3 **Transmission System** Mvar losses.

OC4.4.3.2.4 **Generation Unit** Mvar production or absorption.

OC4.4.3.2.5 **Voltage Control** facilities, such as capacitor banks and reactors.

OC4.4.3.3 The effects of **Transmission System** capacitance can be controlled and to some extent utilised by controlled variation of the **Transmission System Voltage**. Thus at times of high Mvar **Demand** (normally times of high MW **Demand**), the **Transmission System Voltage** may be operated towards the upper portion of the allowable control range, and at times of low Mvar **Demand** (normally times of low MW **Demand**), the **Transmission System Voltage** may be operated towards the lower portion of the allowable control range. This daily variation is typically required for operation of **ESBNG Transmission System**.

OC4.4.3.4 Due to the electrical characteristics of a **Transmission System**, the **Voltage** (for **Plant** operated at the same nominal **Voltage**) will not be the same at all points on the **Transmission System**.

OC4.4.4 VOLTAGE CONTROL POLICY

OC4.4.4.1 **ESBNG** shall control system voltage in order to minimise system losses and cost of use of **Ancillary Services**. **ESBNG** shall determine and modify as appropriate general procedures for its use in controlling **Voltage** on the **Transmission System**. The procedures shall be formulated having due regard to relevant economics of **Transmission System** operation and **Power System** reliability. In particular, the **Voltage Control** shall take cognisance of daily, weekly and seasonal factors and **ESBNG** shall determine:

(a) suitable target **Voltages** in order to limit/control the effect of transmission capacitance;
(b) best utilisation of dedicated **Voltage Control** facilities; and
(c) Mvar dynamic reserve requirements.

OC4.4.5 METHODS UTILISED IN EXERCISING VOLTAGE CONTROL

OC4.4.5.1 **Transmission System Voltages** shall be continuously monitored by **ESBNG**. Appropriate **Voltage** operating points shall be determined by **ESBNG**, taking account of OC4.4.4 and in particular of **System** conditions pertaining at the time of operation.

OC4.4.5.2 **ESBNG** shall adjust **System Voltages**, using control facilities that are available so as to achieve the Mvar capacity necessary in order to operate **Transmission System Voltages** at **Connection Points** within the levels specified in CC.8.3 and retain a dynamic Mvar capability to deal with changing **System** conditions which result from changes in **Demand** or changes in transmission or generation configuration, whether as a result of control actions or faults. This may necessitate the modification of **Generator MW** output**.**

OC4.4.5.3 The excitation system of each **Generation Unit** shall normally be operated under the control of a continuously acting **AVR**, which shall be set so as to maintain a constant terminal voltage. The **Generator** may not disable or restrict the operation of the **AVR** except in accordance with OC4.4.5.4, in which event the **Generator** shall notify **ESBNG** without delay.

OC4.4.5.4 The **Generator** may only disable or restrict **AVR** action where:

(a) the action is essential for the safety of personnel and/or **Plant**; 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 **ESBNG** and the **Generator** in advance.

OC4.4.5.5 In the event of a **Generation Unit** not operating under **AVR**, **ESBNG** may impose restrictions on the operation of the **Generation Unit** in accordance with **Prudent Utility Practice**, to the extent necessary to provide for safe and secure operation of the **Transmission System** and operation within prescribed standards, including where necessary instructing the **Generator** to **De-Energise** the **Generation Unit**. Where **ESBNG** takes such action, **ESBNG** shall consult with the **Generator** as soon as practicable in order to determine a safe operating regime, which causes minimum restriction on the operation of the **Generation Unit**.

OC4.4.5.6 **ESBNG** shall, by means of **Dispatch Instructions** (as provided in SDC2), instruct **Generators** to adjust the **Reactive Power** output of **Generation Units**, and the relevant provisions of SDC2 shall apply.

OC4.4.5.7 Other facilities which shall be utilised by **ESBNG**, where appropriate, in order to exercise **Voltage Control** shall include:

(a) switching in or out of dedicated **Voltage Control** facilities, such as capacitor banks and reactors;
(b) tap-changing on 400/220kV and 220/110kV **Transmission System** transformers;
(c) switching out of transmission **HV** cables (and occasionally transmission lines) in order to reduce the capacitive contribution of the **Transmission System**.

OC4.4.5.8 The extent to which **Voltage Control** mechanisms can be utilised may be limited by **System** conditions and other limitations of **Plant** and **Apparatus**.

OC4.4.5.9 On some occasions it shall be necessary to reschedule **Generation Units** away from their **Nominations** in order to achieve **Transmission System Voltages** at **Connection Points** within the levels specified in CC.8.2.

OC4.4.6 EMERGENCY or EXCEPTIONAL VOLTAGE CONTROL

OC4.4.6.1 Additional **Voltage Control** mechanisms may be utilised in the event of **System Emergency Conditions**. These shall include the following:

OC4.4.6.1.1 **Generators** may be requested to operate **Generation Units** at Mvar production or absorption levels outside their currently **Declared Operating Characteristics**. This will be done by agreement between the **Generator** and **ESBNG** and **Generators** will not be penalised for non-compliance with this clause.

OC4.4.6.1.2 Changes in **System Voltage** can be achieved by instructing, as a form of **Dispatch Instruction** under OC4.4, **Generators** to carry out a **Simultaneous Tap Change.** In the event that **ESBNG** considers it necessary to carry out a **Simultaneous Tap Change**, **Generators** shall comply with **ESBNG's** instructions.

OC4.4.6.1.3 **Demand** shedding may be used to prevent **Voltage** from contravening low **Voltage** limits (as further provided in OC5) at **Connection Points.** .

OC4.5 NETWORK CONTROL

OC4.5.1 INTRODUCTION

OC4.5.1.1 In implementing the **Transmission Outage Programme**, in routine operation of the **Transmission System** and in responding to emergency and fault situations on the **Transmission System**, **ESBNG** needs to carry out network switching and **Control Actions** which may from time to time affect the operations of **Users** or security of supply to **Users**.

OC4.5.1.2 The purpose of this OC4.5 is to set out the actions which may be taken by **ESBNG** in controlling the **Transmission System**, to set out the procedures whereby **ESBNG** shall inform **Users**, where practicable, as to network **Control Actions** which will or may be likely to significantly affect a **User's** operations and to identify where **ESBNG** shall, insofar as reasonably practicable, consult with **Users** and take into consideration **Users'** reasonable requirements.

OC4.5.2 OBJECTIVE

OC4.5.2.1 The first objective of OC4.5 is to identify the **Control Actions** that may be taken by **ESBNG**, in order that **ESBNG** may carry out maintenance and operation of the **Transmission System** and respond to **Transmission System** faults and emergencies.

OC4.5.2.2 The second objective of OC4.5 is to establish procedures whereby **ESBNG** will:

(a) where practicable, inform **Users** who will be or are likely to be significantly affected by network **Control Actions** of relevant details of intended **Control Actions** and the effect of those **Control Actions**;
(b) consult with **Users** as appropriate in order to find out and take into consideration reasonable objections raised by **Users** so affected.

OC4.5.3 NETWORK CONTROL ACTIONS

OC4.5.3.1 **ESBNG** needs to carry out operational network switching for a number of purposes, which will include:

(a) **Outages** of transmission **Plant** and **Apparatus** for the purposes of maintenance, new works, **System Tests**, protection testing and work by **Users**;
(b) **Outages** of transmission **Plant** due to suspected or potential faults and emergency repairs;

(c) **Voltage Control**;

(d) limiting power flows on the **Transmission System** to levels consistent with the capabilities of the transmission **Plant** and system security.

OC4.5.3.2 Additionally, network switching may occur automatically and without advance warning due to operation of protection equipment in isolating or clearing faults on transmission **Plant** or on **User's Plant** which is connected to the **Transmission System.**

OC4.5.3.3 Automatic switching sequences may also be established to limit power flows or **Voltage** or **Frequency** deviations in the event of faults elsewhere on the **System**.

OC4.5.4 NOTIFICATION TO USERS OF NETWORK CONTROL

OC4.5.4.1 All network **Control Actions** carried out on the **Transmission System** have the potential in a given set of circumstances to affect **Users**. To attempt to inform **Users** of every **Control Action** is not practicable and in most cases the information will not be of value to the **User** as the **User** will not invoke any specific action as a result of receipt of the information.

OC4.5.4.2 Where it is identified and agreed, in accordance with the terms of the **Connection Agreements** and/ or Operating Agreements, between **ESBNG** and a **User** that a specific **Control Action** (usually an action affecting the **Transmission System** configuration) has an **Operational Effect** on a **User** and that there is merit in notifying the **User** in advance of the **Control Action**, then **ESBNG** will notify the **User** of the **Control Action** (if planned and where time permits), in accordance with any standing agreement that may be agreed with the **User**.

OC4.5.4.3 Typical examples of actions notified in accordance with OC4.5.4.2 may include:

Notification to the **DSO** of a significant reduction in supply security to a **Grid Supply Point**, where the **DSO** may arrange standby feeding arrangements at lower **Voltages**;

Notification to a **Grid Connected Customer** of a significant reduction in supply security to a **Grid Supply Point** (such as the **Outage** of one of two transmission connections) where the **Grid Connected Customer** may arrange standby supply or run in-house **Generation**.

OC4.5.4.4 Where it is necessary to carry out urgent switching or other network **Control Actions**

resulting from a **System** condition or fault, then it may not be possible for **ESBNG** to inform **Users** in advance of the switching or other **Control Actions**. **ESBNG** shall endeavour to inform **Users** where time permits, but this shall not delay timely implementation of **Control Actions** as required. Where **ESBNG** is unable to inform **Users** prior to the **Control Actions**, then the provisions of OC4.5.5 shall apply.

OC4.5.5 CONTROL UNDER FAULT OR EMERGENCY CONDITIONS

OC4.5.5.1 In the event of a **System** fault or protection operation or other automatic operation, it will not be possible to invoke standing procedures in accordance with OC4.5.4 prior to the occurrence of the **Control Action.**

OC4.5.5.2 In the circumstances referred to in OC4.5.5.1 or in the event that **ESBNG** needs to implement **Control Actions** urgently and without informing **Users**, then unless the situation is of a temporary nature and has been rectified to normal, **ESBNG** shall inform **Users** of the occurrence of the actions

OC4.5.5.3 **ESBNG** shall also inform **Users** as to the likely duration of the condition and shall update this prognosis as appropriate. **ESBNG** shall additionally inform **Users** when the condition has ended.

OC4.5.6 DE-ENERGISATION OF USERS BY ESBNG

OC4.5.6.1 **De-Energisation** of a **User's Plant** and **Apparatus** may be effected at any time and from time to time if and to the extent that **ESBNG** reasonably considers it necessary in order to provide for safe and secure operation of the **Transmission System** within prescribed standards, including in circumstances which otherwise cause or in **ESBNG's** view are likely to cause one or more of the following:

(a) risk to the safety of personnel;
(b) risk to the stability of the **Transmission System**;
(c) risk to the **Transmission System** or any **User's Plant** or **Apparatus**;
(d) **Transmission System** elements to become loaded beyond their emergency limits;
(e) **Voltage** excursions on the **Transmission System** outside the ranges specified in CC.8.3;
(f) any behaviour causing sustained operation outside the normal **Transmission System** operating **Frequency** range;
(g) any material breach of a **Connection Condition**; and
(h) any action or inaction which places **ESBNG** in breach of any legal or statutory or

regulatory obligation.

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 **ESBNG** 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 **Contingency Reserve** is the margin of available generation capacity 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, **ESBNG** 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 **ESBNG** 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** 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 **ESBNG** 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 **ESBNG** 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**;

(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.**

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

OC4.6.6 RESPONSIBILITIES OF ESBNG IN RESPECT OF OPERATING RESERVE

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

OC4.6.6.2 **ESBNG'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 **ESBNG's** then **Operating Reserve** policies.

OC4.7 BLACK START

OC4.7.1 INTRODUCTION

OC4.7.1.1 In order to recover the **Transmission System** from a **Partial Shutdown** or **Total Shutdown**, it is necessary to have certain **Power Stations** ("**Black Start Stations**") available which have the ability for at least one of its **Generation Units** to **Start-Up** from **Shutdown** and to energise a part of the **Total System**, or be **Synchronised** to the **System**, upon instruction from **ESBNG**, without an external electrical power supply.

OC4.7.2 OBJECTIVE

OC4.7.2.1 The objectives of OC4.7is to set out the requirements of **Black Start Stations** to enable recovery of the **Transmission System** from a **Partial Shutdown** or **Total Shutdown**:

OC4.7.3 REQUIREMENTS OF BLACK START STATIONS

OC4.7.3.1 In order that adequate security is maintained on the **Transmission System** at all times, **Black Start Stations** are required to comply with the provisions of OC4.7.3.

OC4.7.3.2 Other than as permitted in accordance with OC4.7.3.3:

During a **Black Start** situation, instructions in relation to **Black Start Stations** will be in the format required for instructions to **Units** in **SDC1**and **SDC2**, and will recognise any differing **Black Start** operational capabilities (however termed) set out in the relevant **Ancillary Services Agreement** in preference to the declared operational capability as registered pursuant to **SDC1** (or as amended from time to time in accordance with **SDC1** and **SDC2**). For the purposes of these instructions the **Black Start** will be an emergency circumstance. For **Power Stations** which are not **Black Start Stations**, **Dispatch** instructions will recognise each **Unit's** declared operational capability as registered pursuant to **SDC1** (or as amended from time to time in accordance with **SDC1** and **SDC2**).

OC4.7.3.3 If during the **Demand** restoration process any **Black Start Unit** cannot, because of the

Demand being experienced, keep within its safe operating parameters, the **Generator** shall inform **ESBNG. ESBNG** will, where possible, either instruct **Demand** to be altered or will re-configure the **Transmission System** or will instruct a **User** to re-configure its **System** in order to alleviate the problem being experienced by the **Generator**. However, **ESBNG** accepts that any decision to keep a **Unit** operating, if outside its safe operating parameters, is one for the **Generator** concerned alone and accepts that the **Generator** may change generation on that **Unit** if it believes it is necessary for safety reasons (whether relating to personnel or **Plant** and/or **Apparatus**). If such a change is made without prior notice, then the **Generator** shall inform **ESBNG** as soon as reasonably practical

OC5 DEMAND CONTROL

OC5 DEMAND CONTROL

OC5.1 INTRODUCTION

OC5.1.1 OC5 is concerned with the provisions to be made by the **DSO** and, by **ESBNG** in relation to **Grid Connected Customers**, to permit the reduction of **Demand** in the event of available **Generating Plant** and transfers from **External Interconnections** being insufficient to meet **Demand**, or in the event of breakdown or operating problems such as in respect of **System Frequency**, **Voltage** levels or **Thermal Overloads** on any part of the **Transmission System**.

OC5.1.2 OC5 deals with the following:

a) **Customer Demand** reduction instructed by **ESBNG;**
b) **Customer Demand** reconnection instructed by **ESBNG**;
c) Automatic low **Frequency Demand Disconnection**;
d) Automatic low **Voltage Demand Disconnection**; and
e) **Automatic Frequency Restoration**.

The term "**Demand Control**" is used to describe any or all of these methods of achieving **Demand** reduction, or in the case of (b) and (e), a **Demand** increase.

OC5.1.3 The procedures set out in OC5 includes a system of **Alerts**, issued to **Users**, to give advance notice of **Demand Control** that may be required by **ESBNG** under this **OC5**.

OC5.1.4 Data relating to **Demand Control** shall include details relating to MW.

OC5.1.5 **Demand Control** shall not, so far as is possible, be exercised in respect of **Priority Customers**. OC5, therefore, applies subject to this exclusion.

OC5.1.6 **Demand Control** shall be exercised equitably in respect of **Customers** connected to the **Distribution System** and **Grid Connected Customers**.

OC5.1.7 Explanation

OC5.1.7.1 **Demand Control** is exercised through operation of the **Distribution System** or of the **Transmission System** (in the case of **Grid Connected Customers**). **Demand Control** in relates to the physical organisation of the total **System**, and not to any contractual arrangements that may exist. Where **Demand Control** is needed in a particular area, **ESBNG** would not know which **Supplier** to contact and (even if it were to) the resulting **Demand Control** implemented, because of the diversity of contracts, may not produce the required result.

OC5.1.7.2 Therefore, in most instances of **Demand Control**, **Demand Control** will be exercisable by the **DSO**. **Suppliers** should note, however, that, although implementation of **Demand Control** in respect of their **Customers** may not be exercisable by them, their **Customers** may be affected by **Demand Control**.

OC5.2 OBJECTIVE

OC5.2.1 The overall objective of OC5 is to require the provision of facilities by **DSO** and **Grid Connected Customers** to enable **ESBNG** to achieve the reduction in **Demand** that will either avoid or relieve operating problems on the **Transmission System**, in whole or in part, and thereby to enable **ESBNG** to instruct **Demand Control** in a manner that does not unduly discriminate against, or unduly prefer, any one or any group of **Users**. It is also to ensure that **ESBNG** is notified of any **Demand Control** utilised by **Users** other than following an instruction from **ESBNG**.

OC5.3 SCOPE

OC5 applies to **ESBNG** and to all **Users**, which term in this OC5 means:

(a) The **Distribution System Operator;**

(b) **Suppliers**; and

(c) **Grid Connected Customers**.

OC5.4 PROCEDURE FOR THE IMPLEMENTATION OF DEMAND CONTROL ON THE INSTRUCTIONS OF ESBNG

OC5.4.1 Where a shortage of generation capacity or other reason for the exercising of **Demand Control** is foreseen, **ESBNG** will alert the **DSO** by means of a **Demand Control Alert**.

OC5.4.2 Where reasonable notice of the need for **Demand Control** is available, **ESBNG** will initiate the **Rota Load Shedding Plan** and **Demand Control** will be implemented in accordance with the **Rota Load Shedding Plan**. **ESBNG** and the **DSO** will each be responsible for maintaining procedures and will co-operate with each other so as to provide for the implementation of **Demand Control** in accordance with the **Rota Load Shedding Plan**.

OC5.4.3 Where the requirement for **Demand Control** arises at short notice, it may be necessary for practical reasons to implement **Demand Control** other than in accordance with the **Rota Load Shedding Plan. ESBNG** and the **DSO** will each maintain procedures (and will co-operate in forming such procedures) to provide that **Demand Control** can be exercised rapidly when required, in accordance with **ESBNG's** instructions.

OC5.4.4 In the event of **Demand Control** being exercised other than in accordance with the **Rota Load Shedding Plan** (due to reasons of short notice or otherwise), and if the **Demand Control** is expected to be sustained, then **ESBNG** will arrange for the **Rota Load Shedding Plan** to be implemented as soon as practicable. **ESBNG** may instruct certain modifications in the application of **the Rota Load Shedding Plan** to provide for those **Customers** which have been subject to shedding in the initial phase prior to the initiation of **Planned Rota Load Shedding**.

OC5.4.5 The **Rota Load Shedding Plan** provides for disconnection and reconnection of defined blocks of demand on instruction from **ESBNG**, In this way **ESBNG** can instruct the necessary level of disconnection (and reconnection) required by the circumstances at the time. The **DSO** shall comply with instructions issued by **ESBNG** in accordance with the **Rota Load Shedding Plan**, and in particular will not reconnect **Demand** other than in accordance with **ESBNG's** instructions.

OC5.4.6 The **Rota Load Shedding Plan** shall also provide for the issue of information to **Customers** through the media of the expected duration of **Demand Control**, and which blocks of **Customers** are at most risk of disconnection at which times.

OC5.4.7 Both **ESBNG** and the **DSO** will maintain records of the disconnection and reconnection of customers exercised under the **Rota Load Shedding Plan**, (and, for the avoidance of doubt, of any **Demand Control** exercised in accordance with OC5.4.3**).**

OC5.5 AUTOMATIC LOW FREQUENCY DEMAND DISCONNECTION

OC5.5.1 The **DSO** shall make arrangements that will enable automatic low **Frequency Disconnection** of a percentage of its total peak **Customer Demand** (based on **Annual SLR Conditions**) as specified by **ESBNG**, in order to seek to limit the consequences of a major loss of **Generation** or an event on the total system which leaves part of the total system with a **Generation** deficit, provided that, so far as possible, **Demand** of **Generation Units** which is required to enable the **Generation Units** to start-up shall not be subject to automatic low **Frequency Disconnection**. **ESBNG** retains the right to specify the **Frequency** settings on percentages of **Demand** subject to automatic low **Frequency Disconnection**.

OC5.5.2 The **Demand** of the **DSO** which is subject to automatic low **Frequency Disconnection** will be split into discrete MW blocks. The number, location, size and the associated low **Frequency** settings of these blocks, will be as specified by **ESBNG** by week 39 in each calendar year following discussion with the **DSO** and will be reviewed annually by **ESBNG**. The distribution of the blocks will be such as to give reasonably uniform **Disconnection** within the **Distribution System** across all **Grid Supply Points**.

OC5.5.3 **Grid Connected Customers** shall provide automatic low **Frequency Disconnection**, which will be split into discrete blocks. The number and size of blocks and the associated low **Frequency** settings will be as specified by **ESBNG** by week 39 each calendar year following discussion with the **Grid Connected Customers**. In the case of a **User**, it is not necessary for it to provide automatic low **Frequency Disconnection** under OC5.5 if it is providing low **Frequency Disconnection** at a higher level of **Frequency** as an **Ancillary Service**.

OC5.6 AUTOMATIC FREQUENCY RESTORATION

OC5.6.1 The **DSO** will make arrangements that will enable automatic **Frequency** restoration of **Demand** that is subject to automatic low **Frequency Demand Disconnection**. **ESBNG** retain the right to specify the **Frequency** settings on blocks of **Demand** subject to automatic **Frequency** restoration.

OC5.6.2 Once an automatic low **Frequency Demand Disconnection** has taken place, the **DSO** shall not reconnect **Customers** until instructed by **ESBNG**, or otherwise in accordance with agreed procedures.

OC5.6.3 Where conditions are such that, following automatic low **Frequency Demand Disconnection**, it is not possible to restore a large proportion of the total **Demand** so **Disconnected** within a reasonable period of time, **ESBNG** may instruct the **DSO** to implement additional **Demand Disconnection** manually, and restore an equivalent amount of the **Demand** that had been **Disconnected** automatically. The purpose of such action is to ensure that a subsequent fall in **Frequency** will again be contained by the operation of automatic low **Frequency Demand Disconnection**. If the requirement for **Demand Control** is expected to continue for a sustained period of time, then **ESBNG** will initiate the implementation of the **Rota Load Shedding Plan** in accordance with OC5.4.

OC5.6.4 Once the **Frequency** has recovered, the **DSO** will abide by the instructions of **ESBNG** with regard to reconnection, and/or shall implement agreed procedures for **Demand** reconnection, without undue delay.

OC5.7 AUTOMATIC LOW VOLTAGE DEMAND DISCONNECTION

OC5.7.1 **ESBNG** may from time to time determine that there is a requirement for automatic low **Voltage Disconnection** of **Customer Demand**, in order to limit the consequences of the loss of a **Generation Unit(s)**, or an event on the **Total System**, which otherwise would result in part of the **Total System** with **Voltages** outside the levels specified in CC.8.3.

OC5.7.2 **ESBNG** may exercise the required **Automatic Low Voltage Demand Disconnection** (**ALVDD**) at the level of the **Transmission System**. However, depending on the extent of **ALVDD** required, and in order not to disconnect more **Customer Demand** than reasonably required in response to a specific incident or set or circumstances, it may be preferable that **ALVDD** is carried out at the level of the **Distribution System**.

OC5.7.3 On request by **ESBNG**, the **DSO** will co-operate with **ESBNG** as to the design and implementation of **ALVDD** at locations on the **Distribution System**, where the requirement is indicated in accordance with OC5.7.2. **ESBNG** will retain full control over the enabling/disabling of the **ALVDD**, and the **Voltage** settings at which **ALVDD** will be initiated in each circumstance. In general, the settings will be specified by

ESBNG by week 39 in each calendar year following discussion with the **DSO**, but the specification of settings may be altered by **ESBNG** at other times to address specific circumstances pertaining at the time. The **DSO** shall respond to any change in specification by altering the settings without undue delay.

OC6 SMALL SCALE GENERATOR CONDITIONS

OC6 SMALL SCALE GENERATOR CONDITIONS

OC6.1 INTRODUCTION

OC6.1.1 Secure operation of an electricity system requires that maintenance of production facilities (**Generation Units**) should be carried out in a timely and orderly fashion. This is essential in order to enable **ESBNG** to fulfil its obligations relating to operation of the **Transmission System**, and to enable **Generators** to plan their **Outages** in an orderly way with due regard to **Plant** requirements and resource limitations.

OC6.1.2 OC6 formalises the mechanism for scheduling outages of **Users** specified in OC6.3.

OC6.1.3 In implementing the **Transmission Outage Programme**, in routine operation of the **Transmission System** and in responding to emergency and fault situations on the **Transmission System**, **ESBNG** needs to carry out network switching and **Control Actions** which may from time to time affect the operations of **Users** or security of supply to **Users**.

OC6.1.4 OC6 sets out the actions which may be taken by **ESBNG** in controlling the **Transmission System**, to set out the procedures whereby **ESBNG** shall inform **Users**, where practicable, as to network **Control Actions** which will or may be likely to significantly affect a **User's** operations and to identify where **ESBNG** shall, insofar as reasonably practicable, consult with **Users** and take into consideration **Users'** reasonable requirements.

OC6.1.5 In addition to OC6, the Users specified in OC6.3 are required to comply with:

- Planning Conditions
- General Conditions
- Connection Conditions (Excluding CC.7.31.1(k) to (v) inclusive, C7.3.5, CC7.3.7, CC7.3.8, CC.12.2 (e) to (g) inclusive)
- OC7
- OC10 (excluding sections OC10.5.6; OC10.7.1; OC10.7.2; OC10.7.3; OC10.7.4; OC10.7.6), and
- OC11

OC6.2 OBJECTIVE

OC6.2.1 OC6 ensures the development and implementation of a **Generation Outage Programme**, consistent with security of supply and requirements for the secure

and economic operation of the **Transmission System**, and with the needs of **Small Scale Generators** in respect of **Plant** maintenance requirements and resource limitations.

OC6.2.2 In order to achieve this objective, OC6 defines the procedure for formal notification of **Outages** by **Generators** to **ESBNG**.

OC6.2.3 OC6 identifies the **Control Actions** that may be taken by **ESBNG**, in order that **ESBNG** may carry out maintenance and operation of the **Transmission System** and respond to **Transmission System** faults and emergencies.

OC6.2.4 OC6 establishes procedures whereby **ESBNG** will:

(a) where practicable, inform **Users,** who will be or are likely to be significantly affected by network **Control Actions,** of relevant details of intended **Control Actions** and the effect of those **Control Actions**;

(b) consult with **Users,** as appropriate, in order to find out and take into consideration reasonable objections raised by **Users** so affected.

OC6.3 SCOPE

OC6 applies to **ESBNG**, and to the following **Users**:

(a) **Generators** with **Registered Capacity** of 2MW or less (on a single **Site**)

(b) **Generators** with **Registered Capacity** less than 5MW (on a single **Site**) and greater than 2MW (on a single **Site**) where **ESBNG** consider that the **Generator** is in a location that does not make its operation particularly critical to the operation of the transmission system

OC6.4 OUTAGE SCHEDULING

OC6.4.1 Throughout OC6 the current year shall be defined as year 0, the following year as year 1, and so on.

OC6.4.2 By the end of March in year 0, **Small Scale Generators** shall submit to **ESBNG**, for each **Generation Site**, plant **Capacity Available** for each week for year 1 for inclusion in the **Committed Outage Programme (COP)** for year 1 and estimated weekly **Load Factors** for year 1.

Generators shall specify the start date and time and the duration of each **Outage**. This information shall be supplied on a **Unit** basis if so requested by **ESBNG**.

OC6.4.3 In scheduling **Outages**, and in relation to all other matters under OC6, the **Generator** must act reasonably and in good faith. Without limitation to such obligation, each **Generator** should act in accordance with **Good Industry Practice** in planning their **Outages** and, in particular, so as to avoid a situation arising in which a **Generator** is obliged to schedule an **Outage** by reason of obligations imposed upon the **Generator** by statute as a consequence of the **Generator** not having planned in accordance with **Good Industry Practice**, for example, by not having planned sufficiently in advance its **Outages** for any statutory time limit.

OC6.4.4 Any concerns which **ESBNG** may have with the **Generation Outage Programme** must be notified to all **Generators** by the end of June in year 0.

OC6.4.5 Between the end of June in year 0 and the end of September in year 0 any concerns raised by **ESBNG** shall be notified to **Generators**. **ESBNG** will facilitate discussions by **Generators** to find a resolution.

OC6.5 CHANGES TO THE COMMITTED OUTAGE PROGRAMME WITHIN THE IMPLEMENTATION YEAR

A request for a change to an **Outage** included in the **Committed Outage Programme** or an additional **Outage** may be initiated either by **ESBNG** or by a **Generator** at any time.

OC6.5.1 Request initiated by ESBNG

OC6.5.1.1 **ESBNG** may at any time request from a **Generator** a change in the timing or duration of any **Outage** of one of the **Generator's Generation Units** in the **Committed Outage Programme**.

OC6.5.1.2 A **Generator** may respond by either declining the request, or by agreeing to the request (in which case the **COP** shall be deemed to be amended accordingly). **Generators** shall make every reasonable effort to co-operate with changes requested by **ESBNG**.

OC6.5.1.3 If a **Generator** responds by agreeing to the request subject to specific conditions, **ESBNG** may respond by either confirming agreement to those conditions, in

which case the conditions specified by the **Generator** shall be deemed to have been accepted, or by declining agreement. Where **ESBNG** agrees to the conditions the **COP** shall be deemed to be amended accordingly. Where **ESBNG** declines to agree to the conditions, then **ESBNG** may negotiate with the **Generator** as to revised or alternative conditions, which would be acceptable.

OC6.5.2 Outage change initiated by a Generator

OC6.5.2.1 **Generators** may at any time request **ESBNG** for a change in the timing or duration of any **Outage** of one of the **Generator's Generation Units** in the **Committed Outage Programme**.

OC6.5.2.2 Where a change to the **COP** is proposed by a **Generator**, **ESBNG** shall evaluate whether the change is likely to have a detrimental effect on the secure operation of the **Transmission System**. This shall be done within a reasonable time frame, taking into consideration the extent of the change and the timing of the **Outage**. The **Generato**r shall be advised by **ESBNG** whether or not the change has been accepted.

OC6.5.2.3 Where, in accordance with OC6.5, the request is not likely to have a detrimental effect on the secure operation of the **Transmission System** then **ESBNG** shall amend the **COP** accordingly

OC6.5.2.4 Where, in accordance with OC6.5, the **Outage** change is likely to have a detrimental effect on requirements for the secure operation of the **Transmission System** then **ESBNG** shall not amend the **COP. ESBNG** shall contact the **Generator** requesting the change to establish that it is still required.

OC6.6 OTHER INFORMATION TO BE NOTIFIED

OC6.6.1 **Generators** will inform **ESBNG** of any proposed maintenance, in addition to **Outages**, which will, or is likely to, affect the capability of the **Generation Unit** to provide **Ancillary Services**.

OC6.6.2 **ESBNG** may, where security of supply or the secure operation of **the Transmission System** would be at risk, request alterations to maintenance notified under Section OC6.6.1. **ESBNG** shall make reasonable endeavours to give as much notice as possible for such requests for alterations. Where **ESBNG** makes such a request, the **Generator** shall use reasonable endeavours to comply with the request in arriving at the **Generator's** final programme for such maintenance.

OC6.7 NETWORK CONTROL

OC6.7.1 NETWORK CONTROL ACTIONS

OC6.7.1.1 **ESBNG** needs to carry out operational network switching for a number of purposes, which will include:

(a) **Outages** of transmission **Plant** and **Apparatus** for the purposes of maintenance, new works, **System Tests**, protection testing and work by **Users**;
(b) **Outages** of transmission **Plant** due to suspected or potential faults and emergency repairs;
(c) **Voltage Control**;
(d) limiting power flows on the **Transmission System** to levels consistent with the capabilities of the transmission **Plant** and system security;
(e) High Speed reclosing is a feature of the network.

OC6.7.1.2 Additionally, network switching may occur automatically and without advance warning due to operation of protection equipment in isolating or clearing faults on transmission **Plant** or on **User's Plant** which is connected to the **Transmission System.**

OC6.7.1.3 Automatic switching sequences may also be established to limit power flows or **Voltage** or **Frequency** deviations in the event of faults elsewhere on the **System**.

OC6.7.2 NOTIFICATION TO USERS OF NETWORK CONTROL

OC6.7.2.1 All network **Control Actions** carried out on the **Transmission System** have the potential in a given set of circumstances to affect **Users**. To attempt to inform **Users** of every **Control Action** is not practicable and in most cases the information will not be of value to the **User** as the **User** will not invoke any specific action as a result of receipt of the information.

OC6.7.2.2 Where it is identified and agreed, in accordance with the terms of the Connection Agreements and/ or Operating Agreements, between **ESBNG** and a **User** that a specific **Control Action** (usually an action affecting the **Transmission System** configuration) has an **Operational Effect** on a **User** and that there is merit in notifying the **User** in advance of the **Control Action**, then **ESBNG** will notify the **User** of the **Control Action** (if planned and where time permits), in accordance with

any standing agreement that may be agreed with the **User**.

OC6.7.2.3 Where it is necessary to carry out urgent switching or other network **Control Actions** resulting from a **System** condition or fault, then it may not be possible for **ESBNG** to inform **Users** in advance of the switching or other **Control Actions**. **ESBNG** shall endeavour to inform **Users** where time permits, but this shall not delay timely implementation of **Control Actions** as required. Where **ESBNG** is unable to inform **Users** prior to the **Control Actions**, then the provisions of OC6.7.3 shall apply.

OC6.7.3 CONTROL UNDER FAULT OR EMERGENCY CONDITIONS

OC6.7.3.1 In the event of a **System** fault or protection operation or other automatic operation, it will not be possible to invoke standing procedures in accordance with OC6.7.2 prior to the occurrence of the **Control Action.**

OC6.7.3.2 In the circumstances referred to in OC6.7.3.1 or in the event that **ESBNG** needs to implement **Control Actions** urgently and without informing **Users**, then unless the situation is of a temporary nature and has been rectified to normal, **ESBNG** shall inform **Users** of the occurrence of the actions

OC6.7.3.3 **ESBNG** shall also inform **Users** as to the likely duration of the condition and shall update this prognosis as appropriate. **ESBNG** shall additionally inform **Users** when the condition has ended.

OC6.7.4 DE-ENERGISATION OF USERS BY ESBNG

OC6.7.4.1 **De-Energisation** of a **User's Plant** and **Apparatus** may be effected at any time and from time to time if and to the extent that **ESBNG** reasonably considers it necessary in order to provide for safe and secure operation of the **Transmission System** within prescribed standards, including in circumstances which otherwise cause or in **ESBNG's** view are likely to cause one or more of the following:

(a) risk to the safety of personnel;

(b) risk to the stability of the **Transmission System**;

(c) risk to the **Transmission System** or any **User's Plant** or **Apparatus**;

(d) **Transmission System** elements to become loaded beyond their emergency limits;

(e) **Voltage** excursions on the **Transmission System** outside the ranges specified in CC.8.3;

(f) any behaviour causing sustained operation outside the normal **Transmission System** operating **Frequency** range;

(i) any material breach of a **Connection Condition**; and

(j) any action or inaction which places **ESBNG** in breach of any legal or statutory or regulatory obligation.

OC6.7.4.2 Instructions to **De-energise** a **User** connected to the distribution system under the terms of OC6.7.4.1 may be issued by **ESBNG** to the **DSO** who shall act on the instruction without undue delay.

OC7 INFORMATION EXCHNAGE

OC7.1 NOTIFICATION OF EVENTS AND OPERATIONS

OC7.1.1 INTRODUCTION

OC7.1.1.1 OC7.1 sets out the requirements for the exchange of information in relation to **Operations** and/or **Events** on the **Power System** which have had (or may have had) or will have (or may have) an **Operational Effect**, and thereby have become **Significant System Incidents**:-

(a) on the **Transmission System** in the case of an **Operation** and/or **Event** occurring on a **User System**; and

(b) on a **User System** in the case of an **Operation** and/or **Event** occurring on the **Transmission System**.

OC7.1.1.2 The requirement to notify in OC7.1 relates generally to notification of what is expected to happen or what has happened. However, as OC7.1 provides, when an **Event** or **Operation** has occurred on the **Transmission System** which itself has been caused by (or exacerbated by) an **Operation** or **Event** on a **User System**, **ESBNG** in reporting the **Event** or **Operation** on the **Transmission System** to another **User** can pass on what it has been told by the **User** under OC7.1 in relation to the **Operation** or **Event** on the first **User System**.

OC7.1.1.3 Much of the information that **ESBNG** will require to analyse **Significant System Incidents** may be available by means of:

(a) **ESBNG's SCADA** system(s) and other data collection systems; and

(b) information provided to **ESBNG** by **Users** under other codes of the **Grid Code**.

OC7.1.1.4 In order to ensure that **ESBNG** receives as rapidly as practicable the information it needs to operate the **Transmission System**, and to ensure that no information is missed, this OC7.1 sets out a comprehensive set of requirements. It also provides for information to be submitted to **Users**, in order to assist **Users**. Where an obligation exists elsewhere to provide data to **ESBNG** the **User** is not required also to provide data under OC7.1.

OC7.1.2 OBJECTIVE

The objective of OC7.1 is to provide for the exchange of information so that the implications of an **Operation** and/or **Event** can be considered, possible risks arising from it can be assessed and appropriate action taken by the relevant party in order to assist in maintaining the integrity of the **Power System**.

OC7.1.3 SCOPE

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

(a) **Generators**;

(b) **Distribution System Operator**; and

(c) **Grid Connected Customers**.

OC7.1.3.2 It is required that as part of the fulfilment of obligations under this OC7.1, both **ESBNG** and **Users** will take into account information they have received from third parties in determining whether an **Operation** or an **Event** is to occur, or has~~,~~ occurred.

OC7.1.4 REQUIREMENT TO NOTIFY

OC7.1.4.1 While in no way limiting the general requirements to notify set out in this OC7.1, **ESBNG** and **Users** shall agree to review from time to time which **Operations** and **Events** are required to be notified.

OC7.1.5 NOTIFICATION OF AN OPERATION

OC7.1.5.1 **ESBNG** will notify the **User**, (save in circumstances as provided for under OC7.1.5.2), of **Operations** on the **Transmission System**, which will have (or may have), in the reasonable opinion of **ESBNG**, an **Operational Effect** on the **User**. Except as agreed with **ESBNG**, the **User** may not pass on the information contained in a notification to it from **ESBNG** under this OC7.1 to any other person.

OC7.1.5.2 In circumstances where it is not possible to invoke standing procedures prior to the occurrence of an **Operation** or in the event that **ESBNG** needs to implement **Operations** urgently and without informing the **User** then, unless the situation is of a temporary nature, i.e. less than 15 minutes, and has been rectified to normal, **ESBNG** shall inform the **User** of the occurrence of the **Operations**, without undue

delay. **ESBNG** shall also inform the **User** as to the likely duration of the condition and shall update this prognosis as appropriate. **ESBNG** shall additionally inform the **User** as soon as reasonably possible when the condition has ended.

OC7.1.5.3 The **User** will notify **ESBNG** of **Operation**s on the **User**'s **System** which will have (or may have) an **Operational Effect** on the **Transmission System**. **ESBNG** may use this information in notifying any other **User(s)** on whose **System(s)** the operation will have, or may have, in the reasonable opinion of **ESBNG**, an **Operational Effect**, in accordance with this OC7.1.

OC7.1.6 FORM OF NOTIFICATION OF AN OPERATION

OC7.1.6.1 A notification (and any response to any questions asked under OC7.1.6.3), of an **Operation** shall be of sufficient detail to describe the **Operation** (although it need not state the cause) and to enable the recipient of the notification reasonably to consider and assess the implications and risks arising.

OC7.1.6.2 A notification will include the name (and job title) of the individual reporting the **Operation** on behalf of **ESBNG** or the **User**, as the case may be.

OC7.1.6.3 The recipient of the notification may ask questions to clarify the notification and the giver of the notification will, insofar as he is able, answer any questions raised.

OC7.1.7 RECORDING OF AN OPERATION

The notification shall be given **In Writing** whenever possible before carrying out an **Operation**. If there is insufficient time before the **Operation** is scheduled to take place for notification to be given **In Writing**, then the notification shall be given orally and if either the **User** or **ESBNG** requests, it shall be submitted **In Writing**.

OC7.1.8 TIMING IN RESPECT OF AN OPERATION

A notification under Section OC7.1.5 will be given as far in advance as possible and in any event shall be given in sufficient time as will reasonably allow the recipient to consider and assess the implications and risks arising.

OC7.1.9 NOTIFICATION OF EVENTS

OC7.1.9.1 **ESBNG** will notify the **User** of **Events** which in the reasonable opinion of **ESBNG** are **Significant System Incidents** having an **Operational Effect** on the **User**.

Except as agreed with **ESBNG**, the **User** may not pass on the information contained in a notification to it from **ESBNG** to any other person.

OC7.1.9.2 The **User** will notify **ESBNG** of **Events** which may be **Significant System Incidents** affecting the **Transmission System**. **ESBNG** may use this information in notifying any other **Users** on whose **System(s)** the **Significant System Event** will have, or may have, in the reasonable opinion of **ESBNG**, an **Operational Effect.**

OC7.1.10 FORM OF NOTIFICATION OF AN EVENT

OC7.1.10.1 A notification (and any response to any questions asked under Section OC7.1.10.3) of an **Event**, will describe the **Event**, pursuant to Section OC7.1.9 although it need not state the cause of the **Event**, and, subject to that, will be of sufficient detail to enable the recipient of the notification reasonably to consider and assess the implications and risks arising

OC7.1.10.2 A notification will include the name (and job title) of the individual reporting the **Event** on behalf of **ESBNG** or the **User**, as the case may be.

OC7.1.10.3 The recipient of the notification may ask questions to clarify the notification and the giver of the notification will, insofar as he is able (although he need not state the cause of the **Event**) answer any questions raised.

OC7.1.11 PROVISION OF FURTHER INFORMATION

When an **Event** has been reported to **ESBNG** by a **Generator** under OC7.1 and it is necessary in order for the **Generator** to assess the implications of the **Event** on their system more accurately, the **Generator** may ask **ESBNG** for details of the fault levels from the **Transmission System** to their **Generation Unit** at the time of the **Event**, and **ESBNG** will, as soon as reasonably practicable, give the **Generator** that information provided that **ESBNG** has that information.

OC7.1.12 RECORDING OF AN EVENT

Notification of an **Event** pursuant to Section OC7.1.9 shall be given orally in the first instance. **Significant System Incidents** must be reported **In Writing** if requested by either the **User** or **ESBNG**.

OC7.1.13 TIMING IN RESPECT OF AN EVENT

A notification of an **Event** under section OC7.1.9 shall be given as soon as practicable after the occurrence of the **Event**, or time that the **Event** is known of or anticipated by the giver of the notification under OC7.1, and in any event, except in an emergency ,within fifteen minutes of such time.

OC7.2 OPERATIONAL COMMUNICATION AND DATA RETENTION

OC7.2.1 INTRODUCTION

OC7.2.1.1 It is necessary that adequate communication facilities and procedures are established between **ESBNG** and **Users** to allow the timely transfer of information, in order that **ESBNG** may fulfil its obligations with regard to the operation of the **Transmission System**.

OC7.2.2 OBJECTIVE

OC7.2.2.1 The objectives of OC7.2 are:

(a) to establish contact locations for **ESBNG** and each class of **User**;

(b) to detail the communication facilities required between **ESBNG** and each class of **User**;

(c) to establish the general procedures (notwithstanding any specific procedures which may be established in other sections of this **Grid Code**) for communication of information between **ESBNG** and **Users**; and

(d) to establish the general procedures (notwithstanding any specific procedures which may be established in other sections of this **Grid Code**) for the authorisation of **ESBNG** personnel to act on behalf of **ESBNG** and **User** personnel to act on behalf of the **User** in the communication of information between **ESBNG** and **Users**.

(e) to establish the general procedures (notwithstanding any specific procedures which may be established in other sections of this **Grid Code**) for the retention of data.

OC7.2.2.2 Pursuant to this OC7.2 both **ESBNG** and **Users** will be obliged to adopt the use of new technologies and methodologies for communication of information, where there is a recognisable benefit from doing so, and to do so would be reasonable in the circumstances.

OC7.2.2.3 This OC7.2 covers the general procedures for all forms of communication of operational information between **ESBNG** and **Users**, other than pre-connection communication that is dealt with in the **Connection Conditions**. Data relating to **Commercial (Energy) Metering** is specifically not covered by this OC7.2.

OC7.2.3 SCOPE

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

(a) **Generators**;
(b) **Distribution System Operator**; and
(c) **Grid Connected Customers**.

OC7.2.4 CONTACT LOCATIONS

OC7.2.4.1 ESBNG

OC7.2.4.1.1 Other than where specifically provided for under Section OC7.2.4.1.2 or in other sections of the **Grid Code**, the contact location within **ESBNG** for communication on matters pertaining to the real time operation of the **Transmission System** shall be the **National Control Centre** (**NCC**) or if designated under Section OC7.2.6.2 the **Emergency Control Centre** (**ECC**).

OC7.2.4.1.2 **ESBNG** will, from time to time, notify to **Users** the relevant points of contact in **ESBNG** (and their contact details) and any changes to such points of contact and/or details for the purposes of each section of this **Grid Code** (including, where appropriate, for specific purposes under each section), and the **User** shall, as required, contact the relevant notified points of contact.

OC7.2.4.1.3 **ESBNG** shall from time to time distribute to each **User** an organisational chart and list of personnel and contact numbers (consistent with the notification given under Section OC7.2.4.1.2) in order to assist the **User** in communicating with **ESBNG**.

OC7.2.4.2 GENERATORS

OC7.2.4.2.1 The **Generator** contact locations and personnel referred to in this Section OC7.2.4.2 shall be notified by the **Generator** to **ESBNG** prior to connection and thereafter updated as appropriate.

OC7.2.4.2.2 The **Generator** is required to provide a **Control Facility**. The **Generator** shall ensure acting in accordance with **Good Industry Practice** that the **Control Facility** is staffed at appropriate staffing levels at all times.

OC7.2.4.2.3 The **Control Facility** shall be staffed by a **Responsible Operator(s)** who shall respond to communications from **ESBNG** without undue delay (except where otherwise provided for by agreement between the **Generator** and **ESBNG**, such

agreement not to be unreasonably withheld) and are of suitable experience and training and are authorised to perform the following functions on behalf of the **Generator**:

(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 **Availability**, **Ancillary Service** capability, or **Operating Characteristics** of the **Generation Units** during **System Emergency Conditions**.

OC7.2.4.2.4 At any point in time, a single person shall be designated by the **Generator** and notified to **ESBNG** as the **Responsible Manager**. The **Responsible Manager** shall be responsible for dealing with **ESBNG** on matters relating to the **Grid Code** other than as provided for in OC7.2.4.2.2 and OC7.2.4.2.3. In the event that the **Responsible Manager** is not a person on duty at the **Control Facility**, then the **Responsible Manager** must be capable of being contacted from the **Control Facility** at all times, and in the event that **ESBNG** issues a request to the **Control Facility** requiring the **Responsible Manager** to contact the **NCC**, the **Responsible Manager** shall comply with the request without undue delay and in any case within 15 minutes of the request.

OC7.2.4.2.5 The **Responsible Manager** shall be authorised by the **Generator** to perform the following functions on behalf of the **Generator**:

(a) to make estimates in accordance with **Good Industry Practice** as to the available **Availability**, **Ancillary Service** capability and **Operating Characteristics** of each **Generation Unit**;
(b) to make **Declarations** for each **Generation Unit**;
(c) to communicate with respect to issues regarding **Outages** of each **Generation Unit**.

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

OC7.2.4.3 Grid Connected Customers

OC7.2.4.3.1 The **Grid Connected Customer** contact locations and personnel referred to in this Section OC7.2.4.3 shall be notified by the **Grid Connected Customer** to **ESBNG** prior to connection and thereafter updated as appropriate.

OC7.2.4.3.2 The **Grid Connected Customer** is required to provide **ESBNG** with the contact information of a **Responsible Operator(s)** who shall respond to communications

from **ESBNG** without undue delay (except where otherwise provided for by agreement between the **Grid Connected Customer** and **ESBNG**, such agreement not to be unreasonably withheld) and are of suitable experience and training and are authorised to perform functions on behalf of the **Grid Connected Customer**.

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

OC7.2.4.3.4 At any point in time, a single person shall be designated by the **Grid Connected Customer** and notified to **ESBNG** as the **Responsible Manager**. The **Responsible Manager** shall be responsible for dealing with **ESBNG** 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 **Grid Connected Customer** , then the **Responsible Manager** must be capable of being contacted from the **Site** of the **Grid Connected Customer** at all times, and in the event that **ESBNG** issues a request to the **Site** of the **Grid Connected 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.

OC7.2.4.4 DSO

OC7.2.4.4.1 The **DSO** contact locations and personnel referred to in this Section OC7.2.4.4 shall be notified by the **DSO** to **ESBNG** prior to connection and thereafter updated as appropriate.

OC7.2.4.4.2 The **DSO** is required to provide a **Control Facility**. The **DSO** shall ensure acting in accordance with **Good Industry Practice** that the **Control Facility** is staffed at appropriate staffing levels at all times.

OC7.2.4.4.3 The **DSO** shall operate its **Control Facility** according to the provisions agreed with **ESBNG** in any agreements between the **DSO** and **ESBNG** agreement such agreement not to be unreasonably withheld.

OC7.2.5 COMMUNICATION FACILITIES

OC7.2.5.1 The minimum communications facilities which are to be installed and maintained between **ESBNG** and the **User** are defined in this Section OC7.2.5.

OC7.2.5.2 All equipment to be provided by **Users** under this Section OC7.2.5 shall comply with the applicable **International Telecommunications Union** (**ITU**) and **International Electrotechnical Commission (IEC)** standards for SCADA and communications equipment and shall meet such standards as notified by **ESBNG**, acting reasonably, in advance of their design or procurement (whichever is later) and shall be provided at the cost of the **User**, except where otherwise specified.

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 **ESBNG 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 **ESBNG** may from time to time by notice to **Users** reasonably require.

OC7.2.5.3.2 Interface cabinets shall be installed in the control room of the **ESBNG Transmission Station** at the **User Site** and also on the **User's Site**. Provision and maintenance of wiring and signalling from the **Generator's Plant** and **Apparatus** to the **User's** interface cabinet shall be the responsibility of the **User. ESBNG** shall provide the cables to interconnect these interface cabinets.

OC7.2.5.4 Computer equipment

OC7.2.5.4.1 Each **User** shall comply with **ESBNG** requirements and provide appropriate computer and data networking equipment to allow data exchange such as electronic mail, dispatch instructions etc between **ESBNG** and the **User**.. The equipment shall only be used by the **User** for operational communications with **ESBNG**.

OC7.2.5.4.2 Each **User** shall be responsible for optimising the reliability and security of the computer equipment, referred to in OC7.2.5.4.1, including the provision, at no charge, of an uninterruptible power supply.

OC7.2.5.5 Telephone/Facsimile

OC7.2.5.5.1 Each **User** shall be responsible for the provision and maintenance (at the cost of the **User**) of telephone and facsimile equipment as required by this Section OC7.2.5.5.

OC7.2.5.5.2 **ESBNG** may provide one or more telephone extensions to be connected to the **ESBNG** private operational telephone system. This facility shall be reserved for

operational purposes only, and shall be continuously attended by a person meeting the requirements of OC7.2.4.2.3, OC7.2.4.3.3, or OC7.2.4.4.3 (as appropriate) and answered without undue delay. **Users** shall be responsible for optimising the reliability and security of this telephone service including the provision at no charge of an uninterruptible power supply.

OC7.2.5.5.3 **Users** shall provide a Public Switched Telephone Network circuit to the **Communications and Control Room**.

OC7.2.5.5.4 **Users** shall provide no fewer than two separate Public Switched Telephone Network circuits to the **Control Facility**.

OC7.2.5.5.5 **Users** shall provide no fewer than one telefacsimile unit, connected to a dedicated Public Switched Telephone Network circuit at the **Control Facility**.

OC7.2.5.7 Access and Security

OC7.2.5.7.1 All SCADA, metering equipment, computer and communications equipment that interfaces with **ESBNG** and the information carried by it must be secure from unauthorised access. Procedures governing security and access shall be agreed with **Users** pursuant to the **Operation Instructions**, but shall allow for adequate access to the equipment and information by **ESBNG** for the purposes of maintenance, repair, testing and the taking of readings.

OC7.2.5.8 Time Standards

OC7.2.5.8.1 Time will be set by a standard determined by **ESBNG**. The time standard will be broadcast to relevant telecommunications devices in order to maintain time coherence.

OC7.2.6 COMMUNICATION BETWEEN ESBNG AND THE USER

OC7.2.6.1 Other than where specifically provided for in other sections of the **Grid Code**, communication between **ESBNG** and **Users** on matters pertaining to the real time operation of the **Transmission System** shall take place between the **NCC** and the **Generator's Control Facility**.

OC7.2.6.2 If the **NCC** is to be moved to a different location **ESBNG** shall ordinarily notify **Users** as soon as practicable after the decision to move has been made, and not less than seven (7) days prior to the move, but in the event of an emergency it may instead notify **Users** as soon as practicable after the move.

OC7.2.6.3 Unless otherwise specified in the **Grid Code**, all instructions given by **NCC** and communications between **NCC** and the **User 's Control Facility** shall be given by means of the facilities described in OC7.2.5.

OC7.2.6.4 Any automatic recording (by whatever means) of communications given by means of telephony, electronic means, facsimile transfer or telex will be accepted by **ESBNG** and **Users** as evidence of those instructions or communications.

OC7.2.7 DATA AND NOTICES

OC7.2.7.1 Data and notices to be submitted to **ESBNG** or to **Users** under the **Grid Code** (other than data and notices which are the subject of a specific requirement of the **Grid Code** as to the manner of their delivery) shall be **In Writing** and shall be delivered by hand or sent by pre-paid post, by telex, receipted email or telefacsimile transfer.

OC7.2.7.2 Data and notices to be submitted to **ESBNG** under the **Grid Code** shall be addressed to the person, and at the address, notified by **ESBNG** to **Users** for such purpose, following entry into the **Connection Agreement**, or to such other person or address, as **ESBNG** may notify to **Users** from time to time.

OC7.2.7.3 Data and notices to be submitted to **Users** under the **Grid Code** shall be addressed to the **User 's** nominated representative (at the address notified by **Users** to **ESBNG** following entry into the **Connection Agreement** for such purpose (and failing such notification to the principal office of the addressee)), or to such other person or address as **Users** may notify to **ESBNG** from time to time.

OC7.2.7.4 All data items, where applicable, will be referenced to nominal **Voltage** and **Frequency** unless otherwise stated.

OC7.2.7.5 All **Operational Data** is to be supplied in accordance with the timetables set out in the **Grid Code**.

OC7.2.8 DATA RETENTION

OC7.2.8.1 **Operational Data** is all data required to be supplied by either **ESBNG** or **Users** under the **Grid Code** any other data expressly provided to be **Operational Data** under the **Grid Code**. **Operational Data** to be supplied by the **User** must be submitted to the department or address as **ESBNG** may from time to time advise.

OC7.2.8.2 **ESBNG** and **Users** will keep all **Operational Data** confidential.

OC7.2.8.3 **ESBNG** shall maintain a complete and accurate record of all **Operational Data** supplied or maintained under the **Grid Code**. The format for the retention of records shall be as **ESBNG** may reasonably determine (provided such format shall not prejudice its accessibility and comprehension by the **User** under OC7.2.8.4). All **Operational Data** shall be so maintained for a period of not less than six (6) years commencing from the date the **Operational Data** was first supplied (or first created, if earlier).

OC7.2.8.4 **ESBNG** shall afford **Users** access to its records (and copies thereof) of **Operational Data** and/or data required to be maintained under OC7.2.8.3 on reasonable notice.

OC8 OPERATIONAL TESTING

OC8 OPERATIONAL TESTING

OC8.1 INTRODUCTION

OC8.1.1 OC8 deals with the responsibilities and procedures for arranging and carrying out **Operational Tests** which may have an effect on the **Systems** of **ESBNG** and **Users**

OC8.1.2 By their nature, **Operational Tests** may impinge on either or both of:

(a) **ESBNG's** responsibilities in respect of the **Transmission System**, including **Dispatch** of generation; and

(b) the operations of **Users** and the quality and continuity of supply of electricity to **Users**.

OC8.1.3 To minimise disruption to the operation of the **Transmission System** and to the **Systems** of other **Users**, it is necessary that tests which affect the operation of the **Transmission System** or **Users' Systems** as under OC8.1.2, are subject to central co-ordination and control.

OC8.1.4 To achieve the primary objective as outlined in OC8.2.1, OC8 sets out procedures for establishing and reporting **Operational Tests.**

OC8.2 OBJECTIVE

OC8.2.1 The primary objective of OC8 is to establish procedures for central co-ordination and control of an **Operational Test** required by **ESBNG** or a **User**, where such test will or may:

(a) affect the secure operation of the **Transmission System**; or

(b) have a significant effect on the operation of the **Transmission System** or a **User's System**; or

(c) affect the economic operation of the **Transmission System** or a **User's System**; or

(d) affect the quality or continuity of supply of electricity to **Users**.

OC8.2.2 By way of example, tests that are typical of those which may be expected to be covered by OC8 are listed in OC8.4 to OC8.5. This list is not intended to be exhaustive and other tests which fall within the definition of **Operational Tests** shall also be covered by the procedures outlined in this OC8.

OC8.2.3 OC8 is not intended to deal with tests which may be called routinely by **ESBNG** in order to assess compliance of **Users** with their design, operating and connection requirements as specified in the **Grid Code** and in each **User's Connection Agreement, Ancillary Services Agreements** and **System Support Agreement**, or to assess that **Generators** are in compliance with their **Registered Data** as notified by **Declarations**, where appropriate, or to determine that **Generation Units** are in compliance with **Dispatch Instructions**. These issues are covered under OC10 (**Monitoring**, **Testing** and **Investigation**).

OC8.3 SCOPE

OC8 applies to **ESBNG** and to all **Users**, which term in this OC8 means:

(a) **Generators** which includes all **Generators** with units with **Registered Capacity** greater than 5 MW ;

(b) The **Distribution System Operator**; and

(c) **Grid Connected Customers**.

OC8.4 TESTS REQUIRED BY ESBNG

OC8.4.1 **ESBNG** as operator of the **Transmission System** will in accordance with **Prudent Utility Practice**, need to carry out **Operational Tests** in order to maintain and develop operational procedures, to train staff, and to acquire information in respect of **Power System** behaviour under abnormal system conditions. **ESBNG** will endeavour to limit the frequency of occurrence, scope, extent of effects and type of **Operational Tests** to those that are required by **Prudent Utility Practice.**

OC8.4.2 **Operational Tests** required by **ESBNG** from time to time shall include, but shall not be limited to the following:

(i) Tests involving the controlled application of **Frequency** and/or **Voltage** variations aimed at gathering information on **Power System** behaviour;

(ii) **Power System Restoration Tests**;

(iii) Testing of standing procedures for **System Emergency Conditions** and **Alert** conditions

(iv) Testing or monitoring of **Power Quality** under various Power System conditions and **Dispatch** configurations.

OC8.4.3 The provisions of OC8.6, OC8.7, OC8.8, OC8.10.4 and OC8.11 shall not apply to **Operational Tests** required by **ESBNG** under this OC8.4.

OC8.4.4 Where **ESBNG** intends to carry out an **Operational Test** in accordance with this OC8.4 and, in **ESBNG's** reasonable opinion, such an **Operational Test** will or may have an **Operational Effect** on a **User's System**, **ESBNG** shall, in accordance with OC7 (Information Exchange) provide such notice to the **User** of the scheduled time and effect of the **Operational Test** as is reasonable in all the circumstances and shall keep the **User** informed as to any changes to the scheduled time and nature of the **Operational Test**.

OC8.4.5 Where a **User**, having been informed about an **Operational Test** under OC8.4.4 may, acting reasonably, contact **ESBNG** to request additional time to consider the impact of the test on the **User**. **ESBNG** shall co-operate with the **User** to assess the risks. The test shall not proceed until all **Users** are satisfied unless, in **ESBNG**'s view, a **User** is acting unreasonably.

OC8.5 TESTS REQUIRED BY THE USERS

OC8.5.1 Operation of **Users**' **Plant** in accordance with **Good Industry Practice** requires **Operational Testing** in order to maintain and develop **Operational Procedures**, develop and measure **Plant** performance, comply with statutory or other industry obligations and to train staff.

OC8.5.2 In accordance with **Good Industry Practice** each **User** shall endeavour to limit the frequency of occurrence of **Operational Tests** and to limit the effects of such **Operational Tests** on the **Transmission System**.

OC8.6 PROCEDURE FOR REQUESTING OPERATIONAL TESTS

OC8.6.1 **Users** shall submit proposals for an **Operational Test** in a timely fashion in accordance with OC7 (Information Exchange) or alternative procedures agreed with **ESBNG**.

OC8.6.2 As part of the proposal **Users**, when requesting an **Operational Test,** shall supply sufficient detail to **ESBNG** to allow any operational consequences of the test to be adequately assessed. This shall include the following information:

OC8.6.2.1 the reason for the proposed test indicating whether the **Operational Test** is a test required by statute, required for compliance with licence conditions, statutory

regulations, or safety codes, which may require that execution of the **Operational Test** be expedited and given priority over other **Operational Tests**;

OC8.6.2.2 the preferred time or times for the test;

OC8.6.2.3 the milestones for individual stages of the **Operational Test** (if any) which can be completed separately, and/or do not require to be repeated if the **Operational Test** is interrupted by **ESBNG** after completion of each stage;

OC8.6.2.4 whether there may be an adverse material impact on the **User** if the **Operational Test** is cancelled at short notice or delayed (reasonable detail being given by the **User** to **ESBNG** of the impact).

OC8.6.2.5 where the **User** is a **Generator,** the **Dispatch** or **Dispatches** required by the **Generator** for completion of the test, if any, including the duration of **Dispatch** shall be supplied to **ESBNG** as part of the proposal. Where the **Generator** may not know the entire **Dispatches** required for completion of the test until part of the test is completed then the **Generator** when proposing the test shall:

(a) divide the test into sections as appropriate;
(b) indicate and discuss with **ESBNG** which sections of the test can be completed in stages and which can not; and
(c) indicate possible variations of the test for the sections that can be completed in stages.

Additionally, the factors that influence the completion of the stages should be outlined to **ESBNG**, namely, if the procedure to be followed for a certain stage depends on the outcome of a previous stage.

OC8.6.3 A request by the **Generator** for an **Operational Test** requiring a **Generation Unit** to be **Dispatched** to a particular MW output or operating condition shall not be considered a **Re-declaration** of **Availability**, **Ancillary Service** capability or **Operating Characteristics**.

OC8.7 EVALUATION OF PROPOSED OPERATIONAL TESTS

OC8.7.1 **ESBNG** shall, on receipt of an **Operational Test** request from the **User**, assess the impact of the proposed test on the operation of the **Power System**. **ESBNG** may request additional information from the **User** required to evaluate the impact or impacts of the test.

OC8.7.2 **ESBNG** will evaluate the impact (in terms of continuity and quality of supply only) of the **Operational Test** with significantly affected **Users**. Any reasonable objections from any such **Operationally Affected Users** shall be considered. When discussing the **Operational Test** with any affected **User**, **ESBNG** shall not disclose what it reasonably believes to be commercially sensitive or otherwise potentially sensitive information to **Users** without the consent of the **User** requesting the test.

OC8.7.3 Where an **Operational Test** proposed by a **Generator** in respect of one of its **Generation Units** requires a **Dispatch** that is outside the currently declared values of **Availability**, **Ancillary Service** capability or **Operating Characteristics** of the **Generation Unit**, then **ESBNG** may so **Dispatch** the **Generation Unit** for the period required for the **Operational Test**, in accordance with the relevant provisions of the **Grid Code**.

OC8.8 APPROVAL FOR OPERATIONAL TESTING

OC8.8.1 Following receipt of an **Operational Test** proposal and evaluation of the **Operational Test's** likely impact, including discussions of test requirements with the **User** requesting the **Operational Test** and with **Operationally Affected Users** as appropriate, **ESBNG** will decide if approval for the requested **Operational Test** is granted.

OC8.8.2 The criteria for approving **Operational Test** include:

(a) the impact of the **Operational Test** on **Transmission System** operation security

(b) the impact of the **Operational Test** on **Transmission System** operation economics

(c) the impact of the **Operational Test** on other **Users**' Systems

(d) the effect of the **Operational Test** on continuity and quality of electricity supply

OC8.8.3 On approval by **ESBNG** of an **Operational Test** proposed by a **User,** who is a **Generator, ESBNG** shall contact the **Generator** outlining the proposed **Dispatch** procedure and schedule.

OC8.8.3.1 On receipt of the proposed **Dispatch** procedure and schedule of the **Operational Test**, the **Test Proposer** shall notify **ESBNG** without undue delay, of the **Test Proposer's** acceptance or rejection of the proposed **Dispatch** procedure and schedule for the test.

OC8.8.3.2 On notification of rejection of the proposed **Dispatch** procedure and schedule for the **Operational Test** by the **Test Proposer**, then the **Operational Test** shall not take place. The **Test Proposer** may enter into discussions with **ESBNG** as to an alternative schedule for the **Operational Test**, or may request a different **Operational Test** or may request the **Operational Test** at an alternative time.

OC8.8.3.3 On notification of acceptance of the proposed **Dispatch** procedure and schedule for the **Operational Test** by the **Test Proposer**, **ESBNG** shall inform other **Users** as to the scheduled time and nature of the test, if in the opinion of **ESBNG** those **Users** will or may be significantly affected by the test, or otherwise as dictated by standing arrangements.

OC8.8.3.4 If **Operationally Affected Users** are not satisfied with the proposed **Operational Test**, they shall advise **ESBNG** of their concerns. **ESBNG** shall not cancel proposed **Operational Test** unless these objections are reasonable. If **Operationally Affected Users** are still not satisfied with the Operational Test being approved, then they may appeal the decision to the **Commission** in accordance with OC8.12.

OC8.8.3.5 Notification by **ESBNG** to the **Test Proposer** of the proposed **Dispatch** procedure and schedule for an **Operational Test**, or notification by the **Test Proposer** to **ESBNG** of acceptance of the proposed **Dispatch** procedure and schedule, does not constitute a **Dispatch Instruction** from **ESBNG** to the **Test Proposer**.

OC8.8.4 On rejection of the proposed **Operational Test** by **ESBNG**, the **Test Proposer** may enter into discussions with **ESBNG** as to an alternative schedule for the **Operational Test**, or may request a different **Operational Test** or may request the **Operational Test** at an alternative time. If the amended proposal for an **Operational Test** is approved by **ESBNG**, and the **User** requesting the **Operational Test** is a **Generator**, then OC8.8.3 shall apply.

OC8.8.5 If the **Test Proposer** is not satisfied that there are reasonable grounds for rejecting the proposed **Operational Test,** then they may appeal to the **Commission** according to OC8.12.

OC8.9 SCHEDULING OF OPERATIONAL TESTS

OC8.9.1 **Operational Tests** will usually, but not necessarily, be scheduled by **ESBNG** in accordance with SDC1 .

OC8.9.2 Where an **Operational Test** is requested by a **Generator**, the **Generator** shall nominate half-hourly MW outputs and constraints in accordance with **SDC1** and the **Trading and Settlement Code** consistent with planned **Operational Tests**.

OC8.9.3 Where an **Operational Test** is required by **ESBNG**, either

(a) the **Generator** shall nominate half-hourly MW outputs and constraints in accordance with **SDC1** and **ESBNG** shall then dispatch consistent with the planned **Operational Test**, or

(b) where **Operational Test** costs and conditions are agreed in advance between the **Generator** and **ESBNG**, the **Generator** shall nominate in accordance with **ESBNG** requirements for the **Operational Test.**

OC8.9.4 **ESBNG** shall use reasonable endeavours to prioritise **Operational Tests** where the **Test Proposer** has notified **ESBNG** that **Operational Tests** are required in accordance with licence conditions, statutory regulations or safety codes or a delay in the execution of the tests may have an adverse material impact on a **User**.

OC8.10 DISPATCHING OF OPERATIONAL TESTS

OC8.10.1 **Dispatch Instructions** for **Operational Tests** shall be issued by **ESBNG** in the normal manner for issuing **Dispatch Instructions** in accordance with **SDC2**.

OC8.10.2 **ESBNG** shall use reasonable endeavours to ensure that scheduled **Operational Tests** are dispatched in accordance with the agreed **Dispatch** procedures.

OC8.10.3 Where **ESBNG** foresees a requirement or likely requirement to cancel, postpone or otherwise significantly alter an agreed **Dispatch** procedure and schedule, then **ESBNG** shall inform the **Test Proposer** as soon as reasonably possible. In this case the provisions of OC.8.10.4 and OC.8.10.5 apply.

OC8.10.4 Where **ESBNG** assesses that the impact of an **Operational Test** on **Transmission System** security or on the continuity and quality of supply or operation of a **User** may or is likely to be significantly greater than originally estimated, **ESBNG** may contact the **Test Proposer** to discuss a revised test procedure or schedule.

OC8.10.5 **ESBNG** may where it considers it necessary cancel, interrupt or postpone an **Operational Test** at any time, but shall where possible utilise the procedures outlined under OC8.10.4 prior to taking such action where the cancellation, interruption or postponement is for other than technical reasons.

OC8.10.5 If the **Test Proposer** wishes to cancel an **Operational Test** either before commencement of the test or during the test**, ESBNG** must be notified by the **Test Proposer**, in accordance with OC7. **Nominations** and **Dispatch Instructions** shall remain valid when **Operational Tests** are cancelled.

OC8.11 TEST REPORTING

OC8.11.1 Upon conclusion of the scheduled time for an **Operational Test** the **Test Proposer** shall notify **ESBNG** as to whether the test has been completed, or sections of the test if divided into sections under OC8.6.2.3 have been completed.

OC8.11.2 At the conclusion of the **Operational Test**, the **Test Proposer** shall be responsible for preparing a written report on the **Operational Test** (the "**Final Report**") which shall be available within three months of the conclusion of the **Operational Test** to **ESBNG**, **Operationally Effected Users** and the **Commission** on request.

OC8.11.3 The **Final Report** shall not be submitted to any person who is not a representative of **ESBNG** or the **Test Proposer** unless **ESBNG** and the **Test Proposer** having reasonably considered the confidentiality issues arising, shall have unanimously approved such submission.

OC8.11.4 The **Final Report** shall include a description of the **Plant** and/or **Apparatus** tested and a description of the **System Test** carried out together with the results, conclusions and recommendations as they relate to **ESBNG** and **Operationally Effected Users**.

OC8.12 DISPUTES

OC8.12.1 **Operationally Affected Users** who consider that the implementation of the proposed **Operational Test** will have a significant negative impact on them may appeal to the **Commission** providing details of their objections.

OC8.12.2 The **Test Proposer** has right of appeal to the **Commission** if it considers that rejection of the proposed **Operational Test** is unreasonable.

OC9 EMERGENCY CONTROL AND POWER SYSTEM RESTORATION

OC9 EMERGENCY CONTROL AND POWER SYSTEM RESTORATION

OC9.1 INTRODUCTION

OC9.1.1 Normal operation of the **Transmission System** by **ESBNG** is in accordance with the principles and procedures as set out in this **Grid Code** and obligations under the Electricity Supply Act 1927. There will be emergency situations when security of the **Transmission System** is subject to abnormal levels of risk (e.g. during major lightning storms) and this OC9 provides for specific requirements to address such situations.

OC9.1.2 Experience has shown that electricity supply systems can suffer **Partial** or **Total Shutdown**. Collapses can result from a number of root causes but might most typically be due to a high number of **Plant** failures (**Generation** and/or transmission) resulting from severe weather conditions and/or maloperation of protection systems.

OC9.1.3 It is therefore necessary in the **Grid Code** to provide for how to deal with a **Partial** or **Total Shutdown** of the **Transmission System**, and to ensure that the necessary procedures and facilities are in place to support rapid re-establishment of the shutdown parts and restore supply to **Customers**.

OC9.1.4 A **Partial** or **Total Shutdown** represents one of the most serious fault situations liable to occur on the **Transmission System,** having a major effect on both **Users** and **Customers**. Due to the significance of such an incident and the urgency in restoring supply to all **Customers**, it is imperative that all **Users** should maintain a high level of awareness and training in respect of **Power System Restoration**.

OC9.2 OBJECTIVE

OC9.2.1 The objective of OC9 is to ensure that in the event of a **Partial** or **Total Shutdown** of the **Transmission System**, normal supply is restored to all **Customers** as quickly and as safely as practicable in accordance with **Prudent Utility Practice**. This objective can be subdivided:

(a) to outline the general restoration strategy which will be adopted by **ESBNG** in the event of a **Partial** or **Total Shutdown** of the **Transmission System**;

(b) to establish the responsibility of **ESBNG** to produce and maintain a comprehensive **Power System Restoration Plan**, covering both **Partial** and **Total Shutdowns**;

(c) to establish the responsibility of **Users** to co-operate with the formation and

execution of the **Power System Restoration Plan**,

(d) to ensure that **ESBNG** and **User** personnel who will potentially be involved with the **Power System Restoration Plan**, should be adequately trained and fully familiar with the relevant details of the plan.

OC9.3 SCOPE

OC9 applies to **ESBNG** and to all **Users**, which term in this OC9 means:

(a) **Generators** which for the purposes of OC9 includes all **Generators** with **Registered Capacity** greater than 5 MW;

(b) The **Distribution System Operator**; and

(c) **Grid Connected Customers**.

OC9.4 SYSTEM ALERTS

OC9.4.1 In the event of a **System Emergency Condition** or imminent shortfall of MW capacity, **ESBNG** may issue any of several **Alerts** to the Generator, key **Transmission Stations** and **Distribution Control Centres**. These **Alerts** may include an **Amber Alert**, **Red Alert** or **Blue Alert**, or other **Alerts** as may be agreed from time to time.

OC9.4.2 **Alerts** will normally (except in the case of a failure of the **Electronic Alert System** when it will be given verbally) be transmitted to the **User** via the **Electronic Alert System**. The **Alert** shall cause an alarm in the receiving location, which must be acknowledged by the **User** in accordance with their **Alert** procedures.

OC9.4.3 AMBER ALERTS

OC9.4.3.1 An **Amber Alert** may be issued when a single **Event** would give rise to a reasonable possibility of failure to meet the **Power System Demand**, or of **Frequency** or **Voltage** departing significantly from normal, as per CC.8.2.1(a) and CC.8.3.1(a), or if multiple **Events** are probable due to prevailing weather conditions.

OC9.4.3.2 Standing procedures to be activated in response to an **Amber Alert** will be developed by **ESBNG,** in consultation with **Users,** and notified to each **User** as appropriate. These standing procedures will not impose obligations on the **User** which are not already implicit in the **Grid Code.**

OC9.4.3.3 Each **User** is responsible for internal procedures necessary to execute the standing procedures.

OC9.4.4 RED ALERTS

OC9.4.4.1 A **Red Alert** may be issued when, other than as provided for in OC10, the **Frequency** or **Voltage** has deviated significantly from normal, or **User's Demand** has been disconnected, or, in the period immediately ahead there is a high probability of failing to meet the **Power System Demand** or to maintain normal **Voltage**.

OC9.4.4.2 Standing procedures to be activated in response to a **Red Alert** will be developed by **ESBNG**, in consultation with **Users,** and notified to each **User** as appropriate.

OC9.4.4.3 Each **User** is responsible for internal procedures necessary to execute the standing procedures.

OC9.4.5 BLUE ALERTS

OC9.4.5.1 The issuing of a **Blue Alert** other than as provided for in 9.5.4, by **ESBNG** signifies that either a **Partial** or a **Total Shutdown** of the **Power System** has taken place.

OC9.4.5.2 Standing procedures to be activated in response to a **Blue Alert** will be developed by **ESBNG**, in consultation with **Users,** and notified to each **User** as appropriate. These standing procedures will not impose obligations on the **User** which are not already implicit in the Grid **Code.**

OC9.4.5.3 Each **User** is responsible for internal procedures necessary to execute the standing procedures. In developing internal procedures to apply following the activation of **Blue Alert** standing procedures, each **User** shall consult with **ESBNG**.

OC9.5 POWER SYSTEM RESTORATION

OC9.5.1 The **Power System Restoration Plan** will be developed and maintained by **ESBNG** in consultation with the **DSO** and other **Users** as appropriate. **ESBNG** will promulgate the **Power System Restoration Plan** in accordance with **Prudent Utility Practice.**

OC9.5.2 The procedure for **Power System Restoration** shall be that notified by **ESBNG** to the **User** at the time of a **Partial** or **Total Shutdown**. Each **User** shall abide

by **ESBNG's** instructions during the restoration process, subject to safety of personnel and **ESBNG's** and the **User's Plant** and **Apparatus**.

OC9.5.3 It shall be the responsibility of the **User** to ensure that any of its personnel who may reasonably be expected to be involved in **Power System Restoration** are familiar with, and are adequately trained and experienced in their standing instructions and other obligations so as to be able to implement the procedures and comply with any procedures notified by **ESBNG** under OC9.5.2.

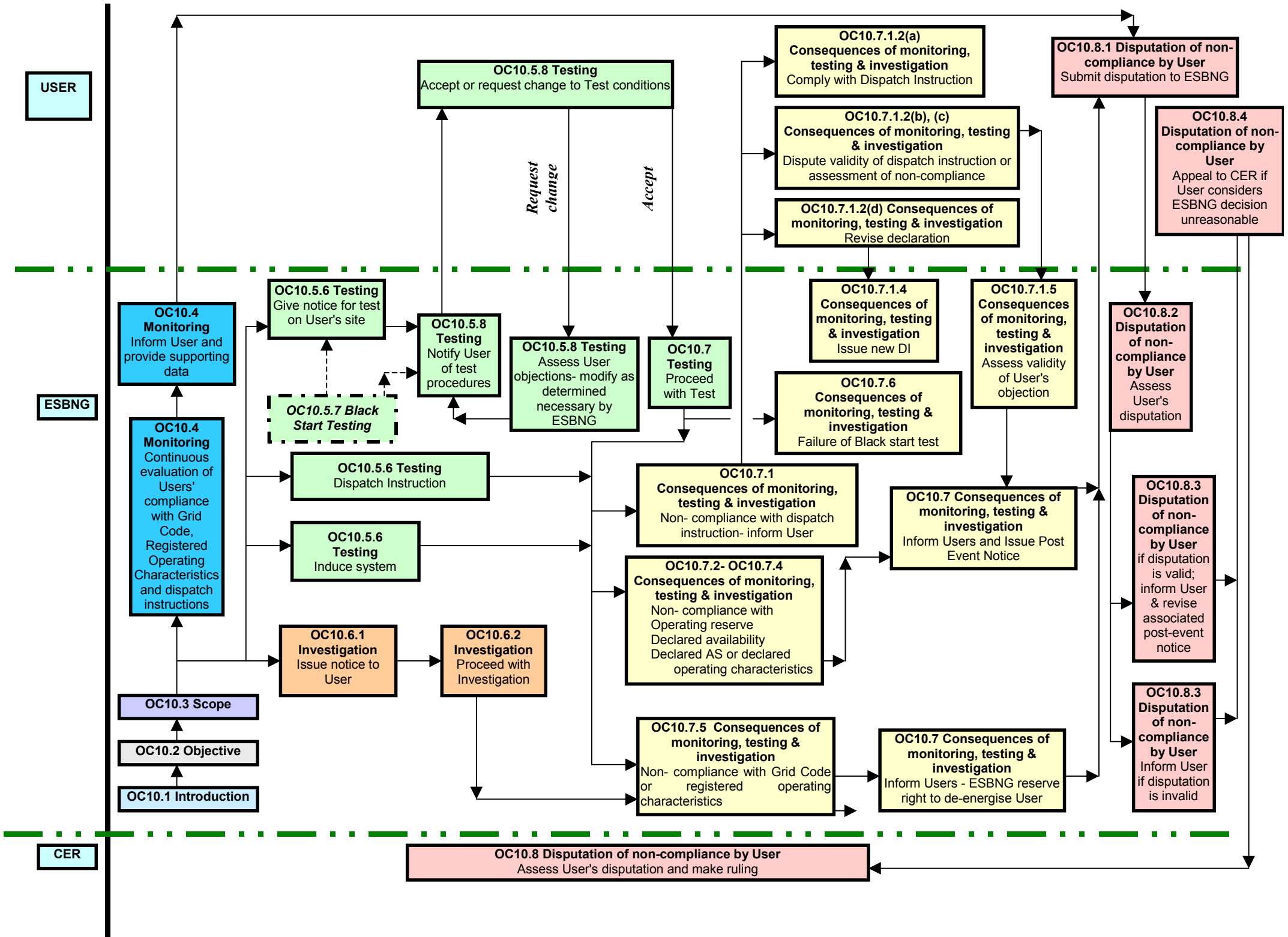
OC9.5.4 **ESBNG** shall in consultation with each **User** and on at least one occasion each year, issue a **Blue Alert** to the **User** for the purposes of assisting training. The content of the tests shall be notified in advance to the **User**, and a date and time for execution of the tests shall be agreed. The **User** must, acting in accordance with **Good Industry Practice**, co-operate with any such testing.

OC9.6 DE-ENERGISATION OF THE USER'S PLANT BY ESBNG

OC9.6.1 **De-Energisation** of a **User's Plant** and **Apparatus** is also provided for in OC4.5.6. It may be effected at any time and from time to time if and to the extent that **ESBNG**, acting in accordance with **Prudent Utility Practice**, considers it necessary in order to provide for safe and secure operation of the **Transmission System** within prescribed standards, including:

(i) during a **System Emergency Condition**;
(ii) during **Power System Restoration**; and
(iii) following the issue of a **Blue Alert.**

OC10 MONITORING, TESTING AND INVESTIGATION


USER
ESBNG
CER
OC10.5.8 Testing
Accept or request change to Test conditions
Request change
Accept
OC10.7.1.2(a)
Consequences of monitoring, testing & investigation
Comply with Dispatch Instruction
OC10.7.1.2(b), (c)
Consequences of monitoring, testing & investigation
Dispute validity of dispatch instruction or assessment of non-compliance
OC10.7.1.2(d) Consequences of monitoring, testing & investigation
Revise declaration
OC10.8.1 Disputation of non-compliance by User
Submit disputation to ESBNG
OC10.8.4
Disputation of non-compliance by User
Appeal to CER if User considers ESBNG decision unreasonable
OC10.4
Monitoring
Inform User and provide supporting data
OC10.5.6 Testing
Give notice for test on User's site
OC10.5.8
Testing
Notify User of test procedures
OC10.5.8 Testing
Assess User objections- modify as determined necessary by ESBNG
OC10.7
Testing
Proceed with Test
OC10.7.1.4
Consequences of monitoring, testing & investigation
Issue new DI
OC10.7.1.5
Consequences of monitoring, testing & investigation
Assess validity of User's objection
OC10.8.2
Disputation of non-compliance by User
Assess User's disputation
OC10.5.7 Black Start Testing
OC10.7.6
Consequences of monitoring, testing & investigation
Failure of Black start test
OC10.4
Monitoring
Continuous evaluation of Users' compliance with Grid Code, Registered Operating Characteristics and dispatch instructions
OC10.5.6 Testing
Dispatch Instruction
OC10.5.6
Testing
Induce system
OC10.7.1
Consequences of monitoring, testing & investigation
Non- compliance with dispatch instruction- inform User
OC10.7.2- OC10.7.4
Consequences of monitoring, testing & investigation
Non- compliance with
Operating reserve
Declared availability
Declared AS or declared operating characteristics
OC10.7 Consequences of monitoring, testing & investigation
Inform Users and Issue Post Event Notice
OC10.8.3
Disputation of non-compliance by User
if disputation is valid; inform User & revise associated post-event notice
OC10.6.1
Investigation
Issue notice to User
OC10.6.2
Investigation
Proceed with Investigation
OC10.3 Scope
OC10.2 Objective
OC10.1 Introduction
OC10.7.5 Consequences of monitoring, testing & investigation
Non- compliance with Grid Code or registered operating characteristics
OC10.7 Consequences of monitoring, testing & investigation
Inform Users - ESBNG reserve right to de-energise User
OC10.8.3
Disputation of non-compliance by User
Inform User if disputation is invalid
OC10.8 Disputation of non-compliance by User
Assess User's disputation and make ruling

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**, **ESBNG** 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 **ESBNG** 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 **ESBNG.**

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)** comply with **Dispatch Instructions**;

(b) whether **Generators** are in compliance with **Declarations** of **Availability**, **Ancillary Services** capabilities, **Operating Characteristics** and any other data required to be registered by those **Generators** 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]; and

(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 **ESBNG.**

OC10.3 SCOPE

OC10 applies to **ESBNG** 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 5 MW on a single **Site**;

(b) The **Distribution System Operator**;

(c) **Suppliers**; and

(d) **Grid Connected Customers**.

OC10.4 MONITORING

OC10.4.1 **Monitoring** is normally continuous or continuous for periods of time, and is carried out by monitoring, data recording and analysis or by such other methods as **ESBNG** shall reasonably determine are appropriate in the circumstances. It does not require advance notification from **ESBNG** to **Users**.

OC10.4.2 Where a data recording and analysis system is used for **Monitoring, ESBNG** shall inform the **User** that such data recording and analysis system is being used and, on request from the **User**, shall make available to the **User** reasonable information in respect of the data recording and analysis system.

OC10.4.3 **Monitoring** may be carried out at any time by **ESBNG** and may result, without the application of further **Testing**, in the evaluation by **ESBNG** of **User** non-compliance. Where the **User** disputes a finding of non-compliance, **ESBNG** shall provide the **User** with any data collected during **Monitoring** over the period of alleged non-compliance and such other documentation as is reasonably necessary to show evidence of non-compliance.

OC10.4.4 Performance parameters that **ESBNG** shall **Monitor** may include, but are not limited to, the following:

OC10.4.4.1 compliance with **Dispatch Instructions**;

OC10.4.4.2 compliance with **Declarations** including, without limitation, in respect of:

(a) **Primary**, **Secondary** and **Tertiary Operating Reserve** provided by each of a **Generator's Generation Units,** following a low **Frequency Event** on the **Transmission System**;

(b) **Frequency Regulation** provided by each **Generation Unit** (to confirm that it is consistent with the **Declared Governor Droop**); and

(c) Tertiary Operating Reserve 2 and Replacement Reserve provided by each of a Generator's Generation Units.

OC10.4.4.3 Compliance with **IEC Power Quality** standards; and

OC10.4.4.4 Provision of static and dynamic **Reactive Power**.

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 **ESBNG**) or otherwise agreed between **ESBNG** and the **User**, such agreement not to be unreasonably withheld.

OC10.5 TESTING

OC10.5.1 Testing may involve attendance by **ESBNG** or **ESBNG** representative at **User Sites** in order to carry out **Tests** in accordance with the testing procedures set out in OC10.5.7.

OC10.5.2 For the purposes of this OC10 a **Test** shall be carried out pursuant to a **Dispatch Instruction** from **ESBNG** or by such alternative procedure as is required or permitted by this OC10.

OC10.5.3 A **Test** may require the **User** to carry out specific actions in response to a **Dispatch Instruction**.

OC10.5.4 The results of a **Test** may be derived from the **Monitoring** of performance during the **Test**.

OC10.5.5 **ESBNG** may, from time to time, carry out **Tests** in order to determine that a **User** is complying with its **Connection Conditions**, **Registered Operating Characteristics** and **Declarations**. **ESBNG** may:

(a) from time to time and for the purposes of **Testing**, issue a **Dispatch Instruction**;

(b) induce controlled **Power System Frequency** or **Voltage** conditions or variations for the purpose of determining that the **Generation Unit's** response is in accordance with its **Declared Availability**, **Ancillary Service** capabilities and **Operating Characteristics**; and

(c) having given three **Business Days** notice, or less where agreed, (identifying the **Ancillary Service** and/or **Operating Characteristic** to be tested), send a representative to the **Generator's Site** to verify by **Testing** in accordance with the **Test** procedures specified in OC10.5.8, that the **Generator** is in compliance with its **Declared** values.

OC10.5.6 If ESBNG subcontracts **Testing** work on a **User's Site**, then the **User** and **ESBNG** must be in agreement on the selection of a suitable subcontractor.

OC10.5.7 Black start Testing

OC.10.5.7.1 **ESBNG** may require a **Generator** with a **Black Start Station** to carry out a test (a "**Black Start Test**") on a **CDGU** in a **Black Start Station** either while the **Black Start Station** remains connected to an external alternating current electrical supply (a "**Black Start Unit Test**") or while the **Black Start Station** is disconnected from all external alternating current electrical supplies (a "**Black Start Station Test**"), in order to demonstrate that a **Black Start Station** has a **Black Start Capability**.

OC.10.5.7.2 Where **ESBNG** requires a **Generator** with a **Black Start Station** to carry out a **Black Start Unit Test**, **ESBNG** shall not require the **Black Start Test** to be carried out on more than one **CDGU** at that **Black Start Station** at the same time, and would not, in the absence of exceptional circumstances, expect any other **CDGU** at the **Black Start Station** to be directly affected by the **Black Start Unit Test**.

OC.10.5.7.3 **ESBNG** may require a **Generator** with a **Black Start Station** to carry out a **Black Start Unit Test** at any time (but will not require a **Black Start Unit Test** to be carried out more than once in each calendar year in respect of any particular **CDGU** unless it can justify on reasonable grounds the necessity for further tests or unless the further test is a re-test, and will not require a **Black Start Station Test** to be carried out more than once in every two calendar years in respect of any particular **CDGU** unless it can justify on reasonable grounds the necessity for further tests or unless the further test is a re-test).

OC.10.5.7.4 When **ESBNG** wishes a **Generator** with a **Black Start Station** to carry out a **Black Start Test**, it shall notify the relevant **Generator** at least 7 **Business Days** prior to the time of the **Black Start Test** with details of the proposed **Black Start Test**.

OC.10.5.7.5 All **Black Start Tests** shall be carried out at the time specified by **ESBNG** in the notice given under OC.10.5.7.4 and shall be undertaken in the presence of a reasonable number of representatives appointed and authorised by **ESBNG**, who shall be given access to all information relevant to the **Black Start Test**.

OC10.5.8 Test Procedures

The proposed procedure for a **Test** will be notified to the **User** by **ESBNG** in advance of the **Test**. For an existing procedure, three **Business Days** notice shall be given. For a new procedure, seven days notice shall be given and following receipt of such notification the **User**, acting in good faith, may, by five days notice to **ESBNG**, reasonably object to the proposed procedure on the grounds that there will be a material risk to the safety of the **User's Plant** or personnel, or that the proposed procedure is technically infeasible or inappropriate to the purpose (in accordance with **Good Industry Practice**), giving full details of its concerns. In the event that the **User** so objects, **ESBNG** shall, as it considers necessary, modify the procedure and re-notify the **User**.

OC10.5.8.1 **ESBNG** shall treat information collected from **Users** during **monitoring** and **testing** as confidential.

OC10.5.9 Results of **Testing** shall be dealt with in accordance with OC10.7

OC10.6 INVESTIGATION

OC10.6.1 **ESBNG** may, if it reasonably considers that there may be an issue of non-compliance by the **User**, carry out an **Investigation** to acquire or verify information relevant to **Users' Plant** and/or **Apparatus** design, operation or connection requirements under the **Grid Code**, **Connection Agreements**, **Ancillary Service Agreements and System Support Agreements** between **Users** and **ESBNG**.

OC10.6.2 **Investigation** by **ESBNG** usually applies to information not collected on a regular basis by means of **Monitoring** and **Testing. ESBNG** may, having given reasonable notice, send a representative or subcontractor to a **User's Site** in order to **Investigate** any equipment or operational procedure on or applicable to the **User Site** insofar as the condition of that equipment or operational procedure is relevant to compliance with the **Grid Code**, **Connection Agreements**, and/or other agreements between **Users** and **ESBNG.**

OC10.7 CONSEQUENCES OF MONITORING, TESTING AND INVESTIGATION

OC10.7.1 Non-compliance with a Dispatch Instruction issued by ESBNG to a Generator.

OC10.7.1.1 When **ESBNG** considers that a **Generator** is not in compliance with a **Dispatch Instruction** then **ESBNG** shall inform the **Generator** by agreed methods, identifying the relevant **Generation Unit**, and identifying the **Dispatch Instruction** and the time of issue of the **Dispatch Instruction** with which **ESBNG** considers the **Generator** 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 **ESBNG** and by the **Generator**

OC10.7.1.2 On receipt of a **Warning** for non-compliance with a **Dispatch Instruction**, the **Generator** 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 **ESBNG**, 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 **ESBNG**, disputing in good faith the validity of the assessment of non--compliance. In this event the **Generator** must as soon as is reasonably practicable, inform **ESBNG** in detail of the grounds on which the assessment of non-compliance is being disputed; or

(d) reply to **ESBNG**, giving a reason for inability to comply with the **Dispatch Instruction**, and making a revised **Declaration** in respect of the **Generator's Availability**, **Ancillary Service** capabilities or **Operating Characteristics**, as appropriate.

OC10.7.1.3 If the **Generator** complies in accordance with OC10.7.1.2 (a), no further action shall arise.

OC10.7.1.4 In the event of the **Generator** making a revised **Declaration** under OC10.7.1.2 (d), **ESBNG** 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** 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, **ESBNG** shall consider the substance of the **Generator's** disputation. **ESBNG** shall, where **ESBNG** considers appropriate, communicate with the **Generator** to clarify aspects relating to the issue and receiving of the **Dispatch Instruction**, and the **Generator's** actions. **ESBNG** shall acting reasonably determine the validity of the **Generator's** disputation, and shall inform the **Generator** as to its decision. **ESBNG** shall record both its decision, and also all pertinent information relating to the event, including the **Generator's** disputation and such information shall be deemed to be **Operational Data**.

OC10.7.1.6 Where **ESBNG**, acting reasonably, is of the view that a disputation given by a **Generator** is not valid or not wholly valid or if the **Generator** has not replied in accordance with OC10.7.1.2, **ESBNG** shall inform the **Generator** that it is overriding, by means of a **Post Event Notice**, the **Generator's Declaration** in respect of the **Availability**, **Ancillary Service** capabilities or **Operating Characteristics** of the **Generation Unit**, as appropriate. The **Post Event Notice** shall govern until such times as the **Generator** makes a further **Declaration**.

OC10.7.1.7 Where **ESBNG** 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** 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 **Generator** will still be deemed under OC10.7.1.1 as having failed to comply with a **Dispatch Instruction**.

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**, **ESBNG** 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 **ESBNG** to be in non-compliance with **Declared Operating Reserve**, then **ESBNG** shall notify the **Generator** of the non-compliance, identifying the system or procedure by which non-compliance was measured. **ESBNG** 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 **ESBNG** 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, **ESBNG** 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 **Trading and Settlement Code** and other agreements as appropriate.

OC10.7.3 Non-compliance by a Generator with Declared Availability

OC10.7.3.1 In the event that the performance of a **Generation Unit** is deemed by **ESBNG** to be in non-compliance with its **Declared Availability**, then **ESBNG** shall notify the **Generator** of the non-compliance.

OC10.7.3.2 Having so informed the **Generator ESBNG** shall by means of a **Post Event Notice** override the **Generator's Declaration** in respect of **Availability**, 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 **ESBNG** 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 with Declared Availability** will be addressed in the **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 **ESBNG** to be in non-compliance with its **Declared Ancillary Services** capability or **Operating Characteristics**, then **ESBNG** shall notify the **Generator** of the non-compliance, and having so informed the **Generator** then **ESBNG** 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 **Trading and Settlement Code** and other agreements as appropriate.

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

In the event that the performance of a **Generation Unit** is deemed by **ESBNG** in accordance with the provisions of this OC10 to be in non compliance with its **Operating Characteristics** or with a **Connection Condition**, then **ESBNG** 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 **ESBNG** to **De-energise** the **Generator's Plant** and **Apparatus** in accordance with the terms of OC9.6.

OC10.7.6 Failure of a Black Start Test

OC10.7.6.1 A **Black Start Station** shall fail a **Black Start Test** if the **Black Start Test** shows that it does not have a **Black Start Capability** (i.e. if the relevant **Generating Unit** fails to be **Synchronised** to the **System** within two hours of the **Auxiliary Gas Turbine(s)** or **Auxiliary Diesel Engine(s)** being required to start).

OC10.7.6.2 If a **Black Start Station** fails to pass a **Black Start Test** the **Generator** must provide **ESBNG** with a written report specifying in reasonable detail the reasons for any failure of the test so far as they are then known to the **Generator** after due and careful enquiry. This must be provided within five **Business Days** of the test. If a dispute arises relating to the failure, **ESBNG** and the relevant **Generator** shall seek to resolve the dispute by discussion, and if they fail to reach agreement, the **Generator** may require **ESBNG** to carry out a further **Black Start Test** on 48 hours notice which shall be carried out following the agreed procedure as the case may be, as if **ESBNG** had issued an instruction at the time of notice from the **Generator**.

OC10.7.6.3 If the **Black Start Station** concerned fails to pass the re-test and a dispute arises on that re-test, either party may use the **Disputes Resolution Procedure** for a ruling in relation to the dispute, which ruling shall be binding.

OC10.7.6.4 If following the procedure in OC10.7.6.2 and OC10.7.6.3 it is accepted that the **Black Start Station** has failed the **Black Start Test** (or a re-test carried out under OC10.7.6.2), within 14 days, or such longer period as **ESBNG** may reasonably agree, following such failure, the relevant **Generator** shall submit to **ESBNG** in writing for approval, the date and time by which that **Generator** shall have brought that **Black Start Station** to a condition where it has a **Black Start Capability** and would pass the **Black Start Test**, and **ESBNG** will not unreasonably withhold or delay its approval of the **Generator's** proposed date and time submitted. Should **ESBNG** not approve the **Generator's** proposed date and time (or any revised proposal) the **Generator** shall revise such proposal having regard to any comments **ESBNG** may have made and resubmit it for approval.

OC10.7.6.5 Once the **Generator** has indicated to **ESBNG** that the **Generating Station** has a **Black Start Capability**, **ESBNG** shall either accept this information or require the **Generator** to demonstrate that the relevant **Black Start Station** has its **Black Start Capability** restored, by means of a repetition of the **Black Start Test** referred to in OC10.5.7.4 following the same procedure as for the initial **Black Start Test**. The provisions of this OC10.5.7 will apply to such test.

OC10.8 DISPUTATION OF ASSESSMENT OF NON-COMPLIANCE BY THE A USER

OC10.8.1 In the event that a **User** has received notification from **ESBNG** of an assessment of non-compliance and/or application of a **Post Event Notice** under **OC7** then the **User** may reply to **ESBNG** disputing in good faith the validity of either the assessment of non-compliance and/or the content of the **Post Event Notice**, detailing the grounds on which the validity is being disputed. Any disputation should be submitted within 12 hours although additional information in support of the disputation may follow within two **Business Days**.

OC10.8.2 If a **User** submits a disputation to **ESBNG** under OC10.8.1, then **ESBNG** shall consider the substance of the **User 's** disputation. **ESBNG** may, where **ESBNG** considers appropriate, communicate with the **User** to clarify aspects of the assessment of non-compliance or the **User 's** disputation.

OC10.8.3 **ESBNG** shall determine the validity of the **User's** disputation, and shall inform the **User** within five **Business Days** as to its decision. **ESBNG** shall alter or revise any assessment of non-compliance and/or **Post Event Notices** as appropriate.

OC10.8.4 In the event that there is still disagreement as to the outcome, the dispute shall if requested by either **ESBNG** or the **User**, be referred to the **Commission**.

OC11 SAFETY CO-ORDINATION

OC11 SAFETY CO-ORDINATION

OC11.1 INTRODUCTION

OC11.1.1 In order to adequately maintain and repair damage to **Plant** and/or **Apparatus** resulting from faults, it will be necessary for **ESBNG** to work on or in close proximity to **Transmission System Plant** and **Apparatus**, or in close proximity to **User's Plant** and **Apparatus**.

OC11.1.2 It will also be necessary for **Users** and/or their agents to similarly work on or in close proximity to **User's Plant** and **Apparatus** which is capable of being connected to the **Transmission System**, and from time to time to work in close proximity to **Transmission System Plant** and **Apparatus**.

OC11.1.3 It will also be from time to time necessary to facilitate work by third parties in close proximity to **Transmission System Plant** and **Apparatus**.

OC11.1.4 In order to ensure safe working conditions for each of the above situations, it will be necessary that **ESBNG** and **Users** operate in accordance with approved safety rules.

OC11.1.5 In the event of a conflict between OC11 (Safety Co-ordination) and any other section of the **Grid Code**, OC11 shall take precedence.

OC11.2 OBJECTIVE

OC11.2.1 The objective of OC11 is to establish the requirement on **ESBNG**, (or their agents), and **Users** (or their agents) to operate in accordance with approved **safety rules**, in order to ensure safe working conditions for personnel working on or in close proximity to **Transmission System** electrical **Plant** and **Apparatus** or personnel who may have to work at or use the equipment at the interface.

OC11.2.2 This will normally involve making electrical **Plant** dead, and suitably isolating and earthing that **Plant** such that it cannot be made live.

OC11.2.3 **Safety rules** shall also cover work on live **Transmission System Plant** and **Apparatus** by **ESBNG**.

OC11.3 SCOPE

OC11 applies to **ESBNG** and to all **Users**, which term in this OC11 means:

(a) **Generators**;
(b) the **Distributor System Operator**;
(c) **Grid Connected Customers**; and
(d) agents of **ESBNG** or agents of any User (as defined in OC 11.3 (a), (b) and (c)).

OC11.4 THE SAFETY RULES

OC11.4.1 Safety procedures for personnel working on or in close proximity to **Transmission System Plant** and **Apparatus** are governed by the **ESB Safety Rules** (or any future revision(s) of these rules) as detailed in:

(a) Safety Rules 1993 (ELECTRICAL) (Transmission, Distribution and Marketing); or

(b) Safety Rules 1991 (ELECTRICAL) (Generation)

OC11.4.2 In the event of a conflict between the provisions of this Code and the provisions of the **ESB Safety Rules**, the provisions of the **ESB Safety Rules** shall take precedence.

OC11.4.3 If a disagreement arises regarding the correct interpretation of a rule in the **Safety Rules** 1993 (ELECTRICAL) (Transmission, Distribution and Marketing) or other such revision in force at that time **ESBNG** will provide a definitive interpretation.

OC11.5 SAFETY AT THE INTERFACE

OC11.5.1 For parties connecting to the **Transmission System** the **Designated Operators** shall be approved in writing by the relevant **User** as competent to carry out the procedures in the agreed **Operation Instructions**

OC11.5.2 A **Site Responsibility Schedule** referred to in CC14 for each **User Site** shall be developed by **ESBNG** in consultation with **Users**. The **Site Responsibility Schedule** shall detail the demarcation of responsibility for safety of persons carrying out work or testing at the **User's Connection Site** and on circuits which cross the **User's Site** at any point.

OC11.5.3 **Operation Instructions** for each **User Site** shall be issued by **ESBNG**. **Operation Instructions** will include, but are not limited to:

(a) detailed switching sequences (which meet as a minimum, the requirements of the ESB Safety Rules) to be followed for voluntary, fault and emergency switching;

(b) control and operational procedures;

(c) identification of operational boundaries;

(d) identity of the representatives of ESBNG and the User(s) who will attend the Transmission Station and/or facility for operation and during emergencies.

OC11.5.4 Each **User** and **ESBNG** will co-operate in developing procedures and agreement on any matters that may be relevant for ensuring overall site safety and, in particular, the overall safety of interface equipment.

OC11.5.5 In the event of a **Modification** or a change in operational practices, which have or may have an **Operational Effect** on a **User Site**, **ESBNG** and the **User** shall review the adequacy of overall site safety. In any event, **ESBNG** and each **User** shall review the adequacy of overall site safety once every 5 years.

OC11.5.6 Adequate means of isolation shall be provided at the interface to allow work to be carried out safely at the interface or either side of the interface by **ESBNG** and each **User**.

OC11.5.7 Where necessary adequate facilities for earthing and short circuit shall be applied to plant and/ or equipment at either side of the interface to allow work to be carried out safely at the interface or either side of the interface.

SDC1 GENERATION SCHEDULING CODE

SDC1 GENERATION SCHEDULING CODE

SDC1.1 INTRODUCTION

SDC1.1.1 In order for **ESBNG** to fulfil its obligations with respect to the **Scheduling** and **Dispatch** of **Generators, ESBNG** requires timely and accurate information relating to **Generation** and supply arrangements.

SDC1.1.2 **Generation Scheduling Code (SDC1)** establishes procedures whereby the following necessary information is made available to **ESBNG**:

(a) **Availability** of **Centrally Dispatched Generation Units (CDGUs);**

(b) **Availability** of **Ancillary Services;**

(c) **Generator Nominations;**

(d) **Operating Characteristics** of **CDGUs;**

(e) **Availability Transfer Capacity (ATC); and**

(f) **Supplier Nominations** for export/ import across **Interconnector**

SDC1.1.3 **SDC1** also specifies the procedures to be followed by **ESBNG** when issuing the **Generation Schedule** for the **Trading Day.**

SDC1.1.4 SDC1 specifies the responsibility of **ESBNG** to issue a **Demand Forecast.**

SDC1.1.5 **SDC1** also specifies and refers to the procedures in OC3 to be followed by **ESBNG** when agreeing **ATC** and scheduling **Interconnector** flows with the **External System Operator (ESO)**.

SDC1.2 OBJECTIVES

SDC1.2.1 The objectives of **SDC1** are to provide **Generators** with **Provisional Running Orders** for the **Trading Day** such that **CDGUs** will be made available in the correct time scale to enable **ESBNG** to **Dispatch** them pursuant to **SDC2,** whilst maintaining the **Operating Margin**, and the **External System Operator (ESO)** indicative schedules.

SDC1.2.2 In order to achieve the primary objective SDC1.6.1 details the process and time scales that specific information should be made available to **ESBNG** and the time

scale for **ESBNG** to make specific information available to **Generators, Pumped Storage Plant** and **Suppliers. SDC1** also details the exchange of scheduling data between **ESBNG** and the **ESO** with respect to the flow on the **Interconnector**.

SDC1.3 SCOPE

SDC1.3.1 **SDC1** applies to **ESBNG** and the following **Users** affected by the process of **Scheduling Generation**.

(a) **Generators** with respect to their **Centrally Dispatched Generation Units (CDGUs)**;

(b) **Suppliers**;

(c) the **External System Operator (ESO)** with respect to **Interconnector** flows; and

(d) **Pumped Storage Plant (PSP)**.

SDC1.4 DEMAND FORECAST

SDC1.4.1 **ESBNG** shall provide a **Demand Forecast** by 10.00 each day for each of the next following three days. This information shall be provided by being posted in the **ESBNG** website and shall be in a reasonable format as determined by **ESBNG.**

SDC1.4.2 The **Demand Forecast** shall include **Transmission System** losses**.**

SDC1.5 DECLARATIONS BY GENERATORS

SDC1.5.1 A day ahead **Declaration** shall be made by each **Generator** by 10.00 of the day preceding the **Trading Day** to which it refers in respect of each **Centrally Dispatched Generation Unit**.

SDC1.5.2 The list of **Declaration** values with respect to each **CDGU** is as follows:

(a) **Ancillary Service** capability;

(b) **Availability**;

(c) **Operating Characteristics**; and

(d) abnormal risk to loss of all or part of output of a **CDGU** (e.g. due to auxiliary plant outages etc.).

SDC1.5.3 The submission of a **Declaration** by a **Generator** for a **CDGU** should be in accordance with the provisions of SDC1.7

SDC1.5.4 Each **Generator** is obliged to immediately inform **ESBNG** when the values of items specified in SDC1.5.2 are expected to change during the subsequent 7 days.

SDC 1.6 NOMINATIONS

The following submissions are required unless otherwise specified in the **Trading and Settlement Code**.

SDC1.6.1 Nominations for Generators

SDC1.6.1.1 Each **Generator** shall nominate its total **Interconnector Trades** for the **Trading Day** on a half-hourly basis by 10.00 on the day ahead of trading.

(i) Half-hourly **Interconnector Trade**	MWh
(ii) **Interconnected Party** to trade	-

SDC1.6.1.2 **Nominations** shall be submitted to **ESBNG** by **Generators** for each of their **CDGUs** by 10.00 on the day ahead of the relevant **Trading Day.** The following information shall be supplied **In Writing**:

(i)	**Nominated** generation for each **Trading Period**	MW
(ii)	**Nominated** export for each **Trading Period** (net of **Auxiliary Load**)	MW

(iii)	Set A **Incremental Price** 1	€/MWh
(iv)	(Set A **Incremental Price** 2	€/MWh
(v)	Set A **Incremental Price** 3	€/MWh
(vi)	Set A **Incremental Price** 4	€/MWh
(vii)	Set A **Decremental Price** 1	€/MWh
(viii)	Set A **Decremental Price** 2	€/MWh
(ix)	Set A **Decremental Price** 3	€/MWh
(x)	Set A **Decremental Price** 4	€/MWh
(xi)	**Incremental** and **Decremental Break Point** 1	MW
(xii)	**Incremental** and **Decremental Break Point** 2	MW
(xiii)	**Incremental** and **Decremental Break Point** 3	MW
(xiv)	Hot start price	€
(xv)	Warm start price	€
(xvi)	Cold start price	€
(xvii)	Set A Incremental **Idling Price**	€/h
(xviii)	Set A Decremental **Idling Price**	€/h

SDC1.6.1.3 The following additional information shall be also be submitted **In Writing** to **ESBNG** by **Generators** for each of their **CDGUs** which are **Energy Limited** including **Pumped Storage Generators** as part of their **Nomination** for the **Trading Day** by 10.00 on the preceding day**.**

(i) Set B **Incremental Price** 1	€/MWh
(ii) Set B **Incremental Price** 2	€/MWh
(iii) Set B **Incremental Price** 3	€/MWh
(iv) Set B **Incremental Price** 4	€/MWh
(v) Set B **Decremental Price** 1	€/MWh
(vi) Set B **Decremental Price** 2	€/MWh
(vii) Set B **Decremental Price** 3	€/MWh
(viii) Set B **Decremental Price** 4	€/MWh
(ix) Set B Incremental **Idling Price**	€/h
(x) Set B Decremental **Idling Price**	€/h

SDC1.6.1.4 In addition to SDC1.6.1.2 and SDC1.6.1.3, **Pumped Storage Generators** shall submit the following information **In Writing** to **ESBNG** for each of their **Pumped Storage Units** as part of their **Nomination** for the **Trading Day.**

(i)	Set C **Pumped Storage Incremental Price** Pumping	€/MWh
(ii)	Set C **Pumped Storage Incremental Price** Generating	€/MWh
(iii)	Set C **Pumped Storage Incremental Price** Reservoir	€/MWh
(iv)	Set C **Pumped Storage Decremental Price** Pumping	€/MWh
(v)	Set C **Pumped Storage Decremental Price** Generating	€/MWh
(vi)	Set C **Pumped Storage Decremental Price** Reservoir	€/MWh
(vii)	**Pumped Storage Mode** for each **Trading Period**	-
(viii)	**Pumped Storage Mode** change price**-Generation**	€/change
(ix)	**Pumped Storage Mode** change price**-Pump**	€/change
(x)	**Pumped Storage Mode** change price**-Spin Generation**	€/change
(xi)	**Pumped Storage Mode** change price**-Spin Pump**	€/change

SDC1.6.1.5 **Generators** shall ensure that the data provided in SDC1.6.1.2 to SDC1.6.1.4 are consistent with declared **Declarations**.

SDC1.6.1.6 The submission of a **Nomination** by a **Generator** for its **CDGUs** shall be in accordance with **SDC1.8**

SDC1.6.1.7 If at any time after the submission of a **Nomination** in respect of a **CDGU** for a **Trading Day** the **Generator** becomes aware of any change to any of the values in its day-ahead nomination or **Availability Declaration** or predicts that any such value will be subject to change before the end of the relevant **Trading Day**, (other than any of the prices submitted or other items that shall not be subject to revision), it shall promptly inform **ESBNG** of such change or predicted change. This shall be known as a **Redeclaration.**

SDC1.6.2 Suppliers Nomination

SDC1.6.2.1 Each day by 1000 hrs on the day preceding the **Trading Day**, **Suppliers** are required to submit to **ESBNG** a **Nomination** which provides profile data for supply arrangements across the **Interconnector** as specified in SDC1.6.2.2 for the **Trading Day.**

SDC1.6.2.2 **Nominations** shall be submitted to **ESBNG** by **Suppliers In Writing** as follows:

(a) Half-hourly **Interconnector Trade** MW

(b) **Interconnected Party** to trade

SDC1.6.2.3 The submission of **Nominations** by **Suppliers** to **ESBNG** shall be in accordance with SDC1.8.

SDC1.6.3 Failure to submit a Nomination

If any party fails to submit a **Nomination** in accordance with SDC1.6.1 to SDC1.6.2 then the provisions of SDC1.11 will apply.

SDC1.7 COMMUNICATION OF DECLARATIONS

SDC1.7.1 In order to ensure rapid transfer of information in the period from 4 hours before the **Trading Period** down to real time, **Generators** should submit **Declarations** orally (by telephone) in the first instance and thereafter confirm (with out undue delay) **In Writing** as set out in SDC1.7.2. For periods outside the 4 hours before the **Trading Period Generators** shall submit **Declarations** as per SDC1.7.2.

SDC1.7.2 **Generators** shall submit **Declarations** by means of an electronic interface in accordance with the reasonable requirements of **ESBNG's** data system, which shall be installed in each **Generator Site** (in accordance with **OC7**) or **Control Facility**.

SDC1.7.3 In the event of failure or other unavailability of the electronic interface **Declarations** shall be made by any other approved means, as outlined in **OC7**.

SDC1.8 COMMUNICATION OF NOMINATIONS

SDC1.8.1 **Users** shall submit **Nominations** for a **Trading Day** by means of using an electronic interface in accordance with the requirements of **ESBNG's** data system, which **Generators** shall install in each **Power Station** or other appropriate **Control Facility** as agreed between **ESBNG** and the **Generator**.

SDC1.8.2 In the event of failure or other unavailability of the electronic interface **Nominations** for a **Trading Day** shall be made by any other approved means outlined in **OC7**.

SDC1.9 AVAILABLE TRANSFER CAPABILITY (ATC) FOR THE INTERCONNECTOR

SDC1.9.1 The process for determining the **ATC** on the **Interconnector** in both directions (Export and Import) for the **Commitment Period** is set out in **OC3**.

SDC1.9.2 **ESBNG** shall issue the agreed **ATC** for the next **Trading Day** as described in OC3.4.

SDC1.10 PRODUCTION OF GENERATION SCHEDULE (GS)

SDC1.10.1 Each day between 1100 hrs and 1600 hrs **ESBNG** shall produce the **Generation Schedule (GS)**. **ESBNG** may produce the **GS** more or less frequently, or reasonably delay its production in response to changes in **Availability** and other events that may arise. The **GS** is utilised by **ESBNG** in its **Scheduling** and in its preparation for **Dispatch** of **CDGUs**.

SDC1.10.2 **ESBNG** shall prepare the **GS** in a manner consistent with the **Trading and Settlement Code**

SDC1.10.3 In preparing the **GS**, **ESBNG** shall consider the following factors:

(a) forecast **Demand** and geographical demand distribution ;
(b) **CDGU Declared MW Capabilities**;
(c) **CDGU Declared Ancillary Service** capabilities;
(d) **CDGU Declared Operating Characteristics**;
(e) **CDGU Declared** inflexibilities;
(f) **Generator Nominations**;
(g) **Pumped Storage Plant Declarations**;
(h) **Pumped Storage Plant Nominations**;
(i) Declared abnormal risks to **CDGUs;**
(j) **Distribution System** constraints;
(k) Output of **Non Centrally Dispatched Generation Units,** e.g. some CHP plants, wind **Generation Units;**
(l) **System Test** requirements;
(m) **User Test** requirements;
(n) **System Operating Reserve** requirements;
(o) **Transmission System** stability implications;
(p) **System Frequency Control**;
(q) **Operating Margin**;

(r) **Transmission System** Constraints together with relevant standards and other constraints;

(s) **Transmission Losses**;

(t) **Interconnector ATC;**

(u) **Power** flows on the **Interconnector;**

(v) **Ancillary Service** requirements;

(w) Other factors as may be reasonably considered by **ESBNG** to be relevant to the **GS**.

SDC1.10.4 **ESBNG** shall issue **Provisional Running Orders** based upon the **GS** for the **Schedule Day** to each **Generator** for each of its **CDGUs** by 1600 hrs on the day preceding the relevant **Trading Day**.

SDC1.10.5 The **Provisional Running Orders** issued to each **Generator** by **ESBNG** shall contain information relating to the **CDGU(s)** of that **Generator** only.

SDC1.10.6 The **Provisional Running Orders** issued to each **Generator** by **ESBNG**, shall indicate, for each of its **CDGUs** the planned load pattern.

SDC1.10.7 **Provisional Running Orders** are indicative only, provided as a guide to the expected output requirements from **Generators** and are not **Dispatch Instructions**.

SDC1.11 PROCEDURE TO BE FOLLOWED IN THE ABSENCE OF A NOMINATION

If a **Nomination** is not received, in total or in part, by **ESBNG** in accordance with SDC1.6 and SDC1.7, then **ESBNG** shall make reasonable efforts to establish contact with the **Generator**, **Supplier** or **Pumped Storage Plant** in question to check whether a complete **Nomination** for a **Trading Day** was sent and not received. If this is the case the **Nomination** for a **Trading Day** shall be resubmitted without delay in accordance with SDC1.8. If no **Nomination** (or, as the case may be, the data necessary to complete the **Nomination** for a **Trading Day**) has been received by 1130 hrs then **ESBNG** shall use the information provided in the **Nomination** for the previous **Trading Day** to the extent necessary to provide **ESBNG** with a complete **Nomination**.

SDC2 GENERATION DISPATCHING

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SDC2 GENERATION DISPATCHING

SDC2.1 INTRODUCTION

SDC2.1.1 In order for **ESBNG** to meet its statutory obligations with respect to **Scheduling** and **Dispatch** of **Generation** such that (as far as possible) available **Generation** is matched to demand, it is necessary to have a structured process of **Dispatch** for all **Users** who may be required to respond to **Dispatch Instructions** from **ESBNG**.

SDC2.1.2 SDC2 details the process whereby **ESBNG** uses the **Generation Schedule** (GS) and data provided by **Users** for **Generation Scheduling** (and where allowable updated in the **Dispatch** phase) to decide which **Generation** to **Dispatch**.

SDC2.1.3 SDC2 also outlines procedures to be followed by **ESBNG** and **Users** when communicating on the **Dispatch Instructions**. It should be noted that OC7 specifies communications requirements and procedures between **ESBNG** and **Generators**.

SDC2.2 OBJECTIVE

SDC2.2.1 The principal objective of SDC2 is to establish a procedure to enable **ESBNG** to issue **Dispatch Instructions** to:

(i) **Generators** with respect to their **CDGUs**
(ii) **Pumped Storage Plant** with respect to their pumping **Demand**; and
(iii) **Users** in relation to **Ancillary Services**

such that (insofar as it is possible) available **Generation** is matched to **Demand** with appropriate margin of **Reserve** whilst maintaining (as far as is possible) the integrity of the **Transmission System** and the security and quality of **Supply.**

SDC2.3 SCOPE

SDC2.3.1 SDC2 applies to **ESBNG** and all **Users** subject to the **Dispatch** process and who will receive **Dispatch Instructions** from **ESBNG**.

SDC2.3.2 SDC2 specifically applies to:-

(i) **Centrally Dispatched Generation Units** (**CDGUs);**

(ii) **Pumped Storage Plant; and**

(iii) **Ancillary Services** providers

SDC2.4 DATA AND PROCESS

SDC2.4.1 **ESBNG** forecasts the **System Demand** that is used in the **Dispatch** process.

SDC2.4.2 **ESBNG** sets the level of **Reserve** that is used in the **Dispatch** process.

SDC2.4.3 The **Availability Transfer Capacity** (ATC) for the **Interconnector** is jointly agreed between **ESBNG** and the **External System Operator (ESO)** as described in OC3.

SDC2.4.4 **ESBNG** uses the information as described in SDC2.4.1 to SDC2.4.3 and the factors specified in SDC1.10.3 to produce a schedule, based on which **Dispatch Instructions** are issued.

SDC2.4.5 **Dispatch Instructions** may include **MW Output** level of **CDGU**, **Synchronising** or **De-Synchronising** time, if appropriate and **Ancillary Service** to be provided

SDC2.4.6 In real time as variations occur due to, e.g., **Demand** or **Availability** variations **ESBNG** will adjust **Generation Unit MW Output** by using a merit order based on the **Incremental** and **Decremental Prices** provided by **Generators** as part of the **Nomination** for each **CDGU**.

SDC2.5 DISPATCH INSTRUCTIONS TO GENERATORS

SDC2.5.1 **Dispatch Instructions** relating to the **Schedule Day** will normally be issued at any time during the period beginning immediately after the issue of the **Generation Schedule** in respect of that **Schedule Day**.

SDC2.5.2 A **Dispatch Instruction** given by **ESBNG** to a **Generator** for a specific **CDGU** may involve a change in output of **Active Power**, a change in **Reactive Power**, a change to the mode of operation or a **Dispatch Instruction** to provide an **Ancillary Service.**

SDC2.5.3 Where a **Dispatch Instruction** given by **ESBNG** to a **Generator** requires a change to the mode of operation for a specific **CDGU**, it may also involve an **Ancillary Service** contract.

SDC2.5.4 A **Dispatch Instruction** given by **ESBNG** to a **Generator** may be given orally by phone or by electronic means in accordance with the procedures detailed in OC7.

SDC2.5.5 A **Dispatch Instruction** must be formally acknowledged immediately by the **Generator** in respect of that **CDGU** by telephone, or a reason given immediately for non-acceptance. The reason for non-acceptance may only be on safety grounds (relating to personnel or plant) or because the **Dispatch Instruction** is not valid as detailed in SDC2.5.6.

SDC2.5.6 For a **Dispatch Instruction** to be valid, it must observe the limits of **Availability**, **Ancillary Service** capability and **Operational Characteristics** as properly **Declared** to **ESBNG** in accordance with SDC1 in a **Declaration** relevant to the time and period to which the **Dispatch Instruction** relates, subject to provisions of SDC2.11.

SDC2.5.7 In the event that in carrying out the **Dispatch Instruction**, an unforeseen problem arises, caused on safety grounds (relating to personnel or, **Plant**), **ESBNG** must be notified without delay by telephone.

SDC2.5.8 The provisions of SDC2.12 are also relevant.

SDC2.5.9 It is essential that there is no misunderstanding with respect to a **Dispatch Instruction** given by **ESBNG** to a **Generator** because of the commercial implications. To aid clarity at this inter-face the form of words to be used: -

(a) by **ESBNG** when giving a **Dispatch Instruction**;

(b) by **Generators** when receiving a **Dispatch Instruction**; and

(c) by **Generator**s when **Declaring** a change

is described in the appendix of SDC2

SDC2.6 GENERATION SYNCHRONISING AND DESYNCHRONISING TIMES

SDC2.6.1 **ESBNG** will determine the required **Synchronising** and **De-Synchronising** times for **CDGUs**.

SDC2.6.2 **ESBNG** will issue **Dispatch Instructions** to **Generators** to **Synchronise** (**or De-Synchronise)** specific **CDGUs** in accordance with the times declared in their **Operating Characteristics.**

SDC2.6.3 If a **Dispatch Instruction** to a **Generator** to **Synchronise** a specific **CDGU** does not also contain a **MW Output** to be achieved then it shall be assumed that **the Dispatch** Instructions is to increase output (following **Synchronisation**) up to the level **of Minimum Load.**

SDC2.6.4 Where **Synchronising** time issued by **ESBNG** to a **Generator** for a specific **CDGU** and the **Generator** identifies that the **CDGU** will not be **Synchronised** within +/- 10 minutes of the instructed time, the Generator must immediately (at the time the discrepancy is identified) inform **ESBNG** of the situation and estimate the new **Synchronising** time.

SDC2.6.5 If the **Synchronising** time, of the **CDGU**, is different from the instructed time by more than 15 minutes but less than 4 hours, this will constitute a **Short Notice Re-declaration** by the **CDGU** for that **Generator.**

SDC2.6.6 If the **Synchronising** time, of the **CDGU**, is different from the instructed time by more than 4 hours, this will constitute a **Redeclaration** for the **CDGU** by the **Generator.**

SDC2.6.7 When **ESBNG** does not issue a **Dispatch Instruction** to a **Generator** in accordance with a **Declaration** for a **CDGU**, reflecting a start time of **Scheduled Outage**, then the **Generator** must immediately contact **ESBNG** to indicate the error. **ESBNG** will take immediate steps to issue **Dispatch Instructions** to **De-load** and **Desynchronise** the **CDGU**. However if this action would result in difficulty in meeting demand, **ESBNG** will inform the **Generator** of the circumstances.

SDC2.6.8 Where a **Generator** has two or more identical (identical for this purpose meaning **Registered Capacity**, **Ancillary Services** capability and **Declared Operating**

Characteristics, and other relevant electrical parameters) **Centrally Dispatched Generation Unit**s at the same site, the **Generator** may notify **ESBNG** as to the preferred **Centrally Dispatched Generation Unit** to be **Dispatched**. **ESBNG** shall however, retain the right to select the **Centrally Dispatched Generation Unit** to be **Dispatched**, taking into account its obligations in operating the **Transmission System**.

SDC2.7 GENERATION ACTIVE POWER DISPATCH

SDC2.7.1 Based on the **Nominations** of the **Generators**, on **System** conditions, and on other factors as may arise from time to time. **ESBNG** may issue **Dispatch Instructions** to a **Generator** in relation to a specific **Centrally Dispatched Generation Unit,** which has been **Instructed** to be **Synchronised** under SDC2.6, to adjust its **MW Output**.

SDC2.7.2 When a **Generator** has received and accepted a **Dispatch Instruction** for a **CDGU** to change the level of **Active Power** it must without undue delay adjust the level of output of the **CDGU** to achieve the new target within its **Declared Operating Characteristics**.

SDC2.7.3 A **CDGU** shall be deemed to have complied with a **Dispatch Instruction** when it achieves an output within the allowable tolerance of the **Dispatched Output** and within the time calculated for the change from its **Declared Operating Characteristics**. For the avoidance of doubt any deviation between the **Dispatched Output** and actual output may give rise to an 'Uninstructed Imbalance' as defined in the **Trading and Settlement Code**.

SDC2.7.4 The allowable tolerance in **Generation Unit Active Power Dispatch** shall be as specified in the **Trading and Settlement Code.**

SDC2.7.5 The adjustment of **MW Output** of a **CDGU** for **System Frequency** other than an average of 50Hz, shall be made in accordance with the current **Declared** value of **Governor Droop** for the **CDGU**.

SDC2.7.6 In the event that while carrying out the **Dispatch Instruction** an unforeseen problem arises caused by safety reasons (relating to personnel or plant), **ESBNG** must be notified immediately by telephone.

SDC2.8 GENERATOR REACTIVE POWER DISPATCH

SDC2.8.1 **ESBNG** may issue **Dispatch Instructions** to **Generator**s to adjust the Mvar **Output** of any **Centrally Dispatched Generation Unit** that has been **Instructed** to be **Synchronised** under SD2.6.

SDC2.8.2 The **Mvar Output** of any **Centrally Dispatched Generation Unit** in respect of which a **Dispatch Instruction** is given under SDC2.8.1 must then, without undue delay be adjusted in accordance with its **Declared Operating Characteristics**, to the new target Mvar so **Instructed**, within, a tolerance of +/- 2% of the target or +/- 2 Mvar, whichever is greater. The **Reactive Power** output of a **CDGU** shall not be adjusted

(other than under **AVR** action) except in response to a **Dispatch Instruction** from **ESBNG**.

SDC2.8.3 **Generators** having achieved the new target **Mvar Output**, should not attempt to sustain this level of **Mvar Output** as the **System** voltage varies but should, rather, allow the **Reactive Power** output to vary under **AVR** control in accordance with the then applicable **Declarations** of **Ancillary Service** capabilities and **Operating Characteristics.**

SDC2.8.4 While a **Reactive Power Dispatch Instruction** shall normally specify a new Mvar target for a **CDGU**, **ESBNG** may also from time to time **Instruct Generators** to perform one or more tap changes on the generator step-up transformer of a **CDGU**. The **Dispatch Instructions** for tap changes may be a **Simultaneous Tap Change Instruction** whereby the tap change must be effected by the **Generator** in response to a **Dispatch Instruction** from **ESBNG** issued simultaneously to relevant **Power Stations.** The **Dispatch Instruction**, which is normally preceded by advance warning, must be effected within 1 minute of receipt from **ESBNG** of the **Dispatch Instruction**.

SDC2.8.5 **Dispatch Instructions** in relation to **Reactive Power** may include target voltage levels to be achieved by the **CDGU** on the **Transmission System at Grid Connection Point** (or on the **User System** at the **User System Entry Point** in the case of an **Embedded Generator**, namely on the higher voltage side of the **Generator** step-up transformer). Where a **CDGU** is **Instructed** to a specified target voltage, the **Generator** must achieve that target within a tolerance of 1 kV by tap changing on the **Generator** step-up transformer unless otherwise agreed with **ESBNG**. Under normal operating conditions, once this target voltage level has been achieved, the **Generator** shall not tap change again without prior consultation with and agreement of **ESBNG**.

SDC2.8.6 Under certain conditions such as low **System** voltage, a **Dispatch Instruction** to maximum Mvar production at **Instructed MW Output** may be given and the **Generator** shall take appropriate action to maximise Mvar production unless constrained by plant operational limits or safety grounds relating to personnel or plant.

SDC2.8.7 Under certain conditions such as high **System** voltage, a **Dispatch Instruction** to maximum Mvar absorption at **Instructed MW Output** may be given and the **Generator** shall take appropriate action to maximise Mvar absorption unless constrained by plant operational limits or safety grounds relating to personnel or plant.

SDC2.8.8 The issue of **Dispatch Instructions** for **Active Power** will be made with due regard to any resulting change in **Reactive Power** capability and may include reduction in **Active Power** generation in order to increase **Reactive Power** capability.

SDC2.8.9 The excitation system, unless otherwise agreed with **ESBNG**, must be operated only in its constant terminal voltage mode of operation with var limiters in service, with any constant **Reactive Power** output control mode or constant **Power Factor** output control mode always disabled, unless agreed otherwise with ESBNG. In the event of any change in **System** voltage, a **Generator** must not take any action to override automatic Mvar response which is produced as a result of constant terminal voltage mode of operation of the automatic excitation control system unless instructed otherwise by **ESBNG** or unless immediate action is necessary to comply with **Generator** stability limits or unless constrained by plant operational limits or safety grounds (relating to personnel or plant).

SDC2.8.10 A **Dispatch Instruction** relating to **Reactive Power** will be implemented without delay and, notwithstanding the provisions of SDC2.11 and subject as provided in this SDC2.8 will be achieved not later than 2 minutes after the **Dispatch Instruction** time, or such longer period as **ESBNG** may **Instruct.**

SDC2.8.11 Where **Dispatch Instructions** relating to **Active Power** and **Reactive Power** are given together, and to achieve the **Reactive Power** output would cause the **CDGU** to operate outside **Generation Scheduling** and **Dispatch** parameters as a result of the **Active Power Dispatch Instruction** being met at the same time, then the adjustment of the **Reactive Power** output may be delayed until the operating limits no longer prevent the change. In any case the **Active** and **Reactive Power** Dispatch **Instruction** must be followed without undue delay.

SDC2.8.12 In circumstances where **ESBNG** issues new **Dispatch Instructions** in relation to more than one **CDGU** at the same **Power Station** at the same time tapping will be carried out by the **Generator** one tap at a time either alternately between (or in sequential order, if more than two), or at the same time on, each **CDGU**, as the case may be.

SDC2.8.13 Where the **Dispatch Instructions** require more than two taps per **CDGU** and that means that the **Dispatch Instructions** cannot be achieved within 2 minutes of the time of the **Dispatch Instructions** (or such longer period at **ESBNG** may have **Instructed**), the **Dispatch Instructions** must each be achieved with the minimum of delay after the expiry of that period;

SDC2.8.14 On receiving a new MW **Dispatch Instruction,** no tap changing shall be carried out to change the **Mvar Output** unless there is a new Mvar **Dispatch Instruction**.

SDC2.8.15 Where a **Dispatch Instructions** to **Synchronise** is given, or where a **CDGU** is **Synchronised** and a MW **Dispatch Instruction** is given, a Mvar **Dispatch Instruction** consistent with the **CDGU's** relevant parameters may be given. In the absence of a Mvar **Dispatch Instruction** with an instruction to **Synchronise**, the **Mvar Output** should be 0 Mvar.

SDC2.8.16 Where a **Dispatch Instructions** to **De-Synchronise** is given, a Mvar **Dispatch Instruction**, compatible with shutdown, may be given prior to **De-Synchronisation** being achieved. In the absence of a separate Mvar **Dispatch Instruction**, it is implicit in the **Dispatch Instructions** to **De-Synchronise** that Mvar output should at the point of synchronism be 0 Mvar at **De-Synchronisation**.

SDC2.8.17 It should be noted that should **System** conditions require, **ESBNG** may need to **Instruct** maximum **Mvar Output** to be achieved as soon as possible, but (subject to the provisions of SDC2.8.13) in any event no later than 2 minutes after the **Dispatch Instruction** is issued.

SDC2.8.18 A **Dispatch Instruction** relating to **Reactive Power** may be given in respect of **CCGT Units** within a **CCGT Module** where running arrangements and/or **System** conditions require, in both cases where connection arrangements permit.

SDC2.8.19 On receipt of a **Dispatch Instruction** relating to **Reactive Power,** the **Generator** may take such action as is necessary to maintain the integrity of the **CDGU** (including, without limitation, requesting a revised **Dispatch Instruction**), and must contact **ESBNG** without delay.

SDC2.8.20 Mvar **Dispatch Instructions** issued by **ESBNG** shall reflect the limits contained in the then applicable **Declarations** of **Ancillary Service** capabilities and **Operating Characteristics**.

SDC2.8.21 Under **System** fault conditions it is possible for **AVR** action to drive **Reactive Power** output for a **CDGU** outside of its **Declared Operating Characteristic** limits. The **Generator** must immediately inform **ESBNG** of the situation. However if the **Generator** reasonably believes that the situation may be dangerous to personnel or Plant, then limited action may be taken to improve the situation.

SDC2.9 GENERATING OPERATING MODE DISPATCH

SDC2.9.1 Based on the **Nominations** submitted by **Generators** and on other factors as may arise from time to time, **ESBNG** may issue **Dispatch Instructions** to a **Generator** to change the **Operating Mode** of any **Centrally Dispatched Generation Unit** which has been instructed to be **Synchronised** under SDC2.6.

SDC2.9.2 The **Generator** must then ensure that the **Centrally Dispatched Generation Unit** achieves the new **Dispatched Operating Mode**, without undue delay, in accordance with the **Centrally Dispatched Generating Units Declared Availability** and **Declared Operating Characteristics.**

SDC2.9.3 **Dispatch Instructions** in relation to **Operating Modes** issued by **ESBNG** shall reflect the applicable **Declarations** of **Availability** and **Declared Operating Characteristics.**

SDC2.10 SYSTEM ALERTS

SDC2.10.1 During specified conditions of **System Emergency Condition** or potential **System Emergency Condition**, **ESBNG** may notify **Generators**, by one of several means, of the existence of a **System Emergency Condition**.

SDC2.10.2 A **System Emergency Condition** may be notified by **a Red Alert, Amber Alert** or **Blue Alert**, or by other means as may be agreed from time to time (as described in OC9).

SDC2.10.3 On receipt of Alert, System Users must respond without delay in accordance with the **Dispatch Instructions** in OC9.

SDC2.11 SYSTEM EMERGENCY CONDITIONS

SDC2.11.1 In order to maintain **Transmission System** integrity under **System Emergency Conditions**, **ESBNG** may issue **Dispatch Instructions** to **Generators** to operate outside the limits implied by the then current **Declarations**. When issuing such a **Dispatch Instruction**, **ESBNG** shall inform the **Generator** that the **Dispatch Instruction** is being issued in accordance with SD2.11.

SDC2.11.2 Where **ESBNG** has issued an **Dispatch Instructions** in accordance with SDC2.11.1 requiring operation of a **Centrally Dispatched Generation Unit** outside the limits applied by the then applicable **Declarations**, then the **Generator** must comply with the **Dispatch Instructions** if, in the reasonable opinion of the **Generator**, the Safety of personnel, and/or **Plant** is not compromised in complying with the request.

SDC2.12 FAILURE TO COMPLY WITH A DISPATCH INSTRUCTION

SDC2.12.1 **If at any time a** Generator **is unable to comply with any** Dispatch Instruction **correctly issued by** ESBNG **in respect of any** Centrally Dispatched Generation Unit**, then the** Generator **must inform** ESBNG **by telephone without delay. Having informed** ESBNG **by telephone the** Generator **must issue a new** Declaration **in accordance with SDC1.**

SDC2.12.2 Where a **Generator** has not informed **ESBNG** of the inability to comply with a **Dispatch Instruction**, but where **ESBNG** assesses that a **Generator** is not in compliance with a **Dispatch Instruction** the provisions of OC10 7.1 shall apply.

SDC2 - APPENDIX DISPATCH INSTRUCTIONS

SDC2A - APPENDIX DISPATCH INSTRUCTIONS

SDC2A.1 FORM OF DISPATCH INSTRUCTION

SDC2A.1.1 All **Ramp-up/ Ramp-down Capabilities** and **Loading/ De-loading Capabilities** will be assumed to be constant and in accordance with **Generation Unit Declarations** submitted under **SDC1**. Each **Dispatch Instruction** will, wherever possible, be kept simple, drawing as necessary from the following forms and **SDC2.5** and shall be in accordance with the **Declared Operating Characteristics** of the **Generation Unit**.

SDC2A.1.2 The **Dispatch Instructions** will normally follow the form:

(a) confirmation of authority to accept **Dispatch Instructions** and dispatch;

(b) the specific **Unit** to which the **Dispatch Instruction** applies;

(c) the **Instruction** for the specific **Unit**;

(d) if the start time is different from the time the **Dispatch Instruction** is issued, the start time will be included;

(e) where specific ramp-up/ ramp-down rates or loading/de-loading rates are concerned, a specific target time; and

(f) the issue time of the **Dispatch Instruction**.

SDC2A.2 DISPATCHING A SYNCHRONISED CDGU TO INCREASE OR DECREASE OUTPUT

If the time of the **Dispatch Instruction** is 1400 hours, the **Unit** is Unit 1 (or the **Module** is Module 1, as the case may be) and the **Generation Unit** Output to be achieved is 460MW, the relevant part of the **Dispatch Instruction** would be, for example:

"Unit 1 (or Module 1) to 460MW **Dispatch Instruction** timed at 1400"

SDC2A.2.2 If the start time is 1415 hours, it would be, for example:

"Unit 1 (or Module 1) to 460MW start at 1415 hours **Dispatch Instruction** timed at 1400"

SDC2A.2.3 **Ramp-up/ Ramp-down Capabilities** and **Loading** and **De-loading Rates** are assumed to be in accordance with **Declarations** unless otherwise stated. If different **Ramp-up/ Ramp-down Capabilities** or **Loading** and **De-loading Rates** are required, the time to be achieved will be stated, for example:

"Unit 1 (or Module 1) to 460MW at 1420 hours target time **Dispatch Instruction** timed at 1400"

SDC2A.3 OTHER DISPATCH INSTRUCTIONS TO A CDGU

SDC2A.3.1 CDGU Synchronising

SDC2A.3.1.1 In this instance for **CDGUs** the **Dispatch Instruction** issue time will always have due regard for the time of **Notice to Synchronise** declared to **ESBNG** by the **Generator.**

The **Dispatch Instruction** will follow the form, for example:

Unit 1 (or Module 1) **Synchronise** at 1600 hours (and other units in sequence when scheduled) **Dispatch Instruction** timed at 1300 hours.

SDC2A.3.1.2 Unless a loading programme is also given at the same time it will be assumed that the **Dispatch Unit(s)** are to be brought to **Minimum Generation** and (at the point of synchronism) 0 **Mvar Output**, and on the **Generator** reporting that the Unit or Module has **Synchronised** a further **Dispatch Instruction** will be issued**.**

SDC2.A.3.1.3 When a **Dispatch Instruction** for a **CDGU** to **Synchronise** is cancelled before the Unit or Module is **Synchronised,** the **Dispatch Instruction** will follow the form, for example:

Unit 1 (or Module 1), cancel **Synchronising** instruction, **Dispatch Instruction** timed at 1400 hours.

SDC2A.3.2 CDGU De-synchronising

SDC2A.3.2.1 The **Dispatch Instruction** will normally follow the form, for example:

Unit 1 (or Module 1) **Shutdown** instruction timed at 1300 hours.

If the **Dispatch Instruction** start time is for 1400 hours the form will be, for example:

Unit 1 (or Module 1) **Shutdown** start at 1400 hours, **Dispatch Instruction**s timed at 1300 hours (and other Units in sequence)

Both the above assume a run-down rate at declared **Generation Scheduling and Dispatch Parameters**. Otherwise the message will conclude with, for example:

"... and **De-Synchronise** at 1500 hours"

Unless a separate Mvar **Dispatch Instruction** is given, it will be assumed that the **CDGU** will be brought to 0 Mvar (at the point of synchronism) at **De-Synchronisation**.

SDC2A.3.3 Emergency Instruction

SDC2A.3.3.1 The **Dispatch Instruction** will be prefixed with the words This is an **Emergency Instruction.** It may be in a pre-arranged format and normally follow the form, for example:

This is an **Emergency Instruction.** Reduce output to "X"MW in "Y" minutes, **Dispatch Instruction** timed at 2000 hours.

SDC2A.3.4 Voltage Control Dispatch Instruction

SDC2A.3.4.1 In order that adequate **System** voltage profiles and **Reactive Power** reserves are maintained under normal and fault conditions a range of voltage control **Dispatch Instructions** will be utilised from time to time, for example:

(a) Change **Reactive Power** to 100 Mvar production or absorption;

(b) Maximum MVAr production (or "maximum excitation");

(c) Maximum MVAr absorption (or "minimum excitation");

(d) Increase **CDGU** generator step-up transformer tap position by [one] tap or go to tap position [x];

(e) For a **Simultaneous Tap Change,** change **CDGU** generator step-up transformer tap position by one [two] taps to raise or lower (as relevant) **System** voltage, to be executed at time of telegraph (or other) **Dispatch Instruction**.

(f) Achieve a target voltage of 405kV and then allow to vary with **System** conditions; and

(g) Maintain a target voltage of 405kV until otherwise instructed. Tap change as necessary."

In relation to Mvar **Dispatch** matters, Mvar production is an export onto the **System** and is referred to as "lagging Mvar", and Mvar absorption is an import from the **System** and is referred to as "leading Mvar";

It should be noted that the excitation control system constant **Reactive Power** level control mode or constant power factor output control mode will always be disabled, unless agreed otherwise with **ESBNG**.

WFPS1 WIND FARM POWER STATION GRID CODE PROVISIONS

WFPS 1 WIND FARM POWER STATION GRID CODE PROVISIONS

WFPS1.1 INTRODUCTION

All **Generator**s connecting to the **Transmission System** are required to comply with the **Grid Code**. The **Grid Code** was originally developed with synchronous generators in mind. Since **Wind Turbine Generators** (**WTG)** do not have the same characteristics as synchronous generators, it was considered appropriate to develop a new set of **Grid Code** provisions specifically for **Wind Farm Power Stations**. This section of the **Grid Code** gives the specific requirements for **Wind Farm Power Stations**.

WFPS1.2 OBJECTIVE

The primary objective of WFPS1 is to establish the technical rules which **Wind Farm Power Stations** must comply with in relation to their connection to and operation on the **Transmission System**.

WFPS1.3 SCOPE

WFPS1.3.1 WFPS1 applies to the following **Users**:

(c) The **TSO**; and

(d) **Grid Connected Wind Farm Power Stations**.

WFPS1.3.2 In addition to WFPS1, **Wind Farm Power Stations** are required to comply with the following sections of the **Grid Code**:

- GC - General Conditions
- PC - Planning Code
- PCA – Planning Code Appendix
- CC- Connection Conditions excluding:
  - *CC 7.2.5.1*
  - *CC 7.2.5.2*
  - *CC7.3.1.1(a) to (h) and (j) to (u)*
  - *CC7.3.1.2*
  - *CC7.3.5*
  - *CC7.3.6*
  - *CC7.3.7*
  - *CC7.3.8*
  - *CC.12.2*
  - *CC.12.3*
- OC1
- OC2

- OC4 excluding:
  - *OC4.3.4*
  - *OC4.4.5.3*
  - *OC4.4.5.4*
  - *OC4.4.5.5*
- OC6
- OC7 excluding
  - *OC7.2.4.2*
- OC8
- OC9
- OC10 excluding
  - *OC10.5.7*
  - *OC10.7.1*
  - *OC10.7.2*
  - *OC10.7.3*
  - *OC10.7.4*
  - *OC10.7.6*
- OC11

In the **Grid Code**, where applicable, for the purposes of **Wind Farm Power Stations** references to **Generation Unit** or **Generator** should be interpreted to mean **Wind Farm Power Station**.

WFPS1.4 FAULT RIDE THROUGH REQUIREMENTS

WFPS1.4.1 A **Wind Farm Power Station** shall remain connected to the **Transmission System** for **Transmission System Voltage** dips on any or all phases, where the **Transmission System Voltage** measured at the HV terminals of the **Grid Connected Transformer** remains above the heavy black line in *Figure WFPS1.1*.

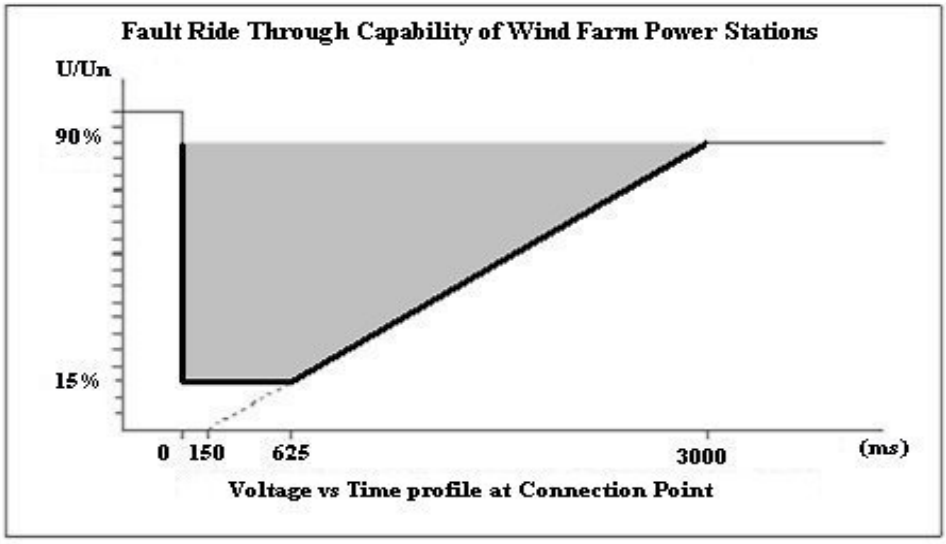


*Figure WFPS1.1 - Fault Ride-Through Capability of **Wind Farm Power Stations***

WFPS1.4.2 In addition to remaining connected to the **Transmission System**, the **Wind Farm Power Station** shall have the technical capability to provide the following functions:

a) During the **Transmission System Voltage** dip the **Wind Farm Power Station** shall provide **Active Power** in proportion to retained **Voltage** and maximise reactive current to the **Transmission System** without exceeding **WTG** limits. The maximisation of reactive current shall continue for at least 600 ms or until the **Transmission System Voltage** recovers to within the normal operational range of the **Transmission System** (ref. WFPS1.6.1), whichever is the sooner;

b) The **Wind Farm Power Station** shall provide at least 90 % of its maximum **Available Active Power** as quickly as the technology allows and in any event within 1 second of the **Transmission System Voltage** recovering to the normal operating range (ref. WFPS1.6.1).

WFPS1.5.1 TRANSMISSION SYSTEM FREQUENCY RANGES

Wind Farm Power Stations shall have the capability to:

a) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5 Hz to 50.5 Hz;

b) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.5 Hz to 52.0 Hz for a duration of 60 minutes;

c) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.0 Hz to 47.5 Hz for a duration of 20 seconds required each time the **Transmission System Frequency** is below 47.5 Hz;

d) remain connected to the **Transmission System** during rate of change of **Transmission System Frequency** of values up to and including 0.5 Hz per second.

No additional **WTG** shall be started while the **Transmission System Frequency** is above 50.2 Hz.

WFPS1.5.2 FREQUENCY RESPONSE

A **Frequency Response System** shall be installed by the **Wind Farm Power Station** to allow for the provision of **Frequency Response** from the **Wind Farm Power Station**. The **Frequency Response System** shall provide the functionality as specified in this section WFPS1.5.2.

WFPS1.5.2.1 MW Curtailment

The **Wind Farm Power Station** shall be capable of operating each **WTG** at a reduced level if the **Wind Farm Power Station's Active Power** output has been curtailed by the **TSO** for system security reasons. The **Wind Farm Power Station** shall be capable of receiving an on-line **MW Curtailment Set-point** sent by the **TSO** and acting accordingly. For system security reasons it may also be necessary for the **TSO** to constrain off the **Wind Farm Power Station**.

WFPS1.5.2.2 Power-Frequency Response Curve

WFPS1.5.2.2.1 The **Frequency Response System** shall have the capabilities as displayed in the *Power-Frequency Response Curve* in *Figure WFPS1.2,* where the power and frequency ranges required for points A, B, C, D, E are defined below in *Table WFPS1.1 and Table WFPS1.2.*

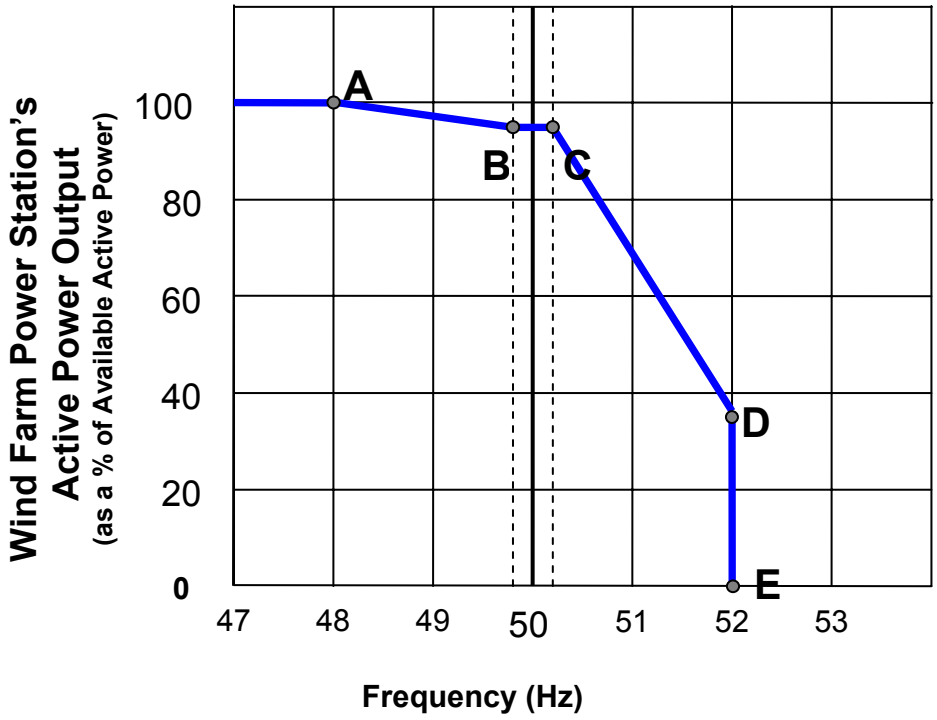


Figure WFPS1.2 – Example of Power-Frequency Response Curve.

WFPS1.5.2.2.2 Under normal **Transmission System Frequency** ranges, the **Wind Farm Power Station** shall operate with an **Active Power** output as set by the line 'B' - 'C'. If the **Transmission System Frequency** falls below point 'B', then the **Frequency Response System** shall act to ramp up the **Wind Farm Power Station's Active Power** output, in accordance with the **Frequency/Active Power** characteristic defined by the line 'B'-'A'.

WFPS1.5.2.2.3 Where the **Transmission System Frequency** is below the normal range and is recovering back towards the normal range, the **Frequency Response System** shall act to ramp down the **Wind Farm Power Station's Active Power** output in accordance with the **Frequency/Active Power** characteristic defined by the line 'A'-'B'.

WFPS1.5.2.2.4 A **Frequency** dead-band shall be applied between the **Transmission System Frequencies** corresponding to points 'B' and 'C', where no change in the **Wind Farm Power Station's Active Power** output shall be required.

WFPS1.5.2.2.5 Once the **Transmission System Frequency** rises to a level above point 'C', the **Frequency Response System** shall act to ramp down the **Wind Farm Power Station's Active Power** output in accordance with the **Frequency/Active Power** characteristic defined by the line 'C'-'D'-'E'. At **Transmission System Frequencies** greater than or equal to 'D'-'E', there shall be no **Active Power** output from the **Wind Farm Power Station**.

WFPS1.5.2.2.6 Points 'A', 'B', 'C', 'D' and 'E' shall depend on a combination of the **Transmission System Frequency**, **Active Power** and **MW Curtailment** set-point settings. These settings may be different for each **Wind Farm Power Station** depending on system conditions and **Wind Farm Power Station** location. These settings are defined in *Table WFPS1.1* below.

Point	***Transmission System Frequency*** *(Hz)*	***Wind Farm Power Station Active Power*** *Output (% of* ***Available Active Power****)*
A	F_A	P_A
B	F_B	Minimum of : P_B or **MW Curtailment Set-point** (converted to a % of **Available Active Power**)
C	F_C	Minimum of: P_C or **MW Curtailment Set-point** (converted to a % of **Available Active Power**)
D	F_D	Minimum of: P_D **or** **MW Curtailment Set-point** (converted to a % of **Available Active Power**)
E	F_E	P_E = 0 %

Table WFPS1.1: ***Transmission System Frequency*** *and %* ***Available Active Power*** *Settings for the Points 'A', 'B', 'C', 'D' and 'E' illustrated in Figure WFPS1.2*

Two settings for each of F_A, F_B, F_C, F_D, F_E, P_A, P_B, P_C, P_D and P_E shall be specified by the **TSO** at least 60 business days prior to the **Wind Farm Power Station's** scheduled **Operational Date** (refer to 1.5.2.3 below). The **Wind Farm Power Station** shall be responsible for implementing the appropriate settings during **Commissioning**. Alterations to the **MW Curtailment Set-point** may be requested in real-time by the **TSO** and these alterations shall be implemented by the **Wind Farm Power Station** within one minute of receipt of the appropriate signal from the **TSO**.

WFPS1.5.2.2.7 The table below, *Table WFPS1.2,* shows the **Transmission System Frequency** and **Active Power** ranges for F_A, F_B, F_C, F_D, F_E, P_A, P_B, P_C, P_D and P_E.

	Transmission System Frequency *(Hz)*		***Available Active Power*** *(%)*	
			MEC > 10 MW	***5 MW < MEC ≤ 10 MW***
F_A	*47.0-51.0*	P_A	*50-100*	*100*
F_B	*49.5-51.0*	P_B	*50-100*	*100*
F_C	*49.5-51.0*	P_C		
F_D	*50.5-52.0*	P_D	*20-100*	*20-100*
F_E		P_E	*0*	*0*

Table WFPS1.2: ***Transmission System Frequency*** *&* ***Active Power*** *ranges appropriate to Figure WFPS1.2.*

For the **Transmission System Frequency** values in *Table WFPS1.2* above, $F_A \leq F_B \leq F_C \leq F_D = F_E$.

WFPS1.5.2.2.8 Alterations to the **Wind Farm Power Station's Active Power** output, triggered by **Transmission System Frequency** changes, shall be achieved by proportionately altering the **Active Power** output of all available **WTG**s as opposed to switching individual **WTG**s on or off, insofar as possible.

WFPS1.5.2.2.9 No time delay other than those necessarily inherent in the design of the **Frequency Response System** shall be introduced. The response rate of each available online **WTG** shall be a minimum of 1 % of **WTG** rated capacity per second (MW/second). The **Frequency Response System** shall continuously monitor the **Transmission System Frequency** in order to continuously determine the **Wind Farm Power Station's** appropriate **Active Power** output by taking account of the **Wind Farm Power Station's Available Active Power** or **Curtailed Active Power**.

WFPS1.5.2.2.10 If the **Transmission System Frequency** rises to a level above 'D'-'E', as defined by the *Power-Frequency Response Curve in Figure WFPS1.2*, the **TSO** accepts that **WTG**s may disconnect. Any **WTG** which has disconnected shall be brought back on load as fast as technically feasible (provided the **Transmission System Frequency** has fallen below 50.2 Hz).

WFPS1.5.2.3 Procedure for Setting and Changing the *Power-Frequency Response Curves*

Two *Power-Frequency Response Curves* (Curve 1 and Curve 2) shall be specified by the **TSO** at least 60 business days prior to the **Wind Farm Power Station's** scheduled **Operational Date.** The **Wind Farm Power Station** shall be responsible for implementing the appropriate settings during **Commissioning**. The **Frequency Response System** shall be required to change between the two curves within one minute from receipt of the appropriate signal from the **TSO**. The **TSO** shall give the **Wind Farm Power Station** a minimum of 2 weeks notice if changes to either of the curve's parameters ***(i.e.*** F_A, F_B, F_C, F_D, F_E, P_A, P_B, P_C, P_D or P_E), are required. The **Wind Farm Power Station** shall formally confirm that any requested changes have been implemented within two weeks of receiving the **TSO's** formal request.

WFPS1.5.3 RAMP RATES

WFPS1.5.3.1 The **Wind Farm Power Station** shall be capable of controlling the ramp rate of its **Active Power** output with a maximum MW per minute ramp rate set by the **TSO**. There shall be two maximum ramp rate settings. The first ramp rate setting shall apply to the MW ramp rate average over one (1) minute. The second ramp rate setting shall apply to the MW per minute ramp rate average over ten (10) minutes. These ramp rate settings shall be applicable for all ranges of operation including start up, normal operation and shut down. The **TSO** acknowledges that falling wind speed or **Frequency Response** may cause either of the maximum ramp rate settings to be exceeded.

WFPS1.5.3.2 It shall be possible to vary each of these two maximum ramp rate settings independently over a range between 1 and 30 MW per minute. The **Wind Farm Power Station** shall have the capability to set the ramp rate in MW per minute averaged over both one and ten minutes.

WFPS1.5.3.3 Procedure for Setting and Changing the Ramp Rate Limitations

The ramp rate settings shall be specified by the **TSO** at least 60 business days prior to the **Wind Farm Power Station's** scheduled **Operational Date.** The **Wind Farm Power Station** shall be responsible for implementing the appropriate settings during **Commissioning.** The ramp rate settings may need to be changed from time to time depending on system needs. The **TSO** shall give the **Wind Farm Power Station** a minimum of two weeks notice if a change is required. The **Wind Farm Power Station** shall formally confirm that any requested changes have been implemented within two weeks of receiving the **TSO's** formal request.

WFPS1.6 TRANSMISSION SYSTEM VOLTAGE REQUIREMENTS

WFPS1.6.1 TRANSMISSION SYSTEM VOLTAGE RANGE

Wind Farm Power Stations shall remain continuously connected to the **Transmission System** at maximum **Available Active Power** or **Curtailed Active Power** output for normal and disturbed system conditions and for step changes in **Transmission System Voltage** of up to 10 %. The following are the ranges which may arise during **Transmission System** disturbances or following transmission faults:

(a) 400 kV system: 350 kV to 420 kV;
(b) 220 kV system: 200 kV to 245 kV;
(c) 110 kV system: 99 kV to 123 kV.

WFPS1.6.2 AUTOMATIC VOLTAGE REGULATION

WFPS1.6.2.1 **Wind Farm Power Stations** shall have a continuously-variable and continuously-acting **Voltage Regulation System** with similar response characteristics to a conventional **Automatic Voltage Regulator** and shall perform generally as described in BS4999 part 140, or equivalent European Standards.

WFPS1.6.2.2 The **Voltage Regulation System** shall be capable of receiving a **Voltage** set-point for the **Voltage** at the **Connection Point**. The **Voltage Regulation System** shall act to regulate the **Voltage** at this point by continuous modulation of the **Wind Farm Power Station's Reactive Power** output, within its **Reactive Power** range and without violating the **Voltage Step Emissions** limits as set out in the IEC standard 61000-3-7:1996 *Assessment of Emission limits for fluctuating loads in MV and HV power systems*. A change to the **Voltage** set-point shall be implemented by the **Wind Farm Power Station** within one minute of receipt of the appropriate signal from the **TSO**.

WFPS1.6.2.3 The slope setting of the **Voltage Regulation System** shall be capable of being set to any value between 0 % and 10 %. The setting shall be specified by the **TSO** at least 60 business days prior to the **Wind Farm Power Station's** scheduled **Operational Date.** The **Wind Farm Power Station** shall be responsible for implementing the appropriate settings during **Commissioning**. The slope setting may be varied from time to time depending on **Transmission System** needs. The **TSO** shall give the **Wind Farm Power Station** a minimum of two weeks notice if a change is required. The **Wind Farm Power Station** shall formally confirm that any requested changes have been implemented within two weeks of receiving the **TSO's** formal request.

WFPS1.6.2.4 The speed of response of the **Voltage Regulation System** shall be such that, following a step change in **Voltage** at the **Connection Point** the **Wind Farm Power Station** shall achieve 90 % of its steady-state **Reactive Power** response within 1 second.

WFPS1.6.2.5 *Figure WFPS1.3* shows the relevant points appropriate to the **Voltage Regulation System** for a **Wind Farm Power Station**. *X* is the high-voltage (HV) side of the **WTG** transformer, *Y* is the low-voltage (LV) side of the **Grid Connected Transformer** and *Z* is the **Connection Point**.

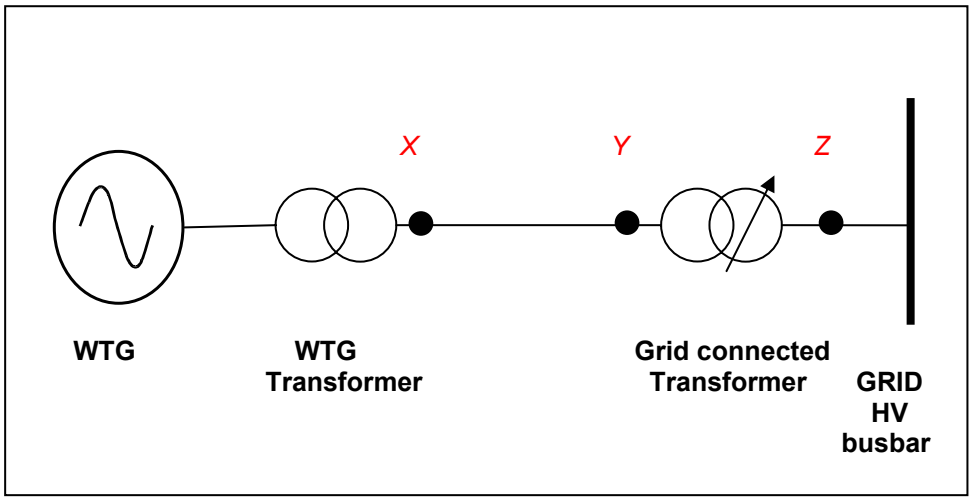
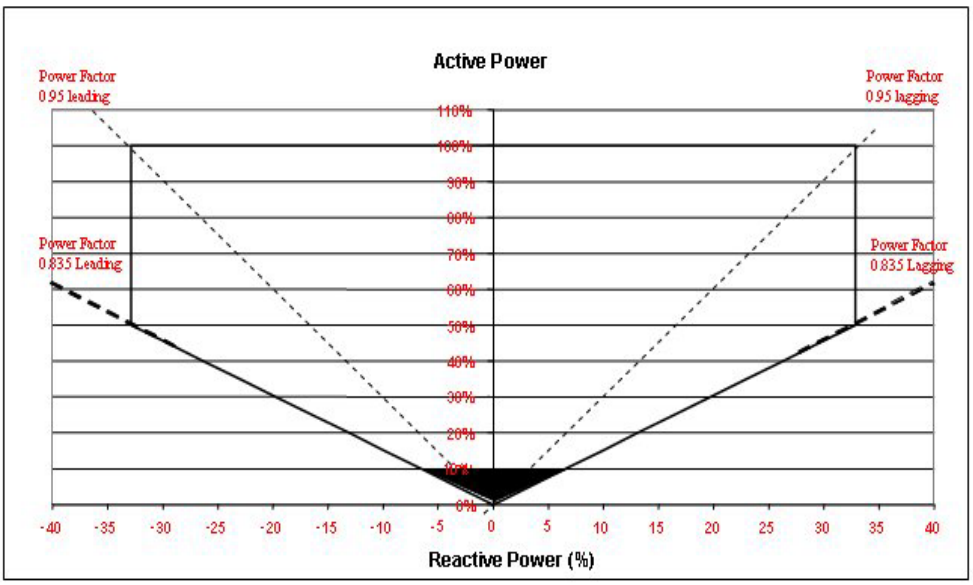


*Figure WFPS1.3 - Locations for **Voltage Regulation** set-point (Z) and the **Power Factor** range (Y). The high-voltage side of the **WTG** transformer is (X).*

WFPS1.6.3 REACTIVE POWER CAPABILITY

WFPS1.6.3.1 **Wind Farm Power Stations** shall be capable of operating at any point within the **Power Factor** ranges illustrated in *Figure WFPS1.4,* as measured at the LV side of the **Grid Connected Transformer** (point *Y* in *Figure WFPS1.3*), for any **Voltage** at the **Connection Point** within the ranges specified in WFPS1.6.1.

WFPS1.6.3.2 For **Wind Farm Power Stations** where the **Connection Point** is remote from the **Grid Connected Transformer**, any supplementary **Reactive Power** compensation required to offset the **Reactive Power** demand of the HV line, or cable, between the **Connection Point** and the **Wind Farm Power Station** shall be identified during the **TSO's Connection Offer** process.



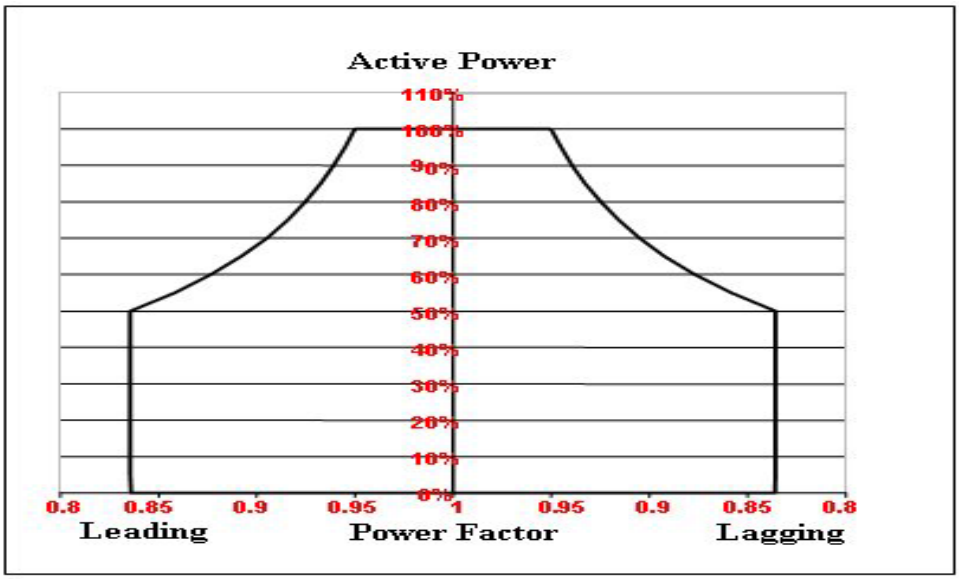


Figure WFPS1.4 - **Reactive Power** Capability of **Wind Farm Power Station**

WFPS1.6.3.3 For operation below 10 % of the **Wind Farm Power Station's MEC**, the **Wind Farm Power Station** shall operate within the shaded triangle in *Figure WFPS1.4*. However, if this cannot be achieved, then the total charging of the **Wind Farm Power Station** network during low load operation (below 10 %) shall be examined during the **TSO's Connection Offer** process. If during this examination it is identified that this charging may cause the voltage on the **Transmission System** to be outside the **Transmission System Voltage** ranges, as specified in WFPS1.6.1, then the **Reactive Power** requirements will need to be altered.

WFPS1.6.4 VOLTAGE STEP EMISSIONS

IEC 61000-3-7:1996 *Assessment of Emission limits for fluctuating loads in MV and HV power systems,* gives a table of the emission limits for **Voltage** changes as a function of the number of changes, R, per hour. This standard shall also apply to **Wind Farm Power Stations**.

WFPS1.6.5 WIND FARM POWER STATION'S GRID CONNECTED TRANSFORMER

WFPS1.6.5.1 All relevant references in the **Grid Code** to **Generator Transformers** shall be interpreted to mean the **Wind Farm Power Station's Grid Connected Transformer** rather than the individual **WTG** transformers. For **Wind Farm Power Stations** where the **Connection Point** is remote from the **Wind Farm Power Station**, **Grid Connected Transformer** shall be interpreted to mean the HV transformer located at the **Wind Farm Power Station**.

WFPS1.6.5.2 **Wind Farm Power Stations** shall provide on-load tap-changing (OLTC) facilities for all **Grid Connected Transformers**. All **Wind Farm Power Stations** shall liaise with the **TSO** on the design specification for the performance of the tap-changing facility of the **Grid Connected Transformer**.

WFPS1.6.5.3 The **Wind Farm Power Station's Grid Connected Transformers** may be connected either:

(a) in delta on the lower **Voltage** side and in star (with the star point or neutral brought out) on the higher **Voltage** side; or
(b) in star on both higher and lower **Voltage** sides with a delta tertiary winding provided.

WFPS1.7 SIGNALS, COMMUNICATIONS & CONTROL

WFPS1.7.1 SIGNALS FROM THE WIND FARM POWER STATION TO THE TSO

Signals from **Wind Farm Power Stations** to the **TSO** shall be broken up into a number of logical groups. There shall be different requirements for **Wind Farm Power Stations** depending on the **Wind Farm Power Station's MEC**. The following groups shall apply:

- ***Signals List #1*** - applies to **all Wind Farm Power Stations**;

In addition, **Wind Farm Power Stations** shall be required to provide signals from *Signals Lists 2, 3, 4 and/or 5*. These lists relate to:

- ***Signals List #2*** - Meteorological Data;
- ***Signals List #3* - Availability** Data;
- ***Signals List #4*** - **MW Curtailment** Data;
- ***Signals List #5*** - **Frequency Response System** Settings.

WFPS1.7.1.1 *Signals List #1*

The **Wind Farm Power Station** shall make the following signals available at the **TSO's RTU** designated for that **Wind Farm Power Station**:

a) **Grid Connected Transformer** tap positions;
b) **Voltage** (in kV) at the **Grid Connected Transformer's** low voltage terminals;
c) **Active Power** output (MW) at the LV side of the **Grid Connected Transformer**;
d) **Available Active Power** (MW) at the LV side of the **Grid Connected Transformer**;
e) **Reactive Power** output/demand (+/-Mvar) at the LV side of the **Grid Connected Transformer**;
f) **Voltage Regulation System** set-point (in kV);
g) On/off status indications for all **Reactive Power** devices exceeding 5 Mvar;
h) Circuit-breaker position indication shall be required. These may include indications from MV circuit-breakers on individual **WTG** circuits. Signals from individual **WTG** circuit-breakers shall not be required. The actual circuit-breaker signals required shall be specified by the **TSO** at least 60 business days prior to the **Wind Farm Power Station's** scheduled **Operational Date**;
i) A minimum of four sets of normally open potential free auxiliary contacts in each **Grid Connected Transformer** LV bay for fault indications.

WFPS1.7.1.2 ***Signals List #2***

WFPS1.7.1.2.1 **Wind Farm Power Station**s with a **MEC** in excess of 10 MW shall make the following meteorological data signals available at the **TSO's RTU** designated for that **Wind Farm Power Station**:

a) Wind speed (at hub height) - measurand signal;
b) Wind direction (at hub height) - measurand signal;
c) Air temperature- measurand signal;
d) Air pressure- measurand signal.

WFPS1.7.1.2.2 The meteorological data signals shall be provided by a dedicated **Meteorological Mast** located at the **Wind Farm Power Station** site or, where possible and preferable to do so, data from a means of the same or better accuracy. For **Wind Farm Power Stations** where the **WTG** are widely dispersed over a large geographical area and rather different weather patterns are expected for different sections of the **Wind Farm Power Station**, the meteorological data shall be provided from a number of individual **Meteorological Masts**, or where possible and preferable to do so, data from a source of the same or better reliability for groups of **WTG** (e.g. 1 set of meteorological data for each group of XX **WTG** within the **Wind Farm Power Station**). It is expected that **WTG** within an individual group shall demonstrate a high degree of correlation in **Active Power** output at any given time. The actual signals required shall be specified by the **TSO** no more than 60 business days after a **Connection Agreement** has been signed between the **Wind Farm Power Station** and the **TSO.**

WFPS1.7.1.3 ***Signals List #3***

WFPS1.7.1.3.1 **Wind Farm Power Stations** with a **MEC** in excess of 10 MW shall make the following signals available at the **TSO's RTU** designated for that **Wind Farm Power Station**:

a) **Wind Farm Power Station Availability** (0-100 % signal);
b) Percentage of **WTG** shutdown due to high wind-speed conditions (0-100 %);
c) Percentage of **WTG** not generating due low wind-speed shutdown (0-100 %).

WFPS1.7.1.3.2 For **Wind Farm Power Stations** with a **MEC** in excess of 10 MW, where the **WTG** are widely dispersed over a large geographical area and rather different weather patterns are expected for different sections of the **Wind Farm Power Station**, the above data set (ref. WFPS1.7.1.3.1) shall be provided for a number of groups of **WTG** (e.g. 1 signal for each group of XX **WTG** within the **Wind Farm Power Station**). It is expected that **WTG** within an individual group shall demonstrate a high degree of correlation in **Active Power**

output at any given time. The actual signals required shall be specified by the **TSO** at least 60 business days prior to the **Wind Farm Power Station's** scheduled **Operational Date.**

WFPS1.7.1.4 ***Signals List #4***

The **Wind Farm Power Station** shall make the following signals available at the **TSO's RTU** designated for that **Wind Farm Power Station**:

a) **Wind Farm Power Station MW Curtailment Set-point** value (MW);

b) **Wind Farm Power Station MW Curtailment** facility status indication (ON/OFF).

WFPS1.7.1.5 ***Signals List #5***

The **Wind Farm Power Station** shall make the following signals available at the **TSO's RTU** designated for that **Wind Farm Power Station**:

a) **Frequency Response System** Mode signal (i.e. *Power-Frequency Response Curve 1 or 2*);

b) **Frequency Response System** Mode status indication (ON/OFF).

WFPS1.7.1.6 Update Rates

WFPS1.7.1.6.1 Signals from the **Wind Farm Power Station** shall be updated at a rate between 1 and 30 seconds at the **Wind Farm Power Station's** designated **RTU**, to provide an average value over that rate. The actual rates required shall be specified by the **TSO** at least 60 business days prior to the **Wind Farm Power Station's** scheduled **Operational Date**.

WFPS1.7.2 CONTROL SIGNALS FROM THE TSO TO WIND FARM POWER STATIONS

WFPS1.7.2.1 The control signals described in WFPS1.7.2 shall be sent from the **TSO** to the **Wind Farm Power Station**. The **Wind Farm Power Station** shall be capable of receiving these signals and acting accordingly.

WFPS1.7.2.2 **MW Curtailment**

A **MW Curtailment Set-point** signal shall be sent by the **TSO** via the **Wind Farm Power Station's RTU** to its **Frequency Response System**. This set-point shall define the maximum **Active Power** output permitted from the **Wind Farm Power Station**. The **Wind Farm Power Station's Frequency Response System** shall be capable of receiving this signal and acting accordingly to achieve the desired change in **Active Power** output. This signal shall most likely be in the form of a single analogue value.

WFPS1.7.2.3 **Power-Frequency Response Curve Mode**

This signal shall be sent by the **TSO** to the **Wind Farm Power Station** in the event that a change from *Power-Frequency Response Curve 1* to *Power Frequency Response Curve 2*, or vice versa, is required.

WFPS1.7.2.4 **Voltage Regulation**

This signal shall allow the **TSO** to send a kV set-point for **Voltage Regulation** purposes.

WFPS1.7.2.5 **Black Start Disconnection**

Means shall be provided by the **Wind Farm Power Station** to facilitate the disconnection of the **Wind Farm Power Station** by the **TSO** and to also prevent re-connection in the event of **Black Start**. It shall be possible for the **TSO** to send a trip and inhibit signal to the circuit-breaker(s) at the **Wind Farm Power Station's Connection Point**. The precise circuit-breakers for which this facility shall be provided shall be specified by the **TSO** no more than 60 business days after a **Connection Agreement** has been signed between the **Wind Farm Power Station** and the **TSO. Wind Farm Power Stations** may only be reconnected (i.e. made live) when the **Network** is fully restored following instruction from the **TSO** and only earlier if the **TSO** deems it acceptable to do so.

WFPS1.7.3 RESPONSIBLE OPERATOR

A designated **Responsible Operator** shall be contactable by the **TSO** at all times to discuss operational matters without undue delay and in any case within 15 minutes. Following a request from the **TSO**, the **Responsible Operator** shall be present at the **Wind Farm Power Station's Connection Point** without undue delay and in any case within one hour and shall be capable of taking any required appropriate actions. The **Responsible Operator** shall be contactable 24 hours a day, 365 days a year.

WFPS1.7.4 DATA AND COMMUNICATIONS SPECIFICATIONS

WFPS1.7.4.1 The location of the **RTU** shall be agreed between the **TSO** and the **Wind Farm Power Station** no more than 60 business days after a **Connection Agreement** has been signed between the **Wind Farm Power Station** and the **TSO**.

WFPS1.7.4.2 The necessary communications links, communications protocol and the requirement for analogue or digital signals shall be specified by the **TSO** no more than 60 business days after a **Connection Agreement** has been signed between the **Wind Farm Power Station** and the **TSO.** Current applicable standards shall apply and the accuracy class for signals shall comply with the prevailing European Standard at that time.

WFPS1.7.4.3 For loss of communications links, persistence (i.e. continuing to operate with the most recent data set) shall be used in terms of set-points until the designated **Responsible Operator** has been contacted by the **TSO**.

WFPS1.7.4.4 If **MW Curtailment**, **Frequency Response** or **Voltage Regulation** facilities for the **Wind Farm Power Station** become unavailable, the **Wind Farm Power Station** shall contact the **TSO** without undue delay.

WFPS1.7.4.5 Where signals or indications required to be provided by the **Wind Farm Power Station** under WFPS1.7.1 and WFPS 1.7.2 become unavailable or do not comply with applicable standards due to failure of the **Wind Farm Power Stations'** technical equipment or any other reason under the control of the **Wind Farm Power Station**, the **Wind Farm Power Station** shall, acting in accordance with **Good Industry Practice**, restore or correct the signals and/or indications as soon as possible.

WFPS1.7.5 MW FORECASTS

MW forecasts shall be provided by **Wind Farm Power Stations** with a **MEC** in excess of 30 MW. These forecasts shall be provided at 10:00 a.m. on a daily basis for the following 48 hours for each 30 minute time-period by means of an electronic interface in accordance with the reasonable requirements of the **TSO's** data system.

WFPS1.7.6 WIND FARM POWER STATION MW AVAILABILITY DECLARATIONS

Wind Farm Power Stations with a **MEC** in excess of 30 MW shall submit **Wind Farm Power Station MW Availability Declarations** whenever changes in **Available Active Power** occur or are predicted to occur. These declarations shall be submitted by means of an electronic interface in accordance with the reasonable requirements of the **TSO**'s data system.

Glossary

GLOSSARY

ACRONYMS

A	Amp(s)
AFR	Automatic Frequency Restoration
ALVDD	Automatic Low Voltage Demand Disconnection
ATC	Available Transfer Capability
AVR/AVC	Automatic Voltage Regulation / Automatic Voltage Control
BGE	Bord Gais Éireann
BS	British Standard
BSP	Bulk Supply Point
BST	Bulk Supply Tariff
CB	Circuit Breaker
CCGT	Combined Cycle Gas Turbine
CDGU	Centrally Dispatched Generation Unit
CENELEC	Comité Européan de Normalisation Electrotechnique
CO_2	Carbon Dioxide
COP	Committed Outage Programme
CSBU	Customer Services Business Unit
CT	Current Transformer
DCC	Distribution Control Centre
DECLARE	ESBNG's Declaration System
DI	Dispatch Instruction
DSO	Distribution System Operator
ECC	Emergency Control Centre
ESB	Electricity Supply Board
ESO	External System Operator
ETSO	European Transmission System Operators
GC	General Conditions
GS	Generation Schedule
GT	Gas Turbine
GWh	Giga Watt Hour
HFO	Heavy Fuel Oil
HV	High Voltage
Hz	Hertz
IEC	International Electrotechnical Committee
IOP	Indicative Outage Programme
kA	Kilo Amp(s)
kV	Kilo Volt(s)
LV	Low Voltage

MEC	Maximum Export Capacity
MV	Medium Voltage
MVA	Mega Volt Ampere
Mvar	Mega Volt Ampere Reactive / Megavar
Mvarh	Megavar Hour
MWh	Mega Watt Hour
NCC	National Control Centre
NG	National Grid
NOx	Oxides of Nitrogen
NTC	Net Transfer Capacity
NTF	Notified Transmission Flow
O_2	Oxygen
OC	Operating Code
OLTC	On load Tap Changer
PG	Power Generation
PMR	Post Mortem Review
POP	Provisional Outage Programme
POR	Primary Operating Reserve
PSDM	Power System Data Management
PSP	Pumped Storage Plant
RPM	Revolutions per minute
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SDC	Scheduling and Dispatch Code
SFRS	Secondary Frequency Regulation System
SLR	Special Load Reading
SNP	Short Notice Penalty
SOR	Secondary Operating Reserve
SOx	Oxides of Sulphur
TRM	Transmission Reliability Margin
TOR	Tertiary Operating Reserve
TSO	Transmission System Operator
TTC	Total Transfer Capacity
UFR	Under Frequency Relay
Un	Nominal Voltage
VO	Voluntary Outage
WFPS	Wind Farm Power Station
WTG	Wind Turbine Generator
YNd (5,7,11)	Star Neutral Delta Vector Group 5 or 7 or 11 (Generator Transformer)
Zp	Impedance of Primary winding of a three phase Transformer

Zs	Impedance of Secondary winding of a three phase Transformer
Zt	Impedance of Tertiary winding of a three phase Transformer

DEFINITIONS

Act	The Electricity Regulation Act 1999.
Active Energy	The electrical energy produced, flowing or supplied by an electric circuit during a time interval, being the integral with respect to time of the instantaneous **Active Power**, measured in units of Watt-hours or standard multiples thereof, i.e.: 1000 Watt-hours = 1 Kilo Watt-hour (kWh) 1000 Kilo Watt-hour = 1 Mega Watt-hour (MWh) 1000 Mega Watt-hour = 1 Giga Watt-hour (GWh) 1000 Giga Watt-hour = 1 Tera Watt-hour (TWh)
Active Power	The product of voltage and the in-phase component of alternating current measured in units of Watts and standard multiples thereof.
Alert	A **Red Alert**, an **Amber Alert** or a **Blue Alert** or other Alert warning as agreed pursuant to OC9 (Emergency Control and Power System Restoration)
Amber Alert	An alert issued by **ESBNG** to the **Users** when a single **Event** would give rise to a reasonable possibility of failure to meet the **Power System Demand**, or of **Frequency** or **Voltage** departing significantly from normal or if multiple **Events** are probable due to prevailing weather conditions.
Ancillary Service	A service, other than the production of electricity, which is used to operate a stable and secure **Power System** including. **Reactive Power, Operating Reserve, Frequency Control** and **Blackstart Capability**.
Ancillary Service Agreement	The bilateral agreement between **ESBNG** and the **User,** which contains the detail specific to the **User's** provision of **Ancillary Services.**
Annual SLR Conditions	12.30 and 18.00 on the second Tuesday of January or any other day nominated by **CSBU**
Apparatus	An item of equipment in which electrical conductors are used, supported or of which they may form part and includes meters, lines, cables and appliances used or intended to be used for carrying electricity for the purpose of supplying or using electricity.

Apparent Power	The product of voltage and of alternating current measured in units of volt-amperes and standard multiples thereof.
Automatic Frequency Restoration	A system for reconnecting **Demand Customers** automatically following a low frequency **Event** on the **Transmission System**, once the frequency has recovered.
Automatic Low Voltage Demand Disconnection (ALVDD)	The automatic disconnection of **Demand Customers** when the Voltage or the rate of change of voltage has violated acceptable limits as determined by **ESBNG.**
Automatic Voltage Regulation	Automatic maintenance of a **Generation Unit's** terminal voltage at a desired setpoint
Automatic Voltage Regulator	A continuously acting automatic closed loop control system acting on the excitation system so as to maintain a **Generation Unit's** terminal voltage at a desired setpoint.
Auxiliaries	Any item of **Plant** and/or **Apparatus** not directly a part of the boiler plant or **Generating Unit**, but required for the boiler plant's or **Generating Unit's** functional operation. 'Auxiliary' shall be defined accordingly.
Auxiliary Diesel Engine	A diesel engine driving a **Generating Unit** which can supply a **Unit Board** or **Station Board**, which can start without an electrical power supply from outside the **Power Station** within which it is situated.
Auxiliary Fuel	A fuel other than a **Primary Fuel** which may be used for start up purposes or for support of combustion or **Maximisation** when the **Generation Unit** is producing **Energy**
Auxiliary Load	The electrical **Demand** of the **Generation Unit's Auxiliary Plant** required for the operation of the **Generation Unit**.
Auxiliary Plant	Any item of **Plant** and/or **Apparatus** not directly a part of the boiler plant or **Generation Unit**, but required for the boiler plant's or **Generation Unit's** functional operation.

Availability	A measure of time a **Generation Unit**, transmission line or other facility is capable of delivering **Energy** to the **Transmission System** at the **Delivery Point** or of providing **Ancillary Services** to the **Transmission System** and the terms "**Available**" and "**Availabilities**" shall be construed accordingly.
Available Active Power	The amount of **Active Power** that the **Wind Farm Power Station** could produce based on current wind conditions. The **Available Active Power** shall only differ from the actual **Active Power** if the **Wind Farm Power Station** has been curtailed, constrained or is operating in a restrictive **Frequency Response** mode.
Available Transfer Capability	The transfer capacity remaining on the **Transmission System** to the **Interconnector** for further trading activity over and above already committed uses. **ATC** is then **NTC** less **NTF**.
Black Start	The procedure necessary for a recovery from a **Total Shutdown** or **Partial Shutdown**.
Black Start Capability	Ability in respect of a **Black Start Station**, for at least one of its **Centrally Dispatched Generation Units** to start-up from **Shutdown**, without importing energy from the **Transmission System**, and to energise a part of the **Transmission System** and be **Synchronised** to the **Transmission System** upon instruction from **ESBNG.**
Black Start Station	A **Power Station** which is registered pursuant to **Grid Code** as having a **Black Start Capability**
Block Load	Some **Generation Units**, when starting to generate energy onto the **Transmission System**, produce a certain amount of output with no need to ramp up to that output. This is a block load. It represents the amount that generators instantaneously put onto the system when **Synchronised.**
Blue Alert	An alert issued by **ESBNG** signifying that either a **Partial** or a **Total Shutdown** of the **Power System** has taken place.
Bulk Supply Points	A point of connection between the **Transmission System** and the **System** of a **Distribution System Operator** or a **Grid Connected Customer** or other network operator.
Business Day	Monday through Friday excluding public holidays and holidays observed by **ESB**.
Capacity	The rated continuous load-carrying ability, expressed in

	megawatts (MW) or megavolt-amperes (MVA) of generation, transmission, or other electrical equipment.
Capacity Adequacy	When there is sufficient **Generation Capacity** to meet the **Demand** and **Reserve** requirements.
Capacity Adequacy Indicator	An indication issued by **ESBNG** for each weekly peak of the year based on **Availability** and **Demand** forecasts whether or not there is sufficient **Generation Capacity** to meet **Demand.**
Capacity Shortfall Warning	A warning issued by **ESBNG** that based on **Availability** and **Demand** forecasts there is insufficient **Generation Capacity** to meet the peak **Demand.**
CCGT Unit	A **Generation Unit** within a **CCGT Module**
CCGT Module	A collection of **Generation Units** comprising one or more **Combustion Turbine Units** and one or more **Steam Units** where, in normal operation, the waste heat from the **Combustion Turbine Units** is passed to the water/steam system of the associated **Steam Unit** or **Steam Units** and where the component **Units** within the **CCGT Module** are directly connected by steam or hot gas lines which enable those **Units** to contribute to the efficiency of the combined cycle operation of the **CCGT Module**
Central Dispatch	The process of **Scheduling** and issuing **Dispatch Instructions** in relation to **Centrally Dispatched Generation Units** direct to a **Power Station** by **ESBNG** pursuant to **Grid Code**
Centrally Dispatched Generation Unit	A **Generation Unit** which is normally subject to **ESBNG's Dispatch Instructions**
Combustion Turbine Unit	A **Generation Unit** which compresses the inlet air and feeds fuel to the combustion chamber. The fuel and air burn to form hot gases which in turn forces these hot gases into the turbine, causing it to spin. The turbine can be fuelled by natural gas, by distillate or by other such fuels as technology may allow.
Commercial Energy Metering	Metering which is utilised to measure **Energy** for Tariff charging purposes.
Commission	The Commission for Electricity Regulation (CER)
Commissioning	Activities involved in undertaking the **Commissioning Test** or implementing the **Commissioning Instructions** pursuant to the terms of the **Connection Agreement** or as the context requires the testing of any item of users equipment required pursuant to this

	Grid Code prior to connection or re-connection in order to determine that it meets all requirements and standards for connection to the **Transmission System.** It also includes activities that determine the new values of parameters that apply to it following a material alteration or modification and in addition those activities involved in undertaking the **Commissioning Tests** or implementing the **Commissioning Instructions** as the context requires.
Commissioning Instructions	A step-by-step test procedure for a **Commissioning Test**.
Commissioning Test	A test conducted on equipment that is connecting to the **Transmission System** for the first time or after modification
Committed Outage Programme	A programme of **Outages** of **the Generator's Generation Units** prepared by **ESBNG** pursuant to Section OC2 and covering year 1.
Committed Project Planning Data	Data relating to a **User Development** once the offer for a **Connection, Use of System Agreement** and/or supplemental agreements are accepted.
Communications and Control Room	The communications and control room to be provided by the **User** in accordance with the **Connection Agreement**
Connection Agreement	The bilateral agreement between **ESB** (acting through **ESBNG)** and the **User,** which contains the detail specific to the **User's** connection to the **Transmission System**.
Connection Conditions	The section of this **Grid Code** which is identified as the **Connection Conditions.**
Connection Date	The date on which the **Commissioning Instructions** have to the **ESBNG's** satisfaction been properly implemented in respect of every part of the **User's Equipment,** following which **ESBNG** shall, as soon as reasonably practicable notify the **User** to that effect, specifying the date of completion of such implementation
Connection Offer	A quotation letter together with the unsigned **Connection Agreement** which forms the **ESBNG's** offer for connection of the **Facility** to the **Transmission System** as the result of an application for connection of the **Facility**.
Connection Point	The physical point where the **User's Plant Apparatus** or **System** is joined to the **Transmission System** or the **Distribution System**.
Connection Site	The site at which the **Plant** and **Apparatus** of the **User** at the

	User's side of the **Connection Point** is to be installed including the land, spaces, roads and any surfaces.
Contingency	The unexpected failure or **Outage** of a system component, such as a **Generation Unit**, transmission line, circuit breaker, switch, or other electrical element. A **Contingency** also may include multiple components, which are related by situations leading to simultaneous component outages.
Contingency Reserve	The margin of available **Generation Capacity** over forecast **System Demand** which is required in the period of 24 hours ahead down to real time, to cover against uncertainties in availability of **Generation Capacity** and against **Demand** forecast errors or variations
Control Action	An action, such as switching, whereby the **Transmission System** is operated.
Control Centre	**A location used for the purpose of monitoring, control and operation of the** Transmission System **or a** User System **other than a** Generator 's System**.**
Control Facility	A location used for the purpose of monitoring, control and operation of the **Generator 's Plant** and **Apparatus**.
Control Phase	The **Control Phase** follows on from the **Programming Phase** and starts with the issue of the **Generation Schedule** for the next day and covers the period down to the real time
Control Synchronising	The coupling (by manual or automatic closing of the circuit breaker) of two asynchronous **Systems** by means of synchroscope.
Curtailed Active Power	The amount of **Active Power** that the **Wind Farm Power Station** is permitted to generate based on the **MW Curtailment Set-point** signal sent by the **TSO**.
Customer	A person to whom electrical power is provided (whether or not this is the same person who provides the electrical power).
Customer Demand Management	Reducing the supply of electricity to a **Customer** or disconnecting a **Customer** in a manner agreed for commercial purposes between a **Supplier** and its **Customers**
Declaration	A notice prepared by the **Generator** in respect of a **Generation Unit** submitted to **ESBNG** in accordance with the requirements of SDC1 and setting out the values (and times applicable to those values) of **Availability**, **Ancillary Services** capabilities, **Operating**

	Characteristics and other items listed or referred to in SDC1 applicable in the **Commitment Period**, and "**Declared**" shall be construed accordingly.
Declared Operating Characteristics	The **Operating Characteristics** which the **Generator** shall have informed **ESBNG** under the provisions of **SDC1** and which shall reasonably reflect the true **Operating Characteristics** of the **Generation Unit**
Decremental Break Point	**MW Output** at which the **Decremental Price** of a **Generation Unit** changes.
Decremental Price	The marginal price at a particular **Generation Unit Output** for reducing **Generation Unit Output** by 1 MWh. A positive decremental price means that the **Generator** pays the marginal price for reducing its **Generation Unit Output** from its **Nominated** value
De-energise	Disconnect from the **Transmission System** utilising circuit switches etc to isolate the **Plant** and/or **Apparatus**, and "**De-energised**" and "**De-energising**" shall be construed accordingly.
De-Loading Rate	The rate at which a **Generation Unit** reduces **MW Output** from **Minimum Generation** to zero when it is instructed to cease output. There are up to two possible deloading rates, which shall be named accordingly: **De-Loading Rate** 1 and **De-Loading Rate** 2.
Demand	The rate at which electric energy is delivered to or by the **System** or part of the **System** comprising of both **Active** and **Reactive Power**, unless otherwise stated.
Demand Control	All or any of the methods of achieving a **Demand** reduction or an increase in **Demand** as set out in OC5.
Demand Control Alert	A warning issued by **ESBNG** when **ESBNG** anticipates that it will or may instruct the **DSO** to implement **Demand** reduction.
Demand Disconnection	Disconnection of **Demand Customers**
De-maximisation Instruction	An instruction issued by **ESBNG** to **Generators** to cease **Maximisation**.
Designated Operator	The operators approved in writing by the relevant **User** as competent to carry out the procedures in the agreed **Operation Instructions** for parties connecting to the **Transmission System**

De-Synchronise	The act of taking a **Generation Unit** which is **Synchronised** to the **Transmission System** off the **Transmission System** to which it has been Synchronised and the term "**De-Synchronised**", and other like terms, shall be construed accordingly.
Disconnection	The physical separation of **Users** (or **Customers**) from the **Transmission System** or a **User System** as the case may be.
Dispatch	The issue by **ESBNG,** pursuant to **SDC1**, of instructions to **Generators** in respect of operation of **Generation Units** under their control, and "**Dispatched**" and other like terms shall be construed accordingly.
Dispatch Instruction	An instruction given by **ESBNG** from its **National Control Centre** to the **Generator's** approved contact person or location to change the output, fuel or manner of operation of the **Generation Unit**. '**Instruct'** and **'Instructed**' shall be construed accordingly.
Disputes Resolution Procedure	The procedures described in the **Connection Agreement**, **Use of System Agreement** and **Ancillary Services Agreement** relating to disputes resolution.
Distribution Control Centre	**Control Centre** of the **Distribution System Operator**
Distribution System	The system consisting (wholly or mainly) of electric circuits, transformers and switchgear which are owned or operated by the **ESB Customer Services Business Unit** and used for the distribution of electricity from **Grid Supply Points** or **Generation Units** or other entry points to the point of delivery to **Customers** or other **Users** and any **Plant** and **Apparatus** and meters owned or operated by the **Customer Services Business Unit** in connection with the distribution of electricity, but not including any part of the **Transmission System**.
Distribution System Operator (DSO)	An entity unit within **CSBU** which is responsible for, amongst other things, the planning, development, operation and maintenance of the **Distribution System**.
Disturbance	An unplanned event that produces an abnormal **System** condition.
Disturbing Loads	A load on the **System** that adversely affects **Power Quality**.
Earthing	A way of providing a connection between conductors and earth by an **Earthing Device.**

Earthing Device	A means of providing a connection between a conductor and earth being of adequate strength and capability for the intended purpose.
Effect of Parallel Flows	The effect of the flow of electricity on an electric system's transmission facilities resulting from scheduled electric power transfers between two electric systems. Electric power flows on all interconnected parallel paths in amounts inversely proportional to each paths resistance.
Electronic Alert System	The primary means by which an **Alert** is transmitted by **ESBNG** to **Users** (or to certain **Users** only) in accordance with **OC9.**
Embedded Generation	**Generation Units** within a **Power Station** which are directly connected to a **Distribution System** or the system of any other **User** , such connection being either a direct connection or a connection via a busbar of another **User** but with no other **Connection** to the **Transmission System**
Emergency	Any abnormal system condition that requires automatic or immediate manual action to prevent or limit loss of transmission facilities or generation supply that could adversely affect the reliability of the **Transmission System**
Emergency Control Centre (ECC)	A site, remote from the **National Control Centre**, providing at least the minimum level of control capabilities necessary for secure operation of the **Power System,** to be utilised in the event that an emergency situation or major failure of facilities at the **National Control Centre** prevents operation from the **National Control Centre,** or otherwise as determined by **ESBNG** (e.g. for **NCC** maintenance, testing or training).
Emergency Instruction	A **Dispatch** instruction issued by **ESBNG,** pursuant to SDC2.11 to a **CDGU** which may require an action or response which is outside the limits implied by the then current **Declarations.**
End of Start-up Period	The time after which the rate of change of the **Generation Unit Output** is not dependent upon the initial warmth of the **Generation Unit.**
Energise	The movement of any isolator, breaker or switch so as to enable active power and reactive power to be transferred to and from the Facility through the **Generator's Plant** and **Apparatus** and "**Energised**" and "**Energising**" shall be construed accordingly.

Energy	The electrical energy produced, flowing or supplied by an electrical circuit during a time interval and being the integral with respect to time of the instantaneous **Active Power**, measured in units of Watt-hours or standard multiples thereof.
ESB Safety Rules	Documents prepared by **ESB** and entitled "Electricity Supply Board Ireland, Safety Rules (ELECTRICAL) (Transmission, Distribution and Marketing)" and "Electricity Supply Board Ireland, Safety Rules (ELECTRICAL) (Generation Stations)".
ESBNG	The **ESB** Business Unit responsible for the planning , development operation and maintenance of the **Transmission System** , for the **Scheduling** and **Dispatch of Generation Units** subject to **Dispatch** and for the co-ordination of **Generation** and **Transmission Outages**
ESBNG Planning Criteria	**System Planning** practices and considerations that **ESBNG** follow. The application of **ESBNG Planning Criteria** may vary to match local conditions and local **System** requirements.
Estimated Registered Data	Those items of **Planning Data** which either upon connection will become **Registered Data**, or which for the purposes of the **Plant** and/or **Apparatus** concerned as at the date of submission are **Registered Data**, but in each case which for the seven succeeding **ESBNG** financial years will be an estimate of what is expected.
Event	An unscheduled or unplanned occurrence on, or relating to either the **Transmission System** or a **User's System**, including faults, incidents and breakdowns.
External Interconnection	**Apparatus** for the transmission of electricity to (from) the **Transmission System** from (to) a transmission or distribution system located outside the Republic of Ireland.
External System	In relation to an **External System Operator** means the transmission or distribution system which it operates which is located outside the Republic of Ireland and any **Apparatus** or **Plant** which connects that system to the **External Interconnection** and which is owned or operated by such **External System Operator**.
External System Operator	A person who operates an **External System** which is connected to the **Transmission System** by an **External Interconnection.**

Externally Interconnected Party	The operator of an electrical transmission or distribution system outside the Republic of Ireland which is connected to the **Transmission System** by an **External Interconnection**.
Facility	The **User's** facility located at the **Connection Site** including the **User's Plant** and **Apparatus** plus the **Plant** and **Apparatus** to be installed at the **User's** side of the **Connection Point** necessary to effect the connection
Flexible Outage	An **Outage** scheduled in the **Committed Outage Programme** as a **Flexible Outage** which is not within four **Business Days** of the scheduled start date and time
Forced Outage Probability	The probability, in percentage terms, of a **Generation Unit** not being available to provide **Energy** or **Ancillary Services.**
Forecast Statement	A statement as defined in Section 38 of the **Act**
Frequency	The number of alternating current cycles per second (expressed in Hertz) at which a **System** is running.
Frequency Control	The retention of the **Frequency** on the **Power System** within acceptable limits.
Frequency Demand Disconnection	**Disconnection** of **Demand Customers** when **Frequency** falls to a particular threshold.
Frequency Event	An event where the **Transmission System Frequency** deviates to a value below 49.5Hz.
Frequency Regulation	The automatic adjustment of **Active Power** output by a **Generation Unit**, initiated by free governor action in response to continuous minor fluctuations of **Frequency** on the **Power System**.
Frequency Response	The automatic adjustment of **Active Power** output from a **Generation Unit(s)** in response to **Frequency** changes
Frequency Response System	A facility providing the means to automatically adjust the **Active Power** output from a **Generation Unit(s)** in response to changes in **Frequency**.
General Conditions	The part of **Grid Code** which is defined as the **General Conditions**
Generation	The process of producing electrical energy from other forms of energy; also, the amount of electric energy produced, usually expressed in megawatthours (MWh).

Generation Outage Programme	Any or all of the **Indicative Outage Programme**, the **Provisional Outage Programme** and the **Committed Outage Programme.**
Generation Schedule	A statement prepared and issued by **ESBNG** under **SDC1** on a daily basis (or more frequently in response to changes in **Availability** and other events)setting out with **Centrally Dispatched Generation Units** are anticipated to be required to ensure so far as practicable the integrity of the **Transmission System** , the security and quality of supply and that they are in sufficient **Generation** to meet **Demand** at all times (to extend practicable) together with an appropriate margin of **Reserve**
Generation Unit	Any apparatus which produces electricity and, for the purpose of **SDC1** and **SDC2**, shall include a **CCGT Module** or a **CCGT Unit**, where running arrangements and/or **System** conditions apply.
Generation Unit Output	The **Active Power and Reactive Power** produced by a **Generation Unit** net of **Generation Unit Auxiliary Load**
Generator	An entity which generates electricity and is subject to the **Grid Code** pursuant to any agreement with **ESBNG** or otherwise.
Generator Site	The site owned (or occupied pursuant to a lease, licence or other agreement) by the **Generator** which contains the **Connection Point**.
Generator Transformer	A transformer whose principal function is to provide the interconnection between the **Generation Unit** and the Network and to transform the **Generation Unit** voltage to the Network voltage.
Good Industry Practice	Has the meaning set out in the **Connection Agreement**.
Governor Control System	A system which will result in **Active Power** output of a **Generation Unit** changing, in response to a change in **System Frequency**, in a direction which assists in the recovery to **Target Frequency**
Governor Droop	The percentage drop in the **Frequency** that would cause the **Generation Unit** under free governor action to change its output from zero to its full **Capacity**.
Grid Code	This code prepared by the **ESBNG** pursuant to section 33 of the **Act**, and approved by the **Commission**, as from time to time revised, amended, supplemented or replaced with the approval of or at the instance of the **Commission**.

Grid Code Review Panel	The panel as set out in GC1.8 of the **General Conditions**
Grid Code Test	A test that is to be mutually agreed, with agreement not to be unreasonably withheld, and conducted in accordance with **Grid Code**.
Grid Connected	Connected to the **Transmission System**
Grid Connected Customers	A **Customer** who is connected directly to the **Transmission System**.
Grid Connected Transformer	Any transformer directly connected to the **Transmission System**.
Grid Connection Point	The point at which a **Generating Unit** or a **CCGT Module** or a **CCGT Unit** or a **Customer** or an **External System**, is directly connected to the **Transmission System**.
Grid Supply Point or GSP	A point of connection between the **Transmission System** and the **Distribution System** or a **Grid Connected Customer** or other network operator.
In Writing	This includes typewriting, printing, lithography, electronic mail, facsimile and other modes of reproducing words in a legible and non-transitory form;
Incremental Price	The marginal price at a particular **Generation Unit Output** for increasing **Generation Unit Output** by 1 MWh once that unit has started to generate energy. A positive incremental price means that the Generator gets paid the marginal price for increasing its **Generation Unit Output** from its **Nominated** value
Independent Sector Users	A person who has been authorised by **ESBNG** to use the interconnector pursuant to a valid Use of System Agreement.
Indicative Outage Programme	A programme of **Outages** of the **Generato**r's **Generation Units** prepared by **ESBNG** pursuant to OC2 and covering years 4-7 ahead.
Interchange Schedule	The sum of the **Interconnector Transfer Schedule** and any franchise market trading occurring during a **Trading Period**.
Interconnection Agreement	A bilateral agreement between **ESBNG** and an **External System Operator**
Interconnector	The tie line, facilities and equipment that connect the **Transmission System** of the Republic of Ireland to the **Northern Ireland Electricity System**

Interconnector Energy Trade	The nominated Import or Export of electric energy between the wholesale electricity markets of Northern Ireland and Ireland by a **Participant** pursuant to the **Trading and Settlement Code.**
Interconnector Transfer Schedule	The schedule showing the net exchange of electric energy between the independent sector electricity markets of Northern Ireland and Ireland effective for each **Trading Period**.
Interruptible Tariff	Special tariff paid for **Energy** due to the arrangement that the **Customer** is automatically interruptible by use of **Under Frequency Relay** or other means in accordance with arrangements made between the **Customer** [and **Supplier**].
Interruptible Tariff Customers	**Customers** who purchase electricity under an **Interruptible Tariff**.
Investigation	Investigation carried out by **ESBNG** under OC10, and "Investigate" shall be construed accordingly.
Licence	An electricity generation licence or an electricity supply licence, as the context requires, granted pursuant to Section 14 of the **Act.**
Load	The **Active Power** or **Reactive Power** as the context requires, generated transmitted or distributed.
Load Factor	The ratio of the actual electrical **Energy** produced by a **Generation Unit** to the possible maximum electrical **Energy** that could be produced by that **Generation Unit** in any defined period
Loading Rate	The rate at which a **Generation Unit** increases **Generation Unit Output** from zero to **Minimum Generation** when it is instructed to start. There are up to two possible loading rates, which shall be named accordingly: **Loading Rate** 1 and **Loading Rate** 2.
Margin	The difference between maximum **Active Power** (net of **Auxiliary Loads**) from **Available Generation Units** and net **System Demand** expressed in MW.
Maximisation	An increase in **MW Output** above the **Availability** up to the level of the **Short Term Maximisation Capability**, and the terms "Maximise" and "Maximised" shall be construed accordingly.
Maximisation Instruction	An instruction issued by **ESBNG** to the **Generator** to Maximise the **MW Output** of a **Generation Unit**.
Maximum Continuous Rating	The maximum capacity (MW) (or effective rating), modified for ambient limitations, that a **Generation Unit** can sustain indefinitely without loss of equipment life, less the capacity used to supply the

	Auxiliary Load.
Maximum Export Capacity	The value (MW) provided in accordance with the **Generator's Connection Agreement**
Maximum Import Capacity	The values (kW and/ or kVA) provided in accordance with the **Grid Connected Customer's Connection Agreement**
Measurement Point	The **Measurement Point** shall be the **Connection Point** to the **Transmission System** or such other point or points as may be agreed between **ESBNG** and the **User**.
Meteorological Mast	A device erected at the **Wind Farm Power Station** which has the capability measure representative wind speed, wind direction, air temperature and air pressure to a degree of accuracy corresponding to the appropriate prevailing European Standard at that time.
Meter	A device for measuring and recording units of electrical energy.
Metering Code	The code that specifies the minimum technical design and operational criteria to be complied with for metering and data collection equipment and associated procedures as required under the **Trading and Settlement Code**.
Metering Equipment	**Meters**, time switches, measurement transformers, metering protection and isolation equipment, circuitry and their associated data storage and data communications equipment and wiring which are part of the **Active Energy** and **Reactive Energy** measuring equipment at or related to a **Site**.
Minimum Down Time	The minimum time that must elapse from the time of a **Generation Unit Shut Down** before it can be instructed to **Start-up.**
Minimum Generation	The minimum **MW Output** which a **Generation Unit** can produce continuously as registered with **ESBNG** under **SDC1**
Minimum Up Time	The minimum time that must elapse from the time of a **Generation Unit Start-up** before it can be instructed to **Shut Down.**
Modification	Any actual or proposed replacement, renovation, modification, alteration or construction by or on behalf of a **User** or **ESBNG** to either that **User's Plant** or **Apparatus** or **ESBNG 's Plant** or **Apparatus**, as the case may be, or the manner of its operation which has or may have a **Material Effect** on **ESBNG** or a **User**, as the case may be, at a particular **Connection Site**.

Monitoring	Monitoring carried out by **ESBNG** under OC10, and "**Monitor**" shall be construed accordingly.
Mvar Output	The **Reactive Power** produced or absorbed by a **Generation Unit** net of **Generation Unit Auxiliary Load**
MW Curtailment	The automatic reduction of **Active Power** output from a **Generation Unit(s)** in response to a **MW Curtailment Set-point** signal being received from the **TSO**.
MW Curtailment Set-point	The limit set by the **TSO** for the amount of **Active Power** that the **Wind Farm Power Station** is permitted to generate.
MW Dispatch Instruction	An instruction given by **ESBNG** from its **National Control Centre** to the **Generator's** approved contact person or location regarding the **MW Output** of the **Generation Unit**.
MW Output	The **Active Power** produced by a **Generation Unit** net of **Generation Unit Auxiliary Load**
National Control Centre	**ESBNG's** National Control Centre, as notified by **ESBNG** to the **Generator** from time to time.
Net Transfer Capacity	Represents the capacity available on the interconnector prior to accounting for **Notified Transmission Flow. NTC** is **TTC** less **TRM** for each **Trading Period**.
Network	The **Transmission System** and the **Distribution System** taken together.
Network Control	Network switching and **Control Actions** that **ESBNG** needs to carry out in implementing the **Transmission Outage Programme**, in routine operation of the **Transmission System** and in responding to emergency and fault situations on the **Transmission System**, which may from time to time affect the operations of **Users** or security of supply to **Users**.
Nomination	A notice prepared by the **Generator** in respect of a **Generation Unit** submitted to **ESBNG** in accordance with the requirements of SDC1 and setting out the values (and **Trading Periods** applicable to those values) of **Generation Unit Output**, **Incremental Prices**, **Decremental Prices**, **Interconnector Trades** and other items listed or referred to in SDC1 applicable for the **Trading Day**, and "**Nominated**" shall be construed accordingly.
Non- Centrally Dispatched	A **Generation Unit** not normally set to **Generation Dispatch**

Generation Unit (NCDGU)	
Normal Dispatch Condition	The condition of the **Generation Unit** at the **End of the Start Up Period**.
Notice to Synchronise	A **Dispatch instruction** given by **ESBNG** from its **National Control Centre** to the **Generator's** approved contact person or location to **synchronise** the **Generation Unit**.
Notified Transmission Flow	The physical flow resulting from the sum of the firm transfer contracts notified to **ESBNG** at the time of study and posting.
Operating Characteristics	The technical capabilities, flexibilities and limitations for the operation of a **Generation Unit** as registered or declared in accordance with the provisions of the **Grid Code**.
Operating Code (OC)	The part of **Grid Code** which is identified as the **Operating Code**
Operating Margin	**Contingency Reserve** and **Operational Reserve.**
Operating Mode	An **Operating Mode** of a **Generation Unit** is a pre-defined method of operating that **Generation Unit,** as agreed between **ESBNG** and the **User.**
Operating Reserve	The additional **MW Output** required from **Generation Units** (or **Demand** reduction) which must be realisable in real time operation to contain and correct any potential **Power System Frequency** deviation to an acceptable level. It will include **Primary Operating Reserve, Secondary Operating Reserve** and **Tertiary Operating Reserve**
Operation	A scheduled or planned action relating to the operation of a **System** (including an **Embedded Independent Generating Plant**).
Operation Instructions	Management instructions and procedures, both in support of the **Safety Rules** and for the local and remote operation of **Plant** and **Apparatus**, issued in connection with the actual operation of **Plant** and/or **Apparatus** at or from a **Connection Site**.
Operational Control Phase	The period from real time to one week ahead of real time.
Operational Data	Data required under the **Operating Codes** and/or **Scheduling** and **Dispatch Codes**.
Operational Date	When **ESBNG** is satisfied that all of the **Grid Code Tests** have been carried out correctly and satisfactorily completed **ESBNG** will as soon as is practicable notify the **User**, specifying the time and

	date of such completion.
Operational Effect	Any effect on the operation of the relevant other system that causes the **Transmission System** or the **User's System** to operate (or be at a materially increased risk of operating) differently to the way in which they would or may have normally operated in the absence of that effect. **Operationally Effected** shall be construed accordingly.
Operational Planning Phase	The period from 1 week to the end of the 7th year ahead of real time
Operational Tests	**Tests** carried out by **ESBNG** in order to maintain and develop operational procedures, to train staff and to acquire information in respect of **Transmission System** behaviour under abnormal **System** conditions, and also tests carried out by other **Users** for similar purposes in respect of their **Plant**.
Outage	In relation to a **Generation Unit**, a total or partial reduction in **Availability** such that the **Generation Unit** is unavailable to achieve its full **Registered Capacity** in accordance with its **Registered Operating Characteristics.**
Partial Shutdown	The situation existing when all generation has ceased in part of the **Power System** and there is no electricity supply from **External Interconnection** or any other part of the **System.**
Planned Rota Load Shedding	Planned **De-Energisation** of **Customers** on a rota basis where there is a significant shortfall of **Generation** required to meet the **Total Demand** for a protracted period.
Planning Code	That part of **Grid Code** which is identified as the **Planning Code**
Plant	Fixed and movable items used in the generation and/or supply and/or transmission of electricity other than **Apparatus**.
Post Control Phase	The days following the **Control Phase**
Post Event Notice	A notice issued by **ESBNG** in accordance with OC10
Power Factor	The ratio of **Active Power** to **Apparent Power**.
Power Quality	Target conditions for power quality and the variation in power quality that can be expected at **Grid Connection Points.**
Power Station	An installation consisting of **Generation Unit(s).**
Power System	The **Transmission System** and all **User System's** within the Republic of Ireland.

Power System Restoration	The restoration of the **Power System** or part of the **Power System** to a state of normal operation from a state of **Total Shutdown** or Partial **Shutdown** as the context requires.
Power System Restoration Plan	A plan, prepared and maintained by **ESBNG** pursuant to OC9 setting out guidelines assisting those involved in **Power System Restoration** to achieve **Power System Restoration** as safely and as quickly as possible.
Power System Stabiliser	Device that injects a supplementary signal into the **AVR** (**Automatic Voltage Regulator**) in order to improve **Power System** damping.
Pre-Incident Frequency	The value is the average **Transmission System Frequency** between 60 and 30 seconds prior to the occurrence of a significant **Frequency** disturbance.
Preliminary Project Planning Data	Data relating to a proposed **User Development** at the time the **User** applies for a **Connection** and **Use of System Agreement** and/or a supplemental **Agreement** but before an offer is made and accepted.
Primary Frequency Control	**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 Unit**s, condensate stop or frequency triggered response of pumped storage units; • automatic load shedding
Primary Fuel	The fuel or fuels registered in accordance with the **Grid Code** as the principal fuel(s) authorised for **Energy** production by the **Generation Unit**
Primary Operating Reserve (POR)	The additional increase in **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. If the actual **Frequency** nadir is before 5 seconds or after 15 seconds after the event, then for the purpose of POR monitoring the nadir is deemed to be the lowest **Frequency** which occurred between 5 and 15 seconds after

	the event.
Priority Customers	Customers **which are either:** • **exempt from load shedding under the rota load shedding scheme or** • **exempt from load shedding under the technical under-frequency load shedding scheme or** • prioritised for supply under the technical under-frequency load shedding scheme.
Programming Phase	The period between **Operational Planning Phase** and the **Control Phase**. It starts at the 1 week ahead stage and finishes with the issue of the **Generation Schedule** for the day ahead
Provisional Outage Programme	An **Outage** programme of the **Generator's Generation Units** prepared by **ESBNG** pursuant to OC2 and covering years 2-3 ahead.
Provisional Running Orders	A statement prepared and issued by **ESBNG** to the **Generator** pursuant to SDC1, which indicates for each **Generation Unit** owned or controlled by the **Generator**, the expected load pattern, the required fuel or fuels and **Synchronising** and **De-Synchronising** times for the following day.
Prudent Utility Practice	**Those standards, practices, methods and procedures conforming to safety and legal requirements which are attained by exercising that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected from skilled and experienced operatives engaged in the same type of undertaking under the same or similar circumstances.**
Pumped Storage Generator	A **Generator** which owns and/or operates any **Pumped Storage Plant.**
Pumped Storage Mode	A mode of operation of a **Pumped Storage Unit** including
Pumped Storage Plant	A **Generation Plant** that produces **Active Energy** using water from an upper reservoir and takes energy by pumping water up to the same reservoir.
Pumped Storage Unit	A **Generation Unit** within a **Pumped Storage Plant**.
Ramp-down Capability	The rate of decrease in a **Generation Unit' Output** after the **End Of Start-up Period. Ramp-down Capabilities** apply over the

	output range from its **Registered Capacity** to **Minimum generation**. The rate of change is not dependent upon the initial warmth of the plant but may depend on the **MW Output.**
Ramp-up Capability	The rate of increase in a **Generation Unit' Output** after the **End Of Start-up Period**. This rate of increase continues until the **Generation Unit** reaches the level of output instructed by the control room operator or its **Registered Capacity.** Following the **End Of Start-up Period**, the rate of increase is not dependent upon the initial warmth of the plant but may depend on the **MW Output.**
Reactive Power	Means the product of voltage and current and the sine of the phase angle between them measured in units of volt-amperes reactive and standard multiples thereof.
Red Alert	An **Alert** issued by **ESBNG** to the **User** in the circumstances set out in OC9
Re-declaration	Notification to **ESBNG** by the **Generator** at any time after the submission of a **Daily Nomination,** in respect of a **CDGU,** of any change to any of the values in its day-ahead **Nomination** or **Availability Declaration** or prediction that any such value will be subject to change before the end of the relevant **Trading Day**, (other than any of the prices submitted or other items that shall not be subject to revision)
Registered Capacity	The maximum **Active Power**, expressed in whole MW, modified for ambient limitations, that a **Generation Unit** can sustain less the **Auxiliary Load,** as declared by the **Generator** in accordance with the **Operating Characteristics.**
Registered Data	Those items of **Standard Planning Data** and **Detailed Planning Data** that upon connection become fixed (subject to any subsequent changes).
Registered Fuel	The fuel(s) registered under the **Planning Code** of the **Grid Code**
Registered Operating Characteristics	The values of a **Generation Unit's Operating Characteristics** for operation of the **Generation Unit** pursuant to the **Grid Code** registered under the **Connection Conditions**.
Remote Terminal Unit (RTU)	A device that collects, codes and transmits data. An **RTU** collects information from a master device and implements processes that are directed by that master. **RTUs** are equipped with input channels for sensing or metering, output channels for control,

	indication or alarms and a communications port.
Remote Transmission Assets	Any **Plant** and **Apparatus** or meters owned by the **Transmission Asset Owner** which: a) are **Embedded** in a **User System** and which are not directly connected by **Plant** and/or **Apparatus** owned by the **Transmission Asset Owner** to a sub-station owned by the **Transmission Asset Owner**; and b) are by agreement between the **Transmission Asset Owner** and such **User** operated under the direction and control of such **User**.
Replacement Reserve	**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**.
Responsible Manager	A manager who has been duly authorised by a **User** or **ESBNG** to deal with issues including matters related to the **Grid Code** on behalf of that **User** or **ESBNG**, as the case may be.
Responsible Operator	A person nominated by a **User** to be responsible for control of **Plant** and **Apparatus** related to the **User's System**
Rota Load Shedding Plan	A plan that provides for disconnection and reconnection of defined blocks of demand on instruction from **ESBNG**
Safety Rules	The rules of **ESB** or a **User** compliance with which ensures that persons working on **Plant** and/or **Apparatus** to which the rules apply are safeguarded from hazards arising from the **System**.
Schedule	A statement, prepared and issued by **ESBNG** under **SDC1**, of which **Centrally Dispatched Generation Units** and **Generation Trading Blocks** may be required to ensure (so far as possible): • the integrity of the **Transmission System**, • the security and quality of supply • sufficient generation to meet **System Demand** at all times • an appropriate margin of **Reserve**.
Schedule Day	The period from 0600 hours in the **Settlement Day** until 0600 hours in the next following **Settlement Day**.
Scheduled Operational Date	Has the meaning set out in the **Connection Agreement.**

Scheduled Outage	Any **Fixed Outage**, **Flexible Outage** or **Short Term Scheduled Outage**.
Scheduling	The process of compiling and issuing a **Generation Schedule**, as set out in **SDC1**.
Secondary Frequency Control	**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. These include: (a) a contribution from automatic governor action and other control systems on **Generation Units**; (b) manual action by **Generation Unit** operators altering the **MW Output** of **Generation Units** in response to **Dispatch Instructions** issued by **ESBNG** in accordance with SDC2.
Secondary Frequency Regulation Systems (SFRS)	A control system installed between the **NCC** and a **Power Station** whereby MW set points can be adjusted remotely by **ESBNG** to reflect the **Dispatch Instruction**
Secondary Operating Reserve (SOR)	The additional **MW Output** (and/or reduction in **Demand**) required compared to the pre-incident output (or **Demand**), which is fully available by 15 seconds from the time of the start of the **Frequency** fall and sustainable up to 90 seconds following an **Event.**
Settlement Day	The period from 0000 to 2400 hours in each day.
SFRS Control Range	The range of loads over which **SFRS** may be applied.
SFRS Maximum Load	The upper limit of the **SFRS Control Range.**
SFRS Minimum Load	The lower limit of the **SFRS Control Range.**
Short Notice Re-declaration	Notification to **ESBNG** by the **Generator** after the submission of a **Daily Nomination,** in respect of a **CDGU,** of any change to any of the values in its day-ahead **Nomination** or **Availability Declaration** or prediction that any such value will be subject to change, where such changes apply to values relating to **Trading Periods** occurring within 4 hours of the time of receipt by **ESBNG** of this notification.
Short-Term Maximisation Capability	The capability of a **Generation Unit** to deliver, for a limited duration of time, **MW Output** greater than its **Registered Capacity.**

Shut Down	The condition of a **Generation Unit** where the **Generator** is at rest or on barring
Significant System Incident (SSI)	**Events** which have had or might have had or might have an operational effect on the **Transmission System** or a **User's System**.
Simultaneous Tap Change	A tap change implemented on the generator step-up transformers of **CDGU**s, effected by **Generators** in response to a **Dispatch Instruction** from **ESBNG** issued simultaneously to the relevant **Power Station**s. The **Dispatch Instruction**, which is normally preceded by advance warning, must be effected within 1 minute of receipt from **ESBNG** of the **Dispatch Instruction**.
Site	An **ESBNG Site** or **User Site**, as the case may be.
Site Responsibility Schedule	Means the site responsibility schedule referred to in OC11
Slope of the Voltage Regulation System	The slope setting is the percentage change in **Transmission System Voltage** that would cause the **Reactive Power** output of the **Wind Farm Power Station** to vary from minimum to maximum output.
Small Scale Generators	(i) **Generators** with **Registered Capacity** of 2MW or less (on a single **Site**); and **Generators** with **Registered Capacity** less than 5MW (on a single **Site**) and greater than 2MW (on a site basis) where **ESBNG** consider that the **Generator** is in a location that does not make its operation particularly critical to the operation of the **Transmission System**.
Spin Generation	A mode of operation of a **Pumped Storage Unit** where it is spinning in air in the same direction as it would if it was generating **Active Power**
Spin Pump	A mode of operation of a **Pumped Storage Unit** which is intermediate between the **Unit** being at standstill and pumping.
Standard Planning Data	The general data required by **ESBNG** under the **PC**. It is generally also the data that **ESBNG** requires from a new **User** in applications for **Connection** and **Use of System Agreements.**
Start-up	The action of bringing a **Generation Unit** from **Shutdown** to **Synchronous Speed**.
Station Board	A switchboard through which electrical power is supplied to the **Auxiliaries** of a **Power Station**, and which is supplied by a

	Station Transformer. It may be interconnected with a **Unit Board.**
Station Transformer	A transformer supplying electrical power to the **Auxiliaries** of a **Power Station**, which is not directly connected to the **Generating Unit** terminals.
Steam Unit	A **Generation Unit** whose prime mover converts the heat-energy in steam to mechanical energy.
Step Change	A step change is defined as a single, rapid change of the RMS voltage. **Transmission System** step changes can occur due to switching in and out of capacitors, lines, cables, transformers and other plant.
Supplier	The holder of a **Supply Licence**.
Supply	The process of delivering electrical energy by a **Supplier**; also, the amount of electric energy delivered, usually expressed in megawatthours (MWh).
Synchronise	The condition where an incoming **Generation Unit** or system is connected to another **System** so that the frequencies and phase relationships of that **Generation Unit** or **System**, as the case may be, and the **System** to which it is connected are identical and the terms "**Synchronise**", "**Synchronising**" and "**Synchronisation**" shall be construed accordingly.
System	Any **User System** and/or the **Transmission System** as the case may be.
System Capacity Shortfall Warning	A warning issued by **ESBNG** if, the **Availability** forecast and **Demand** forecast indicate that there will be a deficit in any week,
System Demand	The sum of all the MW demand values at the **Bulk Supply Points**.
System Emergency Condition	A **Partial Shutdown** or **Total Shutdown** or any other physical or operational condition and/or occurrence on the **Power System** which, in **ESBNG**'s opinion, is (i) imminently likely to endanger or is endangering life or property; or (ii) is imminently likely to impair or is impairing: (a) **ESBNG**'s ability to discharge any statutory, regulatory or other legal obligation and/or

	(b) the safety and/or reliability of the **Power System**.
System Planning	The process by which the performance of the **System** is evaluated and future changes and additions to the **System** are determined.
System Planning Data	Data that must be submitted at regular periods by all **Users,** or other such data or information as requested by **ESBNG** under **PC.6**
System Services	Services which are required for **System** reasons and which include those which must be provided by **Users** in accordance with the **Connection Conditions** and those which must be provided by a **User** if the **User** has agreed to provide them under supplemental agreements
System Support Agreement	A bilateral agreement between **ESBNG** and a **User** for services which are required for **System** reasons and which exclude those which must be provided by **Users** in accordance with the **Connection Conditions.**
System Test	**Tests** which involve simulating conditions, or the controlled application of irregular, unusual or extreme conditions, on the **System**, or any part of the **System**, but which do not include **Commissioning** or recommissioning tests or any other tests of a minor nature.
Target Frequency	That **Frequency** determined by **ESBNG**, in its reasonable opinion, as the desired operating **Frequency** of the **Total System**. This will normally be 50.00Hz plus or minus 0.05Hz, except in exceptional circumstances as determined by **ESBNG**, in its reasonable opinion when this may be 49.90 or 50.10Hz.
Tertiary Operating Reserve	**Tertiary Operating Reserve band 1** and **Tertiary Operating Reserve band 2**
Tertiary Operating Reserve band 1	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.
Tertiary Operating Reserve band 2	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.

Test Proposer	The **User** submitting proposal for a test under OC8.
Testing	Testing carried out by **ESBNG** under **Connection Conditions** and **Test** shall be construed accordingly.
Thermal Overload	A **Thermal Overload** occurs when the designed thermal rating of a transmission line or cable is exceeded. The thermal rating of a transmission line is dictated by its physical construction and varies with the ambient weather conditions, while the thermal rating of a transmission cable is dependent solely on its physical construction.
Total Shutdown	The situation existing when all generation has ceased and there is no electricity supply from **External Interconnection**.
Total Transfer Capacity	The total amount of power that can be exchanged continuously to or from the **Transmission System** over the **Interconnector** while ensuring the safe operation of the **Transmission System**. It is set based on physical and electrical realities according to system security requirements including thermal limits (including single contingencies), voltage limits and stability limits.
Trading and Settlement Code	The code that sets out the rules for wholesale trading and market settlement and the responsibilities of parties to the code.
Trading Day	The period from 0600 hours in the **Settlement Day** on which the physical trade of electrical energy occurs until 0600 hours in the next following **Settlement Day**.
Trading Period	A thirty minute period beginning on the hour or the half-hour. The first **Trading Period** of forty-eight for the **Trading Day** commences at 0600.
Transmission Asset Owner	The owner of the transmission assets
Transmission Planning Criteria	**System Planning** practices and considerations that **ESBNG** follow.
Transmission Reliability Margin	A transmission transfer capacity margin which accounts for the security margin for regulation, reserve sharing, and **Rescue Flows** between **ESBNG** and **NIE** and may also take into account uncertainties of system conditions and other assumptions made to produce **Total Transfer Capacity** ex-ante.
Transmission Station	A node in the electricity **Transmission System** with transmission circuit/s, transformer/s, circuit breakers and their associated

	protection and communications systems.
Transmission System	The system consisting (wholly or mainly) of high **Voltage** electric lines and cables operated by **ESBNG** for the purposes of transmission of electricity from one **Power Station** to a sub-station or to another **Power Station** or between sub-stations or to or from any **External Interconnection** including any **Plant** and **Apparatus** and meters owned or operated by **ESBNG** in connection with the transmission of electricity.
Transmission System Operator (TSO)	The holder of the licence granted pursuant to Section 14 of the **Act** to operate the **Transmission System**.
Unit Board	A switchboard through which electrical power is supplied to the **Auxiliaries** of a **Generating Unit** and which is supplied by a **Unit Transformer.** It may be interconnected with a **Station Board**.
Unit Transformer	A transformer directly connected to a **Generating Unit's** terminals, and which supplies power to the **Auxiliaries** of a **Generating Unit**.
Use of System Agreement	An agreement between **ESBNG** and a **User** setting out the terms relating to the use of the **Transmission System.**
Use of System Tariffs	Tariffs set by **ESBNG** subject to approval by the **Commission** for use of the **Transmission System.**
User	A term utilised in various sections of the **Grid Code** to refer to the persons using the **Transmission System**, as more particularly identified in each section of the **Grid Code** concerned. The term means any person (other than **ESBNG**) to whom the **Grid Code** applies.
User Development	In the **Planning Code** means either **User's Plant** and/or **Apparatus** to be connected to the **Transmission System**, or a **Modification** relating to a **User's Plant** and/or **Apparatus** already connected to the **Transmission System**, or a proposed new connection or **Modification** to the connection within the **User System**.
User Site	A site owned (or occupied pursuant to a lease, licence or other agreement) by a **User** in which there is a **Connection Point**.
User System	Any system owned or operated by a **User** comprising:- (i) **Generating Units;**

	and/or (ii) systems consisting (wholly or mainly) of electric circuits used for the distribution of electricity from **Grid Supply Points** or **Generating Units** or other entry points to the point of delivery to **Customers**, or other **Users**; and **Plant** and/or **Apparatus** connecting:- (i) the system as described above; or (ii) **Grid Connected Customers** equipment; to the **Transmission System** or to the relevant other **User System**, as the case may be. The **User System** includes any **Remote Transmission Assets** operated by such **User** or other person and any **Plant** and/or **Apparatus** and meters owned or operated by the **User** or other person in connection with the distribution of electricity but does not include any part of the **Transmission System**.
User System Entry Point	A point at which a **Generation Unit**, a **CCGT Module** or a **CCGT Unit**, as the case may be, which is **Embedded** connects to the **User System**.
Voltage	Voltage of relevant section of **Transmission System -** nominally 400kV, 220kV or 110kV
Voltage Control	The retention of the **Voltage** on the **System** within acceptable limits.
Voltage Mvar Optimisation Programme	Programme by which **Dispatch** is done to ensure sufficient reserve of **Reactive Power** and maintain voltages within specified criteria.
Voltage Regulation	The automatic adjustment of **Reactive Power** output from a **Generation Unit(s)** in response to **Voltage** changes in response to **Voltage** changes (e.g. from a **Generation Unit**).
Voltage Regulation System	A facility providing the means to automatically adjust the **Reactive Power** output (e.g from a **Generation Unit)(s)** in response to changes in **Voltage**.
Wind Farm Power Station	A site containing at least one WTG.
Wind Farm Power Station	The amount of MW the Wind Farm Power Station can produce

Availability	given favourable wind conditions.
Wind Farm Power Station MW Availability Declaration	A measure of the maximum Active Power output which can be produced by a Wind Farm Power Station given favourable wind conditions. Account shall be taken of partial and/or full outages of individual WTG within the Wind Farm Power Station.
Wind Farm Power Station Operator	The operator of the Wind Farm Power Station.
Wind Turbine Generator(s) (WTG)	A Generation Unit(s) generating electricity from wind.