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Bringing choice and
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10 March 2006

Dear Ben

REVIEW OF THE GRID CODE : DECISION AND DIRECTION IN RELATION TO CONSULTATION D/05 - GRID CODE CHANGES ASSOCIATED WITH LICENCE EXEMPT EMBEDDED MEDIUM POWER STATIONS

The Gas and Electricity Markets Authority (the "Authority")¹ has considered the changes that NGET² has proposed to its Grid Code as set out in the report to the Authority arising from consultation D/05 (Grid Code Changes Associated with Licence Exempt Embedded Medium Power Stations)³ that has been submitted to it for approval.

The Authority has decided to approve the proposed changes to the Licensee's Grid Code (the "Grid Code") as set out in the Appendix A of the report to the Authority arising out of Consultation D/05. In conjunction the Authority has decided to direct the amendments to the Grid Code⁴ as set out in Appendix 1 of this letter.

This document explains the background to the proposals and sets out the Authority's reasons for its decision to approve these changes to the Grid Code and direct the amendments set out in Appendix 1. This letter constitutes notice by the Authority under Section 49A of the Electricity Act 1989 in relation to these decisions.

¹ Ofgem is the office of the Authority. The terms "Ofgem" and "the Authority" are used interchangeably in this letter.

² National Grid Electricity Transmission plc

³ Report from NGET - Consultation Reference D/05, Issue 1, Date of Issue 3 February 2006
http://www.nationalgrid.com/NR/rdonlyres/CAF72A76-44AE-4EA5-A725-5F6FF3F05324/6079/Authrep_D05v11.pdf

⁴ As permitted in C14.4

Background to the proposed changes to NGET's Grid Code

DTI is responsible for the licence exemption arrangements. DTI has recently decided to grant specific generation licence exemption orders to a number of generators in respect of generating stations sized between 50 and 100MW that are connected to distribution systems. These licence exemption decisions have required a contractual agreement between the generator and NGET to ensure that there is a mechanism in place to require compliance with relevant Grid Code obligations.

In May 2003 a joint Grid Code Review Panel ("GCRP") and Distribution Code Review Panel ("DCRP") working group (the "Working Group") was established to consider how changes to the generation licence exemption arrangements could be best reflected in the Grid and Distribution Codes. The main objective of this Working Group was to consider how existing Grid Code technical obligations in respect of Medium Power Stations could be applied transparently to licence exempt generators without requiring an enduring contractual agreement between the generator and NGET. The scope of the Working Group was limited to identifying a suitable mechanism for applying existing Grid Code obligations. The Working Group did not consider the merits of the existing Grid Code obligations relevant to Licence Exempt Embedded Medium Power Stations ("LEEMPS").

The Working Group considered a number of options and proposed that the Grid Code should be amended to place existing Grid Code technical obligations in respect of LEEMPS on the Network Operator to whose system the Medium Power Station is connected. The working group considered that the Network Operator could oblige the Generator to comply with the relevant Grid Code technical obligations via the Distribution Code. Complementary changes to the Distribution Code have been proposed by the chair of the DCRP (on behalf of the 14 ex-PES⁵ distribution licensees).

NGET noted that there may also be a need for consequential changes to other industry codes. NGET advised that where required, changes to other industry codes will be progressed in accordance with the appropriate governance arrangements. NGET has identified a direct dependency between these proposed Grid Code changes and the complementary changes proposed to the Distribution Code. NGET has not identified further direct dependencies between these proposed Grid Code changes and possible changes to other industry codes.

NGET has proposed changes to the Planning Code, Connection Conditions ("CC"), Operating Codes ("OC") 1, 2, 5 and 12, Glossary and Definitions, Data Registration Code and the General Conditions. NGET explained that the proposed changes are intended to:

- Place existing obligations relevant to LEEMPS onto the relevant Network Operator when the Generator is not otherwise required to have a direct relationship with NGET.
- Include additional clauses within the Grid Code which summarise the Grid Code obligations that are relevant to LEEMPS.
- Clarify that LEEMPS are not required to provide frequency response services (but may choose to do so) but are required to have the capability to provide frequency response services.
- Clarify within OC5 that the performance of a LEEMPS would be validated other than at a Balancing Mechanism Unit level.
- Clarify within OC5 the relationship between Network Operator, NGET and the Generator should there be a need for compliance testing of a LEEMPS.

⁵ Public Electricity Suppliers

- Extend the temporary exemption under General Conditions 15 to allow suspension of specified Grid Code obligations until 31 March 2007 for LEEMPS in England and Wales as well as Scotland.

NGET received six responses to Consultation D/05 from authorised electricity operators. Of these responses to NGET's consultations:

- Three respondents supported the proposed approach to pass relevant Grid Code technical obligations through to LEEMPS via the relevant Network Operator. However, two of these respondents expressed reservations about parts of the detailed Grid Code change proposals.
- Three respondents restricted comments to particular aspects of the detailed Grid Code change proposals and did not indicate whether they supported the overall objective of the proposed changes.

Ofgem notes that respondents made the following points about the proposed Grid Code changes: -

- Would result in a significant extension to the scope of the Grid Code in the SP Distribution ("SPD") area which would require new procedures to be established.
- Define the Network Operator's obligations in terms of the existence of a contract to which the Network Operator would not be a party to.
- Contain different obligations to those specified in existing Licence Exempt Generation Agreements ("LEGA") between Generators and NGET in respect of existing LEEMPS.
- Specify a different trigger point for compliance testing of a LEEMPS compared to a generator with a direct contractual relationship with NGET.
- Do not address general issues associated with the requirements of OC5. The respondent was particularly concerned about the obligations with respect to testing of frequency response capability of a LEEMPS without a corresponding obligation for that generator to provide frequency response services.
- Lack clarity about the treatment of constraints on the generating unit's reactive power capability arising as a consequence of distribution network restrictions.
- Lack of defined compensation arrangements so that payment can be made to the Generator if NGET requires compliance testing at a LEEMPS.

NGET has advised that it has identified a number of possible issues that may arise from the implementation of these proposed Grid Code changes. NGET stated that implementation of the proposed Grid Code changes may not completely remove the need for derogation for all existing LEEMPS in England and Wales. NGET stated that it expects to be able to identify and make any derogation requests that are required in respect of the existing LEEMPS by 31 March 2007.

NGET advised that implementation of the Grid Code change proposals in Scotland will be more involved. NGET noted that SPD has advised of 19 LEEMPS connected to its distribution system. NGET further noted that the definition of Medium Power Station is a generator sized between 5 and 30MW in the SP Transmission area. LEEMPS connected to the SPD distribution system have not been required to apply for specific licence exemption from DTI or to enter into a LEGA with NGET). If this change proposal is approved, NGET, SPD and the relevant generators will need to work together to identify compliance issues and as necessary request derogations. NGET stated that it anticipates that this could be achieved by 31 March 2007.

NGET noted that another GCRP working group has been reviewing the regional differences within the Grid Code relating to the definitions of Small, Medium and

Large Power Stations. This proposal has been submitted for consideration at a GCRP meeting and is expected to be progressed to consultation in March 2006. NGET observed that part of the Regional Differences change proposal is the removal of the Medium Power Station category in Scotland. NGET considers that the Regional Differences Grid Code change proposal could have a significant interaction with the LEEMPS proposed changes.

NGET suggested in its report that the Authority may wish to defer its consideration of the LEEMPS proposed Grid Code changes until receipt of the Regional Differences Grid Code change proposal to avoid inefficiencies that may arise should the LEEMPS Grid Code provisions only apply for a short time in the SPD distribution area.

NGET noted in its report to the Authority that it had amended the drafting of the proposed Grid Code changes from the text included as part of consultation D/05 to take account of the comments received from respondents wherever possible. NGET advised that it had not been able to resolve all of the objections raised.

NGET's recommendation

In its report⁶ to the Authority on Consultation D/05 NGET set out the drafting for proposed changes to the Grid Code. It recommended that the Authority approved the proposed changes.

Ofgem's view

Approval of these changes by the Authority is required by standard condition C14(3). Having considered NGET's report on the proposed changes, Ofgem considers that, having had regard to the licensee's obligations⁷ set out in condition C14(1)(b) of the Transmission Licence ("the obligations") and Ofgem's wider statutory duties⁸, that the proposed changes to the Grid Code should be approved by the Authority. Ofgem's reasons for reaching this decision are outlined below.

Ofgem acknowledges the view expressed by two respondents that the proposed Grid Code changes would place obligations on generators who are not currently required to comply with the Grid Code. Ofgem considers that the relaxation that GC.15 provides was not intended to apply on an enduring basis. Ofgem further notes that this provision was introduced during the transition to the British Electricity Trading and Transmission Arrangements ("BETTA") as a temporary measure to allow Users to concentrate on matters that were most critical for BETTA Go-Live. Ofgem understands that pre-BETTA, embedded generators within Scotland were obliged as part of the relevant distribution connection agreement to comply with the Scottish Grid Code which contained similar obligations to those within the Grid Code.

⁶ As required by C14.2.a

⁷ The licensee's transmission licence defines the Grid Code objectives as follows:

- (i) to permit the development, maintenance and operation of an efficient, co-ordinated and economical system for the transmission of electricity;
- (ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the GB transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity); and
- (iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in Great Britain taken as a whole.

⁸ Ofgem's statutory duties are wider than the matters that the NGET has to take into consideration and include amongst other things a duty to have regard to social and environmental guidance provided by Ofgem to the government.

Ofgem accepts that there are particular issues within the SPD distribution area associated with a high volume of Embedded Medium Power Station connections. Ofgem notes the view presented by the distribution licensee that a considerable volume of work will be required in assessing compliance should these Grid Code changes be implemented. Ofgem observes that under the existing arrangements it would expect that NGET and the relevant generators are carrying out compliance assessment work in preparation for the expiry of the period of relaxation allowed under GC.15 on 31 March 2007. Ofgem is concerned by the comments raised by one respondent that this work is not yet being progressed.

Ofgem would welcome early discussion with licensees about any compliance issues that may lead to derogation requests. Ofgem acknowledges that NGET has committed to work with Network Operators and Generators in assessing compliance of existing LEEMPS. Ofgem also notes NGET's view that the necessary assessment works can be completed and any derogation requests progressed before 31 March 2007. In light of the concerns expressed by the respondent about the scope of the assessment works that are still required, NGET should provide Ofgem with regular progress updates to demonstrate that the required works are being carried out in a timely manner. In particular Ofgem requires NGET to have submitted indicative derogation requests in respect of identified LEEMPS compliance issues by 30 September 2006.

Ofgem notes the concern raised about the definition of Network Operator obligations in terms of the absence of a contractual agreement to which the Network Operator would not be a party. Ofgem also notes the NGET explanation that the CUSC requires a CUSC Party to enter into a bilateral agreement with NGET in respect of Embedded Medium Power Stations. Ofgem is satisfied that there is sufficient clarity in the method used for defining the Network Operator obligations in the proposed Grid Code changes.

Ofgem notes that the obligations within existing LEGAs do not necessarily reflect the full scope of the Grid Code obligations which are now relevant to LEEMPS. Ofgem acknowledges that implementation of these proposed Grid Code changes may require NGET and distribution licensees to make derogation requests in respect of existing LEEMPS.

Ofgem recognises that the proposed Grid Code changes would remove the requirement for a direct contractual agreement between the Generator and NGET in respect of LEEMPS. Ofgem notes that this approach is different from the CUSC requirement in respect of Embedded Exemptable Large Power Stations ("EELPS") to enter into a contractual agreement with NGET. Ofgem does not consider that the arrangements in respect of LEEMPS and EELPS would necessarily be the same. Ofgem also notes that the requirements in respect of EELPS are within the CUSC framework and could be the subject of future CUSC amendment proposals.

Ofgem notes the observation made by one respondent about the specification of a different trigger point in respect of obligations relating to a LEEMPS compared to an Embedded Medium Power Station with a bilateral agreement. Ofgem also notes NGET's explanation that CUSC provisions also apply in respect of Generators with a bilateral agreement. Ofgem understands that the proposed drafting of the Grid Code changes was intended to set out obligations in respect of LEEMPS in an appropriate context.

Ofgem notes the concern raised about general OC5 issues including the specific points made about the need for obligations relating to testing of frequency response capability of a LEEMPS. Ofgem also notes the view presented by NGET

that the requirement for Generators to have frequency response capability is defined in the CC and that OC5 sets out the requirements to demonstrate compliance with the CC. Ofgem further notes that NGET does not agree that there are general issues with OC5. Ofgem understands that the scope of this Grid Code review was not intended to consider the appropriateness of existing Grid Code obligations. Ofgem notes that NGET is required by its licence to periodically review both the Grid Code and the implementation of that Grid Code. Ofgem further notes that the licence does not specify the nature or extent of the review work that should be carried out. Ofgem also notes that the governance arrangements for the Grid Code allow users to submit suggested amendments to the Grid Code to NGET for the GCRP's consideration.

Ofgem acknowledges that in some circumstances the distribution system connection may restrict the embedded generator's ability to meet the reactive power range capability specified in the CC. However, Ofgem considers that this issue was not within the scope of the Working Group's review. Ofgem understands that this issue will be considered as part of further Grid Code review work that is planned to be taken forward in the near future.

Ofgem notes the concern expressed by one respondent about the lack of defined arrangements for paying compensation to the Generator if NGET requires compliance testing. Ofgem understands that NGET expects that compliance by a LEEMPS will in most cases be demonstrated by documentary evidence and that it is not anticipated that testing of LEEMPS would be routinely required. Ofgem acknowledges the NGET view that specific payment provisions should be agreed between relevant parties should testing be required and that general provisions could be developed if the requirement for testing is more onerous than currently anticipated.

Ofgem notes that similar Grid Code changes are also proposed in relation to Embedded DC Converter Stations that are not required to have a bilateral agreement with NGET. Ofgem observes that arrangements relating to Embedded Medium Power Stations were the main focus of consultation D/05 and the associated report to the Authority. However, Ofgem notes changes relating to Embedded DC Converter Stations were marked within the proposed Grid Code text within consultation D/05.

Ofgem agrees that there appears to be potential for significant interaction between these proposed Grid Code changes and the change proposals that have been developed by another GCRP working group. Whilst it is usual practice for the Authority to seek to align implementation dates of Grid Code changes when possible, in this case the Authority considers that it is not appropriate to delay the implementation date until reaching a decision on Grid Code changes that have not yet been the subject of consultation.

Ofgem has reviewed the proposed Grid Code drafting and identified a number of drafting issues which it asked NGET to address. These issues related to:-

- Consistency in references to Embedded Medium Power Stations and Embedded DC Converter Stations.
- Typographical and change marking errors.
- Clarity in the wording of obligations on Network Operators with respect to Embedded Medium Power Stations and Embedded DC Converter Stations not required to have a bilateral agreement.

NGET has subsequently set out further proposed changes and these are included in Appendix 1 to this letter. Appendix 1 shows all of the proposed Grid Code changes shown against the current version of the Grid Code and these subsequent changes are highlighted in yellow. NGET has also taken account of

Grid Code changes which have been implemented since consultation D/05. Ofgem considers that these further changes are needed to provide additional clarity. Ofgem does not consider that these further changes affect the scope of the changes in NGET's consultation D/05.

Ofgem understands that the proposed Grid Code changes will remove the need for a contractual relationship between Generators and NGET in respect of LEEMPS. Ofgem considers that the removal of this burden on generators who have met the criteria for licence exemption will facilitate competition in the generation of electricity. Ofgem further considers that the proposal to ensure that LEEMPS comply with existing relevant technical obligations will promote the security of the electricity system as a whole and enhance the efficiency of transmission system operation.

The Authority's decision

Based on the reasons set out above the Authority has therefore decided to approve the Grid Code changes set out in Appendix A of the report submitted to the Authority arising from consultation D/05 (Grid Code Changes Associated with Licence Exempt Embedded Medium Power Stations). In conjunction it has decided to direct the amendments set out in Appendix 1 that reflect the drafting issues identified during Ofgem's review of NGET's report to the Authority.

The implementation date for these Grid Code changes is 1 April 2006.

Please do not hesitate to contact me on the above number if you have any queries in relation to the issues raised in this letter or alternatively contact Bridget Morgan on 020 7901 7080.

Yours sincerely

A handwritten signature in black ink that reads "John Scott". The signature is written in a cursive style with a horizontal line underneath the name.

John Scott
Technical Director

Signed on behalf of the Authority and authorised for that purpose by the Authority

cc: Lilian MacLeod, GCRP Secretary

Appendix 1 – Amendment to Changes Proposed in the Report to the Authority Arising from Consultation D/05 (Grid Code Changes Associated with Licence Exempt Embedded Medium Power Stations)

GLOSSARY AND DEFINITIONS REVISIONS

Embedded Development Agreement	An agreement entered into between a Network Operator and an Embedded Person , identifying the relevant site of connection to the Network Operator's System and setting out other site specific details in relation to that use of the Network Operator's System .
Embedded Person	The party responsible for a Medium Power Station not subject to a Bilateral Agreement or DC Converter Station not subject to a Bilateral Agreement connected to or proposed to be connected to a Network Operator's System not subject to a Bilateral Agreement .
Embedded Development	Has the meaning set out in PC.4.4.3(a)
Completion Date	Has the meaning set out in the Bilateral Agreement with each User to that term or in the absence of that term to such other term reflecting the date when a User is expected to connect to or start using the GB Transmission System . <u>In the case of an Embedded Medium Power Station or Embedded DC Converter Station having a similar meaning in relation to the Network Operator's System as set out in the Embedded Development Agreement.</u>

PLANNING CODE REVISIONS

- PC.3.2 In the case of **Embedded Power Stations** and **Embedded DC Converter Stations**, unless provided otherwise, the following provisions apply with regard to the provision of data under this PC:
- (a) each **Generator** shall provide the data direct to **NGGNGET** in respect of (i) **Embedded Large Power Stations**, (ii) **Embedded Medium Power Stations subject to a Bilateral Agreement** and (iii) **Embedded Small Power Stations** which form part of a **Cascade Hydro Scheme**;
 - (b) each **DC Converter** owner shall provide the data directly to **NGGNGET** in respect of **Embedded DC**

Converter Stations subject to a Bilateral Agreement;

(c) each Network Operator shall provide the data to NGGNET in respect of each Embedded Medium Power Station not subject to a Bilateral Agreement or Embedded DC Converter Station not subject to a Bilateral Agreement connected, or proposed to be connected within such Network Operator's System;

(de) although data is not normally required specifically on **Embedded Small Power Stations** or on **Embedded** installations of direct current converters which do not form a **DC Converter Station** under this **PC**, each **Network Operator** in whose **System** they are **Embedded** should provide the data (contained in the Appendix) to **NGGNET** in respect of **Embedded Small Power Stations** or **Embedded** installations of direct current converters which do not form a **DC Converter Station** if:

(i) it falls to be supplied pursuant to the application for a **CUSC Contract** or in the **Statement of Readiness** to be supplied in connection with a **Bilateral Agreement** and/or **Construction Agreement**, by the **Network Operator**; or

(ii) it is specifically requested by **NGGNET** in the circumstances provided for under this **PC**.

PC3.3

Certain data does not normally need to be provided in respect of certain **Embedded Power Stations** or **Embedded DC Converter Stations**, as provided in PC.A.1.12.

In summary, Network Operators are required to supply the following data in respect of **Embedded Medium Power Stations not subject to a Bilateral Agreement** or **Embedded DC Converter Stations not subject to a Bilateral Agreement** connected, or is proposed to be connected, within such **Network Operator's System**:

PC.A.2.5.6

PC.A.3.1.5

PC.A.3.2.2

PC.A.3.3.1

PC.A.3.4.1

PC.A.3.4.2

PC.A.5.2.2

PC.A.5.3.2

PC.A.5.4.

PC.A.5.5.1

PC.A.5.6.

.....

PC.4.1

Pursuant to Condition C11 of **NGGNET's** **Transmission Licence**, the means by which **Users** and proposed **Users** of the **GB Transmission System** are able to assess opportunities for connecting to, and using, the **GB Transmission System** comprise two distinct parts, namely:

- (a) a statement, prepared by **NGGNET** under its **Transmission Licence**, showing for each of the seven succeeding **Financial Years**, the opportunities available for connecting to and using the **GB Transmission System** and indicating those parts of the **GB Transmission System** most suited to new connections and transport of further quantities of electricity (the "**Seven Year Statement**"); and
- (b) an offer, in accordance with its **Transmission Licence**, by **NGGNET** to enter into a **CUSC Contract** ~~for connection to (or, in the case of **Embedded Large Power Stations**, **Embedded Medium Power Stations**, and **Embedded DC Converter Stations** and **Embedded Small Power Stations**, use of) the **GB Transmission System**~~. A **Bilateral Agreement** is to be entered into for every **Connection Site** (and for certain **Embedded Power Stations** and for **Embedded DC Converter Stations**, ~~as explained above~~) within the first two of the following categories and the existing **Bilateral Agreement** may be required to be varied in the case of the third category:
 - (i) existing **Connection Sites** (and for certain **Embedded Power Stations**, ~~as detailed above~~) as at the **Transfer Date**;
 - (ii) new **Connection Sites** (and for certain **Embedded Power Stations** and for **Embedded DC Converter Stations**, ~~as detailed above~~) with effect from the **Transfer Date**;
 - (iii) a **Modification** at a **Connection Site** (or in relation to the connection of certain **Embedded Power Stations** and for **Embedded DC Converter Stations**, ~~as detailed above whether or not the subject of a **Bilateral Agreement**~~) (whether such **Connection Site** or connection exists on the **Transfer Date** or ~~is~~ is new thereafter) with effect from the **Transfer Date**.

In this **PC**, unless the context otherwise requires, "connection" means any of these 3 categories.

PC.4.3.1

Seven Year Statement

To enable the **Seven Year Statement** to be prepared, each **User** is required to submit to **NGGNET** (subject to the provisions relating to **Embedded Power Stations** and

Embedded DC Converter Stations in PC.3.2) both the **Standard Planning Data** and the **Detailed Planning Data** as listed in parts 1 and 2 of the Appendix. This data should be submitted in calendar week 24 of each year (although **Network Operators** may delay the submission of data (other than that to be submitted pursuant to PC.3.2(c) and PC.3.2(d)) until calendar week 28) and should cover each of the seven succeeding **Financial Years** (and in certain instances, the current year). Where, from the date of one submission to another, there is no change in the data (or in some of the data) to be submitted, instead of re-submitting the data, a **User** may submit a written statement that there has been no change from the data (or in some of the data) submitted the previous time. In addition, **NGENGET** will also use the **Transmission Entry Capacity** and **Connection Entry Capacity** data from the **CUSC Contract**, and any data submitted by **Network Operators** in relation to an **Embedded Medium Power Station not subject to a Bilateral Agreement** or **Embedded DC Converter Station not subject to a Bilateral Agreement**, in the preparation of the **Seven Year Statement** and to that extent the data will not be treated as confidential.

PC.4.4 Offer of Terms for connection

PC.4.4.1 **CUSC Contract – Data Requirements/Offer Timing**

The completed application form for a **CUSC Contract** to be submitted by a **User** when making an application for a **CUSC Contract** will include:

- (a) a description of the **Plant** and/or **Apparatus** to be connected to the **GB Transmission System** or of the **Modification** relating to the **User's Plant** and/or **Apparatus** already connected to the **GB Transmission System** or, as the case may be, of the proposed new connection or **Modification** to the connection within the **User System** of the **User**, each of which shall be termed a "**User Development**" in the **PC**;
- (b) the relevant **Standard Planning Data** as listed in Part 1 of the Appendix; and
- (c) the desired **Completion Date** of the proposed **User Development**.
- (d) the desired **Connection Entry Capacity** and **Transmission Entry Capacity**.

The completed application form for a **CUSC Contract** will be sent to **NGENGET** as more particularly provided in the application form.

PC.4.4.2 Any offer of a **CUSC Contract** will provide that it must be accepted by the applicant **User** within the period stated in the offer, after which the offer automatically lapses. Acceptance of the offer renders the **GB Transmission System** works relating to that **User Development**, reflected in the offer, committed and binds both parties to the terms of the offer. Within 28 days

(or such longer period as **NGGNET** may agree in any particular case) of acceptance of the offer the **User** shall supply the **Detailed Planning Data** pertaining to the **User Development** as listed in Part 2 of the Appendix.

PC.4.4.3 Embedded Development Agreement – Data Requirements
The **Network Operator** shall submit the following data in relation to an **Embedded Medium Power Station not subject to, or proposed to be subject to, a Bilateral Agreement or Embedded DC Converter Station not subject to, or proposed to be subject to, a Bilateral Agreement** as soon as reasonably practicable after receipt of an application from an **Embedded Person to connect to its System**:

- (a) details of the proposed new connection or variation (having a similar effect on the **Network Operator’s System** as a **Modification** would have on the **GB Transmission System**) to the connection within the **Network Operator’s System**, each of which shall be termed an “**Embedded Development**” in the **PC** (where a **User Development** has an impact on the **Network Operator’s System** details shall be supplied in accordance with PC.4.4 and PC.4.5);
- (b) the relevant **Standard Planning Data** as listed in Part 1 of the Appendix;
- (c) the proposed completion date (having a similar meaning in relation to the **Network Operator’s System** as **Completion Date** would have in relation to the **GB Transmission System**) of the **Embedded Development**; and
- (d) upon the request of **NGGNET**, the relevant **Detailed Planning Data** as listed in Part 2 of the Appendix.

PC.4.4.4 Within 28 days (or such longer period as **NGGNET** may agree in any particular case) of entry into the **Embedded Development Agreement** the **Network Operator** shall supply the **Detailed Planning Data** pertaining to the **Embedded Development** as listed in Part 2 of the Appendix.

PC.4.5.3 To enable **NGGNET** to carry out any necessary detailed system studies, the relevant **Network Operator** may, at the request of **NGGNET**, be required to provide some or all of the **Detailed Planning Data** listed in Part 2 of the Appendix in advance of the normal timescale referred in PC.4.4.4 provided that **NGGNET** can reasonably demonstrate that it is relevant and necessary.

PC.5.2 At the time the **User** applies for a **CUSC Contract** but before an offer is made and accepted by the applicant **User**, the data relating to the proposed **User Development** will be considered

as **Preliminary Project Planning Data**. Data relating to an Embedded Development provided by a Network Operator in accordance with PC.4.4.3, and PC.4.4.4 if requested, will be considered as Preliminary Project Planning Data. All such data ~~This data~~ will be treated as confidential within the scope of the provisions relating to confidentiality in the **CUSC**.

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PC.5.4 Once the offer for a **CUSC Contract** is accepted, the data relating to the **User Development** already submitted as **Preliminary Project Planning Data**, and subsequent data required by **NGENGET** under this **PC**, will become **Committed Project Planning Data**. Once an Embedded Person has entered into an Embedded Development Agreement, as notified to NGENGET by the Network Operator, the data relating to the Embedded Development already submitted as Preliminary Project Planning Data, and subsequent data required by NGENGET under the PC, will become Committed Project Planning Data. ~~Such This~~ data, together with **Connection Entry Capacity** and **Transmission Entry Capacity** data from the **CUSC Contract** and other data held by **NGENGET** relating to the **GB Transmission System** will form the background against which new applications by any **User** will be considered and against which planning of the **GB Transmission System** will be undertaken. Accordingly, **Committed Project Planning Data, Connection Entry Capacity** and **Transmission Entry Capacity** data will not be treated as confidential to the extent that **NGENGET**:

.....

PC.5.5 The **PC** requires that, at the time that a **Statement of Readiness** is submitted under the **Bilateral Agreement** and/or **Construction Agreement**, any estimated values assumed for planning purposes are confirmed or, where practical, replaced by validated actual values and by updated estimates for the future and by updated forecasts for forecast data items such as **Demand**. In the case of an Embedded Development the relevant Network Operator will update any estimated values assumed for planning purposes with validated actual values as soon as soon as reasonably practicable after energisation. This data is then termed **Connected Planning Data**.

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- PC.A.1.2 (a) Planning data submissions by **Users** shall be:
- (i) with respect to each of the seven succeeding **Financial Years** (other than in the case of **Registered Data** which will reflect the current

position and data relating to **Demand** forecasts which relates also to the current year);

(ii) provided by **Users** in connection with a **CUSC Contract** (PC.4.1, PC.4.4 and PC.4.5 refer); ~~and~~

(iii) provided by **Users** on a routine annual basis in calendar week 24 of each year to maintain an up-to-date data bank (although **Network Operators** may delay the submission of data (other than that to be submitted pursuant to PC.3.2(c) and PC.3.2(d)) until calendar week 28). Where from the date of one annual submission to another there is no change in the data (or in some of the data) to be submitted, instead of re-submitting the data, a **User** may submit a written statement that there has been no change from the data (or some of the data) submitted the previous time; and -

(iv) provided by **Network Operators** in connection with **Embedded Developments** (PC.4.4 refers).

(b) Where there is any change (or anticipated change) in **Committed Project Planning Data** or a significant change in **Connected Planning Data** in the category of **Forecast Data** or any change (or anticipated change) in **Connected Planning Data** in the categories of **Registered Data** or **Estimated Registered Data** supplied to **NGENGET** under the **PC**, notwithstanding that the change may subsequently be notified to **NGENGET** under the **PC** as part of the routine annual update of data (or that the change may be a **Modification** under the **CUSC**), the **User** shall, subject to PC.A.3.2.3 and PC.A.3.2.4, notify **NGENGET** in writing without delay.

(c) The notification of the change will be in the form required under this **PC** in relation to the supply of that data and will also contain the following information:

- (i) the time and date at which the change became, or is expected to become, effective;
- (ii) if the change is only temporary, an estimate of the time and date at which the data will revert to the previous registered form.

(d) The routine annual update of data, referred to in (a)(iii) above, need not be submitted in respect of **Small Power Stations** or **Embedded** installations of direct current converters which do not form a **DC Converter Station** (except as provided in PC.3.2(ed)), or unless specifically requested by **NGENGET**, or unless otherwise specifically provided.

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PC.A.1.4 The data requirements listed in this Appendix are subdivided into the following three parts:

(a) **Standard Planning Data**

This data (as listed in Part 1 of the Appendix) is first to be provided by a **User** at the time of an application for a **CUSC Contract** or in accordance with PC.4.4.3. It comprises data which is expected normally to be sufficient for **NGENGET** to investigate the impact on the **GB Transmission System** of any **User Development** or Embedded Development. **Users** should note that the term **Standard Planning Data** also includes the information referred to in PC.4.4.1.(a) and PC.4.4.3.(a).

(b) **Detailed Planning Data**

This data (as listed in Part 2 of the Appendix) is usually first to be provided by the **User** within 28 days (or such longer period as **NGENGET** may agree in any particular case) of the offer for a **CUSC Contract**, being accepted by the **User**. In the case of an Embedded Development this data (as listed in Part 2 of the Appendix) is usually first to be provided by the relevant Network Operator within 28 days (or such longer period as NGENGET may agree in any particular case) of entry into the Embedded Development Agreement. It comprises additional, more detailed, data not normally expected to be required by **NGENGET** to investigate the impact on the **GB Transmission System** of any **User Development** associated with an application by the **User** for a **CUSC Contract** or Embedded Development Agreement. **Users, and Network Operators in respect of Embedded Developments,** should note that, although not needed within 28 days of the offer or entry into the Embedded Development Agreement, as the case may be, the term **Detailed Planning Data** also includes **Operation Diagrams** and **Site Common Drawings** produced in accordance with the **CC**.

The **User** may, however, be required by **NGENGET** to provide the **Detailed Planning Data** in advance of the normal timescale before **NGENGET** can make an offer for a **CUSC Contract**, as explained in PC.4.5.

(c) **Network Data**

The data requirements for **NGENGET** in this Appendix are in Part 3.

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PC.A.1.8 The data supplied under PC.A.3.3.1, although in the nature of **Registered Data**, is only supplied either upon application for a **CUSC Contract**, or in accordance with PC.4.4.3, and therefore

does not fall to be **Registered Data**, but is **Estimated Registered Data**.

PC.A.2.1.1 Each **User**, whether connected directly via an existing **Connection Point** to the **GB Transmission System**, or seeking such a direct connection, shall provide **NGENGET** with data on its **User System** which relates to the **Connection Site** and/or which may have a system effect on the performance of the **GB Transmission System**. Such data, current and forecast, is specified in PC.A.2.2 to PC.A.2.5. In addition each **Generator in respect of its with Embedded Large Power Stations** ~~or and its Embedded Medium Power Stations~~ subject to a Bilateral Agreement and each Network Operator in respect of Embedded Medium Power Stations within its System not subject to a Bilateral Agreement, connected to the **Subtransmission System**, shall provide **NGENGET** with fault infeed data as specified in PC.A.2.5.5, and each **DC Converter owner with Embedded DC Converter Stations** subject to a Bilateral Agreement, or Network Operator in the case of Embedded DC Converter Stations ~~without not subject to a Bilateral Agreement~~, connected to the **Subtransmission System** shall provide **NGENGET** with fault infeed data specified in PC.A.2.5.6.

PC.A.2.1.3 Although not itemised here, each **User** with an existing or proposed **Embedded Small Power Station**, **Embedded Medium Power Station** or **Embedded DC Converter Station** with a **Registered Capacity** of less than 100MW or an **Embedded** installation of direct current converters which does not form a **DC Converter Station** ~~or Embedded Medium Power Station~~ in its **User System** may, at **NGENGET's** reasonable discretion, be required to provide additional details relating to the **User's System** between the **Connection Site** and the existing or proposed **Embedded Small Power Station** ~~or Embedded Medium Power Station~~ or **Embedded DC Converter Station** or **Embedded** installation of direct current converters which does not form a **DC Converter Station**.

PC.A.2.5.2 **Network Operators** and **Non-Embedded Customers** are required to submit data in accordance with PC.A.2.5.4. **Generators** ~~and~~ **DC Converter Station owners** and Network Operators, in respect of Embedded Medium Power Stations not subject to a Bilateral Agreement and Embedded DC Converter Stations not subject to a Bilateral Agreement within their such Network Operator's Systems not subject to a Bilateral Agreement, are required to submit data in accordance with PC.A.2.5.5.

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PC.A.2.5.5 Data from **Generators** ~~and~~, **DC Converter Station** owners ~~and~~ from **Network Operators** in respect of **Embedded Medium Power Stations** ~~not subject to a Bilateral Agreement~~ and **Embedded DC Converter Stations** ~~not subject to a Bilateral Agreement~~ within such **Network Operator's** ~~their~~ **Systems** ~~not subject to a Bilateral Agreement~~

PC.A.2.5.5.1 For each **Generating Unit** with one or more associated **Unit Transformers**, the **Generator**, ~~or the~~ **Network Operator** in respect of **Embedded Medium Power Stations** ~~not subject to a Bilateral Agreement~~ and **Embedded DC Converter Stations** ~~not subject to a Bilateral Agreement~~ within such **Network Operator's** ~~its~~ **System** ~~not subject to a Bilateral Agreement~~, is required to provide values for the contribution of the **Power Station Auxiliaries** (including **Auxiliary Gas Turbines** or **Auxiliary Diesel Engines**) to the fault current flowing through the **Unit Transformer(s)**.

The data items listed under the following parts of PC.A.2.5.6(a) should be provided: -

- (i), (ii) and (v);
- (iii) if the associated **Generating Unit** step-up transformer can supply zero phase sequence current from the **Generating Unit** side to the **GB Transmission System**;
- (iv) if the value is not 1.0 p.u;

and the data items shall be provided in accordance with the detailed provisions of PC.A.2.5.6(c) - (f), and with the following parts of this PC.A.2.5.5.

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PC.A.3.1.2 (a) Each **Generator** and **DC Converter Station** owner ~~with an~~ in respect of its existing, ~~and/or~~ proposed, **Embedded Large Power Stations** ~~and/or~~ **Embedded DC Converter Stations** and/or ~~an~~ **Embedded Medium Power Station**, its **Embedded Medium Power Stations** subject to a **Bilateral Agreement** and each **Network Operator** in respect of **Embedded Medium Power Stations** ~~not subject to a Bilateral Agreement~~ and/or **Embedded DC Converter Stations** ~~not subject to a Bilateral Agreement~~ within ~~its~~ such **Network Operator's** **System** ~~not subject to a Bilateral Agreement~~, in each case connected to the **Subtransmission** ~~connected to the~~ **Sub-Transmission System**, shall provide **NGENGET** with data relating to that **Power Station** or **DC Converter Station**, both

current and forecast, as specified in PC.A.3.2 to PC.A.3.4.

- PC.A.3.1.4
- (a) PC.A.4.2.4(b) and PC.A.4.3.2(a) explain that the forecast **Demand** submitted by each **Network Operator** must be net of the output of all **Small Power Stations** and **Medium Power Stations** and **Customer Generating Plant** and all installations of direct current converters which do not form a **DC Converter Station, Embedded within that Network Operator's System**. The **Network Operator** must inform **NGENGET** of the number of such **Embedded Power Stations** and such **Embedded** installations of direct current converters (including the number of **Generating Units** or **Power Park Modules** or **DC Converters**) together with their summated capacity.
 - (b) On receipt of this data, the **Network Operator** or **Generator** (if the data relates to **Power Stations** referred to in PC.A.3.1.2) may be further required, at **NGENGET's** reasonable discretion, to provide details of **Embedded Small Power Stations** and **Embedded Medium Power Stations** and **Customer Generating Plant** and **Embedded** installations of direct current converters which do not form a **DC Converter Station**, both current and forecast, as specified in PC.A.3.2 to PC.A.3.4. Such requirement would arise where **NGENGET** reasonably considers that the collective effect of a number of such **Embedded Power Stations** and **Customer Generating Plants** and **Embedded** installations of direct current converters may have a significant system effect on the **GB Transmission System**.

Busbar Arrangements, CCGT Units and DC Converters

PC.A.3.1.5 Where **Generating Units**, which term includes **CCGT Units** and **Power Park Modules**, and **DC Converters** are connected to the **GB Transmission System** via a busbar arrangement which is or is expected to be operated in separate sections, the section of busbar to which each **Generating Unit, DC Converter** or **Power Park Module** is connected is to be identified in the submission.

PC.A.3.3.1 The following information is required to facilitate an early assessment, by **NGENGET**, of the need for more detailed studies;

- (a) for all **Generating Units (excluding Power Park Units) and Power Park Modules**:

Rated MVA
Rated MW;

- (b) for each **Synchronous Generating Unit**:

Short circuit ratio
Inertia constant (for whole machine),
MWsecs/MVA;

- (c) for each **Synchronous Generating Unit** step-up transformer:

Rated MVA
Positive sequence reactance (at max, min and nominal tap).

- (d) for each **DC Converter** at a **DC Converter Station** or **DC Converter** connecting a **Power Park Module**

DC Converter type (e.g. current/voltage sourced)
Rated MW per pole for import and export
Number of poles and pole arrangement
Rated DC voltage/pole (kV)
Return path arrangement
Remote AC connection arrangement

- (e) for each type of **Power Park Unit** in a **Power Park Module** not connected to the **Total System** by a **DC Converter**:

Rated MVA
Rated MW
Rated terminal voltage
Inertia constant, (MWsec/MVA)
Additionally, for **Power Park Units** that are squirrel-cage or doubly-fed induction generators driven by wind turbines:
Stator reactance.
Magnetising reactance.
Rotor resistance (at rated running)
Rotor reactance (at rated running)
The generator rotor speed range (minimum and maximum speeds in RPM) (for doubly-fed induction generators only)
Converter MVA rating (for doubly-fed induction generators only)

For a **Power Park Unit** consisting of a synchronous machine in combination with a back-to-back **DC Converter**, or for a **Power Park Unit** not driven by a wind turbine, the data to be

supplied shall be agreed with **NGENGET** in accordance with PC.A.7.

This information should only be given in the data supplied ~~with the application for a CUSC Contract (if appropriate for any variation), as the case may be~~ in accordance with PC.4.4 and PC.4.5.

PC.A.5.1.2 Each **Generator**, ~~with in respect of its existing~~, or proposed, **Embedded Large Power Stations** and **its Embedded Medium Power Stations** subject to a **Bilateral Agreement** and each **Network Operator** in respect of **Embedded Medium Power Stations** ~~not subject to a **Bilateral Agreement** within its **System** not subject to a **Bilateral Agreement**~~ shall provide **NGENGET** with data relating to each of those **Large Power Stations** and ~~for~~ **Medium Power Stations**, both current and forecast, as specified in PC.A.5.2, PC.A.5.3 and PC.A.5.4 as applicable. Each **DC Converter Station** owner, or **Network Operator** in the case of an **Embedded DC Converter Station** ~~not subject to a **Bilateral Agreement** within its **System** not subject to a **Bilateral Agreement**~~, with existing or proposed **DC Converter Stations** shall provide **NGENGET** with data relating to each of those **DC Converter Stations**, both current and forecast, as specified in PC.A.5.2 and PC.A.5.4. However, no data need be supplied in relation to those **Embedded Medium Power Stations** or **Embedded DC Converter Stations** if they are connected at a voltage level below the voltage level of the **Subtransmission System** except in connection with an application for, or under a, **CUSC Contract** or unless specifically requested by **NGENGET** under PC.A.5.1.4.

PC.A.5.1.4 PC.A.4.2.4(b) and PC.A.4.3.2(a) explained that the forecast **Demand** submitted by each **Network Operator** must be net of the output of all **Medium Power Stations** and **Small Power Stations** and **Customer Generating Plant Embedded** within that **User's System**. In such cases (PC.A.3.1.4 also refers), the **Network Operator** must inform **NGENGET** of the number of such **Power Stations** (including the number of **Generating Units**) together with their summated capacity. On receipt of this data, ~~the **Network Operator** or **Generator** (if the data relates to **Power Stations** referred to in PC.A.5.1.2)~~ may be further details may be required at **NGENGET's** discretion as follows:

- (i) ~~in the case of to provide details required from the **Network Operator** for **Embedded Small Power Stations** and **Embedded Medium Power Stations** ~~not subject to a **Bilateral Agreement** and **Embedded DC Converter Stations** not subject to a **Bilateral Agreement** and **Embedded Small Power Stations** and **Embedded DC Converters**~~~~, in each case, within

its such **Network Operator's System**, and **Customer Generating Plant**; and

(ii) in the case of details required from the **Generator of Embedded Large Power Stations and Embedded Medium Power Stations** subject to a **Bilateral Agreement**, and

(iii) in the case of details required from the **DC Converter Station** owner of an **Embedded DC Converter or DC Converter Station** subject to a **Bilateral Agreement**,

both current and forecast, as specified in PC.A.5.2 and PC.A.5.3. Such requirement would arise when **NGCNGET** reasonably considers that the collective effect of a number of such **Embedded Small Power Stations** ~~and~~, **Embedded Medium Power Stations**, **Embedded DC Converter Stations**, **DC Converters** and **Customer Generating Plants** may have a significant system effect on the **GB Transmission System**.

PC.A.5.2.2

Where the **Power Station** or **DC Converter Station** has associated **Demand** additional to the unit-supplied **Demand** of PC.A.5.2.1 which is supplied from either the **GB Transmission System** or the **Generator's User System** the **Generator** ~~or~~, **DC Converter Station** owner or the **Network Operator** (in the case of **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** within its **System** not subject to a **Bilateral Agreement**), as the case may be, shall supply forecasts for each **Power Station** or **DC Converter Station** of:

- a) the maximum **Demand** that, in the **User's** opinion, could reasonably be imposed on the **GB Transmission System** or the **Generator's User System** as appropriate;
- b) the **Demand** at the time of the peak **GB Transmission System Demand**;
- c) the **Demand** at the time of minimum **GB Transmission System Demand**.

PC.A.5.2.3

No later than calendar week 17 each year **NGCNGET** shall notify each **Generator** with-in respect of its **Large Power Stations** and ~~or~~ its **Medium Power Stations** and **DC Converter** owner in respect of its **DC Converter Stations** subject to a **Bilateral Agreement**, and each **Network Operator** in respect of each **Embedded Medium Power Station** not subject to a **Bilateral Agreement** and each **Embedded DC Converter Stations** not subject to a

Bilateral Agreement within its such Network Operator's System ~~not subject to a Bilateral Agreement~~, in writing of the following, for the current **Financial Year** and for each of the following seven **Financial Years**, which will be regarded as the relevant specified days and times under PC.A.5.2.2:

- a) the date and time of the annual peak of the **GB Transmission System Demand** at **Annual ACS Conditions**;
- b) the date and time of the annual minimum of the **GB Transmission System Demand** at **Average Conditions**.

PC.A.5.3.2 The following **Synchronous Generating Unit** and **Power Station** data should be supplied:

(a) **Synchronous Generating Unit Parameters**

- Rated terminal volts (kV)
- * Rated MVA
- * **Rated MW**
- * Minimum Generation MW
- * Short circuit ratio
- Direct axis synchronous reactance
- * Direct axis transient reactance
- Direct axis sub-transient reactance
- Direct axis short-circuit transient time constant.
- Direct axis short-circuit sub-transient time constant.
- Quadrature axis synchronous reactance
- Quadrature axis sub-transient reactance
- Quadrature axis short-circuit sub-transient time constant.
- Stator time constant
- Stator leakage reactance
- Armature winding direct-current resistance.

Note: The above data item relating to armature winding direct-current resistance need only be supplied ~~by **Generators**~~ with respect to **Generating Units** commissioned after 1st March 1996 and in cases where, for whatever reason, the Generator or the Network Operator, as the case may be, is aware of the value of the relevant parameter.

- * Turbogenerator inertia constant (MWsec/MVA)
- Rated field current (amps) at **Rated MW** and Mvar output and at rated terminal voltage.

Field current (amps) open circuit saturation curve for **Generating Unit** terminal voltages ranging from 50% to 120% of rated value in 10% steps as derived from appropriate manufacturers test certificates.

(b) Parameters for **Generating Unit** Step-up Transformers

- * Rated MVA
- Voltage ratio
- * Positive sequence reactance
(at max, min, & nominal tap)
- Positive sequence resistance
(at max, min, & nominal tap)
- Zero phase sequence reactance
- Tap changer range
- Tap changer step size
- Tap changer type: on load or off circuit

(c) Excitation Control System parameters

Note: The data items requested under Option 1 below may continue to be provided ~~by~~ **Generators** in relation to **Generating Units** on the **System** at 09 January 1995 (in this paragraph, the "relevant date") or ~~they may provide~~ the new data items set out under Option 2 may be provided. **Generators or Network Operators, as the case may be,** must supply the data as set out under Option 2 (and not those under Option 1) for **Generating Unit** excitation control systems commissioned after the relevant date, those **Generating Unit** excitation control systems recommissioned for any reason such as refurbishment after the relevant date and **Generating Unit** excitation control systems where, as a result of testing or other process, the **Generator or the Network Operator, as the case may be,** is aware of the data items listed under Option 2 in relation to that **Generating Unit**.

Option 1

DC gain of **Excitation Loop**

Rated field voltage

Maximum field voltage

Minimum field voltage

Maximum rate of change of field voltage (rising)

Maximum rate of change of field voltage (falling)

Details of **Excitation Loop** described in block diagram form showing transfer functions of individual elements.

Dynamic characteristics of **Over-excitation Limiter**.

Dynamic characteristics of **Under-excitation Limiter**

Option 2

Excitation System Nominal Response

Rated Field Voltage

No-Load Field Voltage

Excitation Voltage	System	On-Load	Positive	Ceiling
Excitation Voltage	System	No-Load	Positive	Ceiling
Excitation Voltage	System	No-Load	Negative	Ceiling

Details of **Excitation System** (including **PSS** if fitted) described in block diagram form showing transfer functions of individual elements.

Details of **Over-excitation Limiter** described in block diagram form showing transfer functions of individual elements.

Details of **Under-excitation Limiter** described in block diagram form showing transfer functions of individual elements.

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PC.A.5.4 **Non-Synchronous Generating Unit and Associated Control System Data**

PC.A.5.4.1 The data submitted below are not intended to constrain any **Ancillary Services Agreement**

PC.A.5.4.2 The following **Power Park Unit, Power Park Module** and **Power Station** data should be supplied in the case of a **Power Park Module** not connected to the **Total System** by a **DC Converter**:

(a) **Power Park Unit** model

A mathematical model of each type of **Power Park Unit** capable of representing its transient and dynamic behaviour under both small and large disturbance conditions. The model shall include non-linear effects and represent all equipment relevant to the dynamic performance of the **Power Park Unit** as agreed with **NGCNET**. The model shall be suitable for the study of balanced, root mean square, positive phase sequence time-domain behaviour, excluding the effects of electromagnetic transients, harmonic and sub-harmonic frequencies.

The model shall accurately represent the overall performance of the **Power Park Unit** over its entire operating range including that which is inherent to the **Power Park Unit** and that which is achieved by use of supplementary control systems providing either continuous or stepwise control. Model resolution should be sufficient to accurately represent **Power Park Unit** behaviour both in response to operation of transmission system protection and in the context of longer-term simulations.

The overall structure of the model shall include:

- (i) any supplementary control signal modules not covered by (c), (d) and (e) below.

- (ii) any blocking, deblocking and protective trip features that are part of the **Power Park Unit** (e.g. "crowbar").
- (iii) any other information required to model the **Power Park Unit** behaviour to meet the model functional requirement described above.

The model shall be submitted in the form of a transfer function block diagram and may be accompanied by dynamic and algebraic equations.

This model shall display all the transfer functions and their parameter values, any non wind-up logic, signal limits and non-linearities.

The submitted **Power Park Unit** model shall have been validated and this shall be confirmed by the **Generator**. The validation shall be based on comparing the submitted model simulation results against measured test results. Validation evidence shall also be submitted and this shall include the simulation and measured test results. The latter shall include appropriate short-circuit tests. In the case of an **Embedded Medium Power Station** not subject to a **Bilateral Agreement** the **Network Operator** will provide **NGGNET** with the validation evidence if requested by **NGGNET**.

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- (h) Harmonic and flicker parameters

When connecting a **Power Park Module**, it is necessary for **NGGNET** to evaluate the production of flicker and harmonics on **NGGNET** and **User's Systems**. At **NGGNET's** reasonable request, the **User** (a **Network Operator** in the case of an **Embedded Power Park Module** not subject to a **Bilateral Agreement**) is required to submit the following data (as defined in IEC 61400-21 (2001)) for each **Power Park Unit**:-

- Flicker coefficient for continuous operation.
- Flicker step factor.
- Number of switching operations in a 10 minute window.
- Number of switching operations in a 2 hour window.
- Voltage change factor.
- Current Injection at each harmonic for each **Power Park Unit** and for each **Power Park Module**

* Data items marked with an asterisk are already requested under part 1, PC.A.3.3.1, to facilitate an early assessment by **NGGNET** as to whether detailed stability studies will be required before an offer of terms for a **CUSC Contract** can be made. Such data items have been repeated here merely for completeness and need not, of course, be resubmitted unless their values, known or estimated, have changed.

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PC.A.5.5

Response data for **Frequency** changes

The information detailed below is required to describe the actual frequency response capability profile as illustrated in Figure CC.A.3.1 of the **Connection Conditions**, and need only be provided for each ~~Genset; at a Large Power Stations.~~

(i) **Genset at Large Power Stations**; and

(ii) **Generating Unit, Power Park Module or CCGT Module at a Medium Power Station or DC Converter Station that has agreed to provide Frequency response in accordance with a CUSC Contract.**

In the case of (ii) above for the rest of this PC.5.4 where reference is made to **Gensets**, it shall include such **Generating Units, CCGT Modules, Power Park Modules and DC Converters** as appropriate.

In this **PC.A.5.5**, for a **CCGT Module** with more than one **Generating Unit**, the phrase **Minimum Generation** applies to the entire **CCGT Module** operating with all **Generating Units Synchronised** to the **System**. Similarly for a **Power Park Module** with more than one **Power Park Unit**, the phrase **Minimum Generation** applies to the entire **Power Park Module** operating with all **Power Park Units Synchronised** to the **System**.

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Add at end of PC.A 5.6

.....
In the case of **Embedded Medium Power Stations not subject to a Bilateral Agreement** and **Embedded DC Converter Stations** not subject to a **Bilateral Agreement**, upon request from **NGENGET** each **Network Operator** such provide the information required in PC.A.5.6.1, PCA.5.6.2, PC.A.5.6.3 and PC.A.5.6.4 in respect of such **Embedded Medium Power Stations and Embedded DC Converter Stations** within their **System**.

.....
.....
CONNECTION CONDITIONS REVISIONS

CC.3.2 The above categories of **User** will become bound by the **CC** prior to them generating, distributing, supplying or consuming, as the case may be, and references to the various categories should, therefore, be taken as referring to them in that prospective role as well as to **Users** actually connected.

CC.3.3 The obligations within the **CC** that are expressed to be applicable to **Generators** in respect of **Embedded Medium Power Stations not subject to a Bilateral Agreement** and **DC Converter Station** owners in respect of **Embedded DC**

Converter Stations not subject to a Bilateral Agreement (which where the obligations are in each case are listed in CC.3.4) shall be read and construed as obligations that the Network Operator within whose System any such Medium Power Station or Embedded DC Converter Station is Embedded must ensure are performed and discharged by the Generator or the DC Converter Station owner.

CC.3.4 The Network Operator within whose System a Medium Power Station not subject to a Bilateral Agreement is Embedded or a Embedded DC Converter Station not subject to a Bilateral Agreement is Embedded must ensure that the following obligations in the CC are performed and discharged by the Generator in respect of each such Embedded Medium Power Station or the DC Converter Station owner in the case of an Embedded DC Converter Station:

CC.5.1

CC.5.2.2

CC.5.3

CC.6.1.3

CC.6.1.5 (b)

CC.6.3.2, CC.6.3.3, CC.6.3.4, CC.6.3.6, CC.6.3.7, CC.6.3.8,

CC.6.3.9, CC.6.3.10, CC.6.3.12, CC.6.3.13, CC.6.3.15,

CC.6.3.16

CC.6.4.4

In respect of CC.6.2.2.2, CC.6.2.2.3, CC.6.2.2.5, CC.6.1.5(a), CC.6.1.5(b) and CC6.3.11 equivalent provisions as co-ordinated and agreed with the Network Operator and Generator or DC Converter Station owner may be required. Details or any such requirements will be notified to the Network Operator in accordance with CC.3.5.

CC.3.5 In the case of Embedded Medium Power Stations not subject to a Bilateral Agreement, and Embedded DC Converter Stations not subject to a Bilateral Agreement the requirements in:

CC.6.1.6

CC.6.3.8

CC.6.3.12

CC.6.3.15

CC.6.3.16

that would otherwise have been specified in a Bilateral Agreement will be notified to the relevant Network Operator in writing in accordance with the provisions of the CUSC and the Network Operator must ensure such requirements are performed and discharged by the Generator or the DC Converter Station owner.

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CC.5.1 The provisions relating to connecting to the GB Transmission System (or to a User's System in the case of a connection of

an **Embedded Large Power Station** or **Embedded Medium Power Station** or **Embedded DC Converter Station** are contained in:

- (a) the **CUSC** and/or **CUSC Contract** (or in the relevant application form or offer for a **CUSC Contract**);
- (b) or, in the case of an **Embedded Development**, the relevant **Distribution Code** and/or the **Embedded Development Agreement** for the connection (or in the relevant application form or offer for a **Embedded Development Agreement**).

and include provisions relating to both the submission of information and reports relating to compliance with the relevant **Connection Conditions** for that **User**, **Safety Rules**, commissioning programmes, **Operation Diagrams** and approval to connect (and their equivalents in the case of **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** or **Embedded DC Converter Stations** not subject to a **Bilateral Agreement**). References in the ~~is~~ **CC** to the "**Bilateral Agreement**" and/or "**Construction Agreement**" and/or "**Embedded Development Agreement**" shall be deemed to include references to the application form or offer therefor.

CC.5.2 Items for submission:

CC.5.2.1 Prior to the **Completion Date** under the **Bilateral Agreement** and/or **Construction Agreement**, the following is submitted pursuant to the terms of the **Bilateral Agreement** and/or **Construction Agreement**:

- (a) updated **Planning Code** data (both **Standard Planning Data** and **Detailed Planning Data**), with any estimated values assumed for planning purposes confirmed or, where practical, replaced by validated actual values and by updated estimates for the future and by updated forecasts for **Forecast Data** items such as **Demand**, pursuant to the requirements of the **Planning Code**;
- (b) details of the **Protection** arrangements and settings referred to in CC.6;
- (c) copies of all **Safety Rules** and **Local Safety Instructions** applicable at **Users' Sites** which will be used at the **NGGNET**/User interface (which, for the purpose of **OC8**, must be to **NGGNET's** satisfaction regarding the procedures for **Isolation** and **Earthing**. For **User Sites** in Scotland **NGGNET** will consult the **Relevant Transmission Licensee** when determining whether the procedures for **Isolation** and **Earthing** are satisfactory);

- (d) information to enable **NGGNGET** to prepare **Site Responsibility Schedules** on the basis of the provisions set out in Appendix 1;
- (e) an **Operation Diagram** for all **HV Apparatus** on the **User** side of the **Connection Point** as described in CC.7;
- (f) the proposed name of the **User Site** (which shall not be the same as, or confusingly similar to, the name of any **Transmission Site** or of any other **User Site**);
- (g) written confirmation that **Safety Coordinators** acting on behalf of the **User** are authorised and competent pursuant to the requirements of **OC8**;
- (h) **RISSP** prefixes pursuant to the requirements of **OC8**. **NGGNGET** is required to circulate prefixes utilising a proforma in accordance with **OC8**;
- (i) a list of the telephone numbers for **Joint System Incidents** at which senior management representatives nominated for the purpose can be contacted and confirmation that they are fully authorised to make binding decisions on behalf of the **User**, pursuant to **OC9**;
- (j) a list of managers who have been duly authorised to sign **Site Responsibility Schedules** on behalf of the **User**;
- (k) information to enable **NGGNGET** to prepare **Site Common Drawings** as described in CC.7;
- (l) a list of the telephone numbers for the **Users** facsimile machines referred to in CC.6.5.9; and
- (m) for **Sites** in Scotland a list of persons appointed by the **User** to undertake operational duties on the **User's System** and to issue and receive operational messages and instructions in relation to the **User's System**; and an appointed person or persons responsible for the maintenance and testing of **User's Plant** and **Apparatus**.

CC.5.2.2 prior to the **Completion Date** the following must be submitted to **NGGNGET** by the **Network Operator** in respect of an **Embedded Development**:

- (a) updated **Planning Code** data (both **Standard Planning Data** and **Detailed Planning Data**), with any estimated values assumed for planning purposes confirmed or, where practical, replaced by validated actual values and by updated estimates for the future and by updated forecasts for **Forecast Data** items such as **Demand**, pursuant to the requirements of the **Planning Code**;

- (b) details of the **Protection** arrangements and settings referred to in CC.6;
 - (c) the proposed name of the **Embedded Medium Power Station or Embedded DC Converter Station Site** (which shall be agreed with **NGGNET** unless it is the same as, or confusingly similar to, the name of other **Transmission Site or User Site**);
-

CC.5.3 ~~As explained in the **Bilateral Agreement** and/or **Construction Agreement**, of the list:~~

- (a) Of the items CC5.2.1(c), (e), (g), (h), (k) and (m) need not be supplied in respect of **Embedded Power Stations** or **Embedded DC Converter Stations**,
 - (b) item CC5.2.1(i) need not be supplied in respect of **Embedded Small Power Stations** and **Embedded Medium Power Stations** or **Embedded DC Converter Stations** with a **Registered Capacity** of less than 100MW, and
 - (c) items CC5.2.1(d) and (j) are only needed in the case where the **Embedded Power Station** or **Embedded DC Converter Station** is within a **Connection Site** with another **User**.
-

CC.6.3.7 (a) Each **Generating Unit, DC Converter** or **Power Park Module** (excluding **Power Park Modules** in Scotland with a **Completion Date** before 1 July 2004 or in a **Power Station** in Scotland with a **Registered Capacity** less than 30MW) must be fitted with a fast acting proportional **Frequency** control device (or turbine speed governor) and unit load controller or equivalent control device to provide **Frequency** response under normal operational conditions in accordance with **Balancing Code 3 (BC3)**. The **Frequency** control device (or speed governor) must be designed and operated to the appropriate:

- (i) **European Specification**; or
- (ii) in the absence of a relevant **European Specification**, such other standard which is in common use within the European Community;

as at the time when the installation of which it forms part was designed or (in the case of modification or alteration to the **Frequency** control device (or turbine

speed governor)) when the modification or alteration was designed.

The **European Specification** or other standard utilised in accordance with sub-paragraph CC.6.3.7 (a) (ii) will be notified to **NGGNET** ~~as~~ by the Generator or DC Converter Station owner or, in the case of an Embedded Medium Power Station not subject to a Bilateral Agreement or Embedded DC Converter Station not subject to a Bilateral Agreement, the relevant Network Operator, as:

- (i) as part of the application for a **Bilateral Agreement**; or
- (ii) as part of the application for a varied **Bilateral Agreement**; or
- (iii) in the case of an Embedded Development, within 28 days of entry into the Embedded Development Agreement (or such later time as agreed with NGGNET); or
- (iv) as soon as possible prior to any modification or alteration to the **Frequency** control device (or governor); and

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.....
CC.6.3.16 (a) **DC Converter** owners or Network Operators in the case of an Embedded DC Converter Station not subject to a Bilateral Agreement must ensure that any of their **DC Converters** will not cause a sub-synchronous resonance problem on the **Total System**. Each **DC Converter** is required to be provided with sub-synchronous resonance damping control facilities.

.....
Operational Metering

CC.6.4.4 When **NGGNET** can reasonably demonstrate that an Embedded Person Medium Power Station or Embedded DC Converter Station has a significant effect on the GB Transmission System, it may require the Network Operator within whose System the Embedded Person is situated to ensure that the operational metering equipment described in CC6.5.6 is installed such that **NGGNET** can receive the data referred to in CC6.5.6. **NGGNET** shall notify such Network Operator of the details of such installation in writing within 3 months of being notified of the application to connect under CUSC and the Network Operator shall ensure that the data referred to in CC.6.5.6 is provided to **NGGNET**.

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CC.8.1

System Ancillary Services

The **CC** contain requirements for the capability for certain **Ancillary Services**, which are needed for **System** reasons ("**System Ancillary Services**"). There follows a list of these **System Ancillary Services**, together with the paragraph number of the **CC** (or other part of the **Grid Code**) in which the minimum capability is required or referred to. The list is divided into two categories: Part 1 lists the **System Ancillary Services** which:

- (a) **Generators** in respect of **Large Power Stations** are obliged to provide; and
- (b) **DC Converter Station** owners are obliged to have the capability to supply; and
- (c) **Generators** in respect of **Medium Power Stations** (except **Embedded Medium Power Stations**) are obliged to provide in respect of **Reactive Power** only;

and Part 2 lists the **System Ancillary Services** which **Generators** will provide only if agreement to provide them is reached with **NGENGET**:

Part 1

- (a) **Reactive Power** supplied (in accordance with CC.6.3.2) otherwise than by means of synchronous or static compensators (except in the case of a **Power Park Module** where synchronous or static compensators within the **Power Park Module** may be used to provide **Reactive Power**)
- (b) **Frequency** Control by means of **Frequency** sensitive generation - CC.6.3.7 and BC3.5.1

Part 2

- (c) **Frequency** Control by means of **Fast Start** - CC.6.3.14
- (d) **Black Start Capability** - CC.6.3.5
- (e) **System to Generator Operational Intertripping**

CC.A.3.4 TESTING OF FREQUENCY RESPONSE CAPABILITY

The response capabilities shown diagrammatically in Figure CC.A.3.1 are measured by taking the responses as obtained from some of the dynamic response tests specified by **NGENGET** and carried out by **Generators** and **DC Converter Station** owners for compliance purposes and to validate the content of **Ancillary Services Agreements** using an injection of a **Frequency** change to the plant control system (ie governor and load controller). The injected signal is a linear ramp from zero to 0.5 Hz **Frequency** change over a ten second period, and is sustained at 0.5 Hz **Frequency** change

thereafter, as illustrated diagrammatically in figures CC.A.3.2 and CC.A.3.3. In the case of an Embedded Medium Power Station not subject to a Bilateral Agreement or Embedded DC Converter Station not subject to a Bilateral Agreement, NGENGET may require the Network Operator within whose System the Embedded Medium Power Station or Embedded DC Converter Station is situated, to ensure that the Embedded Person performs the dynamic response tests reasonably required by NGENGET in order to demonstrate compliance with the relevant requirements in the CCs.

The **Primary Response** capability (P) of a **Generating Unit** or a **CCGT Module** or a **Power Park Module** or a **DC Converter** is the minimum increase in **Active Power** output between 10 and 30 seconds after the start of the ramp injection as illustrated diagrammatically in Figure CC.A.3.2.

The **Secondary Response** capability (S) of a **Generating Unit** or a **CCGT Module** or a **Power Park Module** or a **DC Converter** is the minimum increase in **Active Power** output between 30 seconds and 30 minutes after the start of the ramp injection as illustrated diagrammatically in Figure CC.A.3.2.

The **High Frequency Response** capability (H) of a **Generating Unit** or a **CCGT Module** or a **Power Park Module** or a **DC Converter** is the decrease in **Active Power** output provided 10 seconds after the start of the ramp injection and sustained thereafter as illustrated diagrammatically in Figure CC.A.3.3.

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OPERATING CODE 1 REVISIONS

OC1.1.2 In the **Operational Planning Phase**, **Demand** forecasting shall be conducted by **NGENGET** taking account of **Demand** forecasts furnished by **Network Operators** ~~and in certain circumstances, Generators~~, who shall provide **NGENGET** with information in the form set out in this **OC1**. The data supplied under the **PC** is also taken into account.

OC1.1.3 In the **Programming Phase** and **Control Phase**, **NGENGET** will conduct its own **Demand** forecasting taking into account information to be furnished by **Suppliers**, ~~and Network Operators and by Generators~~ and the other factors referred to in OC1.6.1.

.....
OC1.3 SCOPE

OC1 applies to **NGENGET** and to **Users** which in this **OC1** means:-

~~(a) Generators,~~

~~(b)(a) Network Operators,~~ and

~~(c)(b) Suppliers.~~

OC1.4.1 (a) Each **User**, as specified in (b) below, shall provide **NGENGET** with the data requested in OC1.4.2 below.

(b) The data will need to be supplied by:-

~~(i) each **Network Operator** directly connected to the **GB Transmission System** in relation to **Demand Control**; and in relation and~~

~~(ii) each **Generator** with respect to the output of **Embedded Medium Power Stations** within its **System**.~~

OC1.5.1 **Programming Phase**

For the period of 2 to 8 weeks ahead the following will be supplied to **NGENGET** in writing by 1000 hours each Monday:

(a) **Demand Control:**

Each **Network Operator** will supply MW profiles of the amount and duration of their proposed use of **Demand Control** which may result in a **Demand** change equal to or greater than the **Demand Control Notification Level** (averaged over any half hour on any **Grid Supply Point**) on a half hourly and **Grid Supply Point** basis;

(b) **Medium Power Station Operation:**

Each ~~**Generator**~~ **Network Operator** will, if reasonably required by **NGENGET**, supply MW schedules for the operation of **Embedded Medium Power Stations** within its **System** on a half hourly and **Grid Supply Point** basis.

OC1.5.2 For the period 2 to 12 days ahead the following will be supplied to **NGENGET** in writing by 1200 hours each Wednesday:

(a) **Demand Control:**

Each **Network Operator** will supply MW profiles of the amount and duration of their proposed use of **Demand Control** which may result in a **Demand** change equal to or greater than the **Demand Control Notification Level** (averaged over any half hour on any **Grid Supply Point**) on a half hourly and **Grid Supply Point** basis;

(b) **Medium Power Station Operation:**

Each **Generator–Network Operator** will, if reasonably required by **NGGNET**, supply MW schedules for the operation of **Embedded Medium Power Stations within its System** on a half hourly and **Grid Supply Point** basis.

.....

OC1.5.3 **Medium Power Station Output:**
Each **Generator–Network Operator** will, if reasonably required by **NGGNET**, supply **NGGNET** with MW schedules for the operation of **Embedded Medium Power Stations within its System** on a half hourly and **Grid Supply Point** basis in writing by 1000 hours each day (or such other time specified by **NGGNET** from time to time) for the next day (except that it will be for the next 3 days on Fridays and 2 days on Saturdays and may be longer (as specified by **NGGNET** at least one week in advance) to cover holiday periods);

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.....

OPERATING CODE 2 REVISIONS

OC2.2.1 (a) The objective of **OC2** is to seek to enable **NGGNET** to harmonise outages of **Gensets** in order that such outages are co-ordinated (taking account of **Embedded Medium Power Stations**) between **Generators** and **Network Operators**, and that such outages are co-ordinated taking into account **GB Transmission System** outages and other **System** outages, so far as possible to minimise the number and effect of constraints on the **GB Transmission System** or any other **System**.

(b) In the case of **Network Operator’ User Systems** directly connected to the **GB Transmission System** this means in particular that there will also need to be harmonisation of outages of **Embedded Gensets**, and **GB Transmission System** outages, with **Network Operators** in respect of their outages on those **Systems**.

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OC2.4.1.1 Under **OC2** the interaction between **NGGNET** and **Users** will be as follows:

.....

(c) **NGGNET** and each **Network Operator** in respect of outages of all **Operator Embedded Large Power Stations and Embedded Medium Power Stations** and in respect of outages of other and/or **Apparatus** relating to such **Embedded Large Power Stations and Embedded Medium Power Stations**;

- (d) **NGGNET** and each **Network Operator** and each **Non-Embedded Customer** or **NGGNET** in respect of **GB Transmission System** outages relevant to the particular **Network Operator** **Non-Embedded Customers**;
- (e) Each **Network Operator** and each **Non-Embedded Customer** and **NGGNET** in respect of **User System** and outages relevant to **NGGNET**.

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OPERATING CODE 5 REVISIONS

OC5.1 INTRODUCTION

Operating Code No. 5 ("OC5") specifies the procedures to be followed by **NGGNET** in carrying out:

- (a) monitoring
 - (i) of **BM Units** against their expected input or output;
 - (ii) of compliance by **Users** with the **CC** and in the case of response to **Frequency, BC3**; and
 - (iii) of the provision by **Users** of **Ancillary Services** which they are required or have agreed to provide; and
- (b) the following tests (which are subject to **System** conditions prevailing on the day):
 - (i) tests on **Gensets, CCGT Modules, Power Park Modules, and DC Converters, and Generating Units (excluding Power Park Units)** to test that they have the capability to comply with the **CC** and, in the case of response to **Frequency, BC3** and to provide the **Ancillary Services** that they are either required or have agreed to provide;
 - (ii) tests on **BM Units**, to ensure that the **BM Units** are available in accordance with their submitted **Export and Import Limits, QPNs, Joint BM Unit Data** and **Dynamic Parameters**.

The **OC5** tests include the **Black Start Test** procedure.

OC5 also specifies in OC5.8 the procedures which apply to the monitoring and testing of **Embedded Medium Power Stations not subject to a Bilateral Agreement** and **Embedded DC Converter Stations not subject to a Bilateral Agreement**.

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The pass criteria must be read in conjunction with the full text under the Grid Code reference. The **BM Unit**, [CCGI Module](#), [Power Park Module](#) or [Generating Unit \(excluding Power Park Units\)](#) will pass the test if the criteria below are met.

Parameter to be Tested	Grid Code Reference	Pass Criteria (to be read in conjunction with the full text under the Grid Code reference)
Harmonic Content	CC.6.1.5(a)	Measured harmonic emissions do not exceed the limits specified in the Bilateral Agreement or where no such limits are specified, the relevant planning level specified in G5/4.
Phase Unbalance	CC.6.1.5(b)	The measured maximum Phase (Voltage) Unbalance on the GB Transmission System should remain, in England and Wales, below 1% and, in Scotland, below 2%.
Phase Unbalance	CC.6.1.6	In England and Wales, measured infrequent short duration peaks in Phase (Voltage) Unbalance should not exceed the maximum value stated in the Bilateral Agreement .
Voltage Fluctuations	CC.6.1.7(a)	In England and Wales, measured voltage fluctuations at the Point of Common Coupling shall not exceed 1% of the voltage level for step changes. Measured voltage excursions other than step changes may be allowed up to a level of 3%. In Scotland, measured voltage fluctuations at a Point of Common Coupling shall not exceed the limits set out in Engineering Recommendation P28 .
Flicker	CC.6.1.7(b)	Measured voltage fluctuations at a Point of Common Coupling shall not exceed, for voltages above 132kV, Flicker Severity (Short Term) of 0.8 Unit and Flicker Severity (Long Term) of 0.6 Unit, and, for voltages at 132kV and below, shall not exceed Flicker Severity (Short Term) of 1.0 Unit and Flicker Severity (Long Term) of 0.8 Unit, as set out in Engineering Recommendation P28 as current at the Transfer Date .

Voltage Quality

Parameter to be Tested	Grid Code Reference	Pass Criteria (to be read in conjunction with the full text under the Grid Code reference)
Fault Clearance Times	CC.6.2.2.2.2(a) CC.6.2.3.1.1(a)	The fault clearance times shall be in accordance with the Bilateral Agreement .
Back-Up Protection	CC.6.2.2.2.2(b) CC.6.2.3.1.1(b)	The Back-Up Protection system provided by Generators operates in the times specified in CC.6.2.2.2.2(b). The Back-Up Protection system provided by Network Operators and Non-Embedded Customers operates in the times specified in CC.6.2.3.1.1(b) and with Discrimination as specified in the Bilateral Agreement .
Circuit Breaker fail Protection	CC.6.2.2.2.2(c) CC.6.2.3.1.1(c)	The circuit breaker fail Protection shall initiate tripping so as to interrupt the fault current within 200ms.
Reactive Capability	CC.6.3.2 CC.6.3.4	The Generating Unit, DC Converter or Power Park Module will pass the test if it is within $\pm 5\%$ of the reactive capability registered with NGENGET under OC2 which shall meet the requirements set out in CC.6.3.2. The duration of the test will be for a period of up to 60 minutes during which period the System voltage at the Grid Entry Point for the relevant Generating Unit, DC Converter or Power Park Module will be maintained by the Generator at the voltage specified pursuant to BC2.8 by adjustment of Reactive Power on the remaining Generating Units, DC Converter or Power Park Module , if necessary. Any test performed in respect of an Embedded Medium Power Station not subject to a Bilateral Agreement or an Embedded DC Converter Station not subject to a Bilateral Agreement shall be as confirmed pursuant to OC5.8.3. Measurements of the Reactive Power output under steady state conditions should be consistent with Grid Code requirements i.e. fully available within the voltage range $\pm 5\%$ at 400kV, 275kV and 132kV and lower voltages.
Fault Clearance		
Reactive Capability		

Parameter to be Tested	Grid Code Reference	Pass Criteria (to be read in conjunction with the full text under the Grid Code reference)
Fast Start		The Fast Start Capability requirements of the Ancillary Services Agreement for that Genset are met.
Black Start	OC.5.7.1	The relevant Generating Unit or Power Park Module is Synchronised to the System within two hours of the Auxiliary Gas Turbine(s) or Auxiliary Diesel Engine(s) being required to start.
Excitation System/ Voltage Control	CC.6.3.8(a) & BC2.11.2	Measurements of the continuously acting automatic excitation control system are required to demonstrate the provision of: (i) constant terminal voltage control; or (ii) zero MVAR transfer; or, (iii) voltage control with a Slope of the Generating Unit, DC Converter or Power Park Module as applicable without instability over the entire operating range of the Generating Unit, DC Converter or Power Park Module . The measured performance of the automatic excitation control system should also meet the requirements (including Power System Stabiliser performance) specified in the Bilateral Agreement and/or any requirements specified in an Embedded Development Agreement .

OC5.5.4 Test Failure/Re-test

If the **BM Unit, CCGT Module, Power Park Module or Generating Unit (excluding Power Park Units)** concerned fails to pass the test the **User** must provide **NGENGET** 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 **User** after due and careful enquiry. This must be provided within five **Business Days** of the test. If a dispute arises relating to the failure, **NGENGET** and the relevant **User** shall seek to resolve the dispute by discussion, and, if they fail to reach agreement, the **User** may by notice require **NGENGET** to carry out a re-test on 48 hours' notice which shall be carried out following the procedure set out in OC5.5.2 and OC5.5.3 and subject as provided in OC5.5.1.3, as if **NGENGET** had issued an instruction at the time of notice from the **User**.

OC5.5.5 Dispute following Re-test

If the **BM Unit, CCGT Module, Power Park Module or Generating Unit (excluding Power Park Units)** in **NGENGET's** view 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.

OC5.6.1

If following the procedure set out in OC5.5 it is accepted that the **BM Unit, CCGT Module, Power Park Module or Generating Unit (excluding Power Park Units)** has failed the test or re-test (as applicable), the **User** shall within 14 days, or such longer period as **NGENGET** may reasonably agree, following such failure, submit in writing to **NGENGET** for approval the date and time by which the **User** shall have brought the **BM Unit, CCGT Module, Power Park Module or Generating Unit (excluding Power Park Units)** concerned to a condition where it complies with the relevant requirement. **NGENGET** will not unreasonably withhold or delay its approval of the **User's** proposed date and time submitted. Should **NGENGET** not approve the **User's** proposed date or time (or any revised proposal), the **User** should amend such proposal having regard to any comments **NGENGET** may have made and re-submit it for approval.

OC5.6.3

Once the **User** has indicated to **NGENGET** the date and time that the **BM Unit, CCGT Module, Power Park Module or Generating Unit (excluding Power Park Units)** can achieve the parameters previously registered or submitted, **NGENGET** shall either accept this information or require the **User** to demonstrate the restoration of the capability by means of a repetition of the test referred to in OC5.5.2 by an instruction requiring the **User** on 48 hours notice to

carry out such a test. The provisions of this OC5.6 will apply to such further test.

OC5.8 Procedures applying to **Embedded Medium Power Stations not subject to a Bilateral Agreement and Embedded DC Converter Stations not subject to a Bilateral Agreement**

OC5.8.1 Compliance Statement

Each **Network Operator** shall ensure that each **Embedded Person** provides to the **Network Operator upon NCCGET's request:-**

- (a) written confirmation that each such **Generating Unit, Power Park Module or DC Converters** complies with the requirements of the **CC**; and
- (b) evidence, where requested, reasonably satisfactory to **NCCGET**, of such compliance. Such a request shall not normally be made by **NCCGET** more than twice in any calendar year in respect of any **Generator's Generating Unit or Power Park Module or DC Converter owner's DC Converter**.

The **Network Operator** shall provide the evidence or written confirmation required under OC5.8.1 (a) and (b) forthwith upon receipt to **NCCGET**.

OC5.8.2 **Network Operator's obligations to facilitate tests**

If:

- (a) the **Network Operator** fails to procure the confirmation referred to at OC5.8.1(a); or
- (b) the evidence of compliance is not to **NCCGET's** reasonable satisfaction,

then, **NCCGET** shall be entitled to require the **Network Operator** to procure access upon terms reasonably satisfactory to **NCCGET** to enable **NCCGET** to witness the **Embedded Person** carrying out the tests referred to in OC5.8.3 in respect of the relevant **Embedded Medium Power Station or Embedded DC Converter Station**.

OC5.8.3 Testing of **Embedded Medium Power Stations not subject to a Bilateral Agreement or Embedded DC Converter Stations not subject to a Bilateral Agreement**

NCCGET may, in accordance with the provisions of OC5.8.2, at any time (although not normally more than twice in any calendar year in respect of any particular **Embedded Medium Power Station not subject to a Bilateral Agreement or Embedded DC Converter Station not subject to a Bilateral Agreement**) issue an instruction requiring the **Network Operator** within whose **System** the relevant **Medium Power Station not subject to a**

Bilateral Agreement or **DC Converter Station** not subject to a **Bilateral Agreement** is **Embedded**, to require the **Embedded Person** to carry out a test.

Such test shall be carried out at a time no sooner than 48 hours from the time that the instruction was issued, on any one or more of the **Generating Units, Power Park Module or DC Converter** comprising part of the relevant **Embedded Medium Power Station** or **Embedded DC Converter Station** and should only be to demonstrate that:

(a) the relevant **Generating Unit, Power Park Module or DC Converter** meets the requirements of the paragraphs in the **CC** which are applicable to such **Generating Units, Power Park Module or DC Converter**;

(b) the **Reactive Power** capability registered with **NGENGET** under **OC2** meets the requirements set out in CC.6.3.2.

The instruction may only be issued where, following consultation with the relevant **Network Operator, NGENGET** has:

(a) confirmed to the relevant **Network Operator** the manner in which the test will be conducted, which shall be consistent with the principles established in OC5.5.2; and

(b) received confirmation from the relevant **Network Operator** that the relevant **Generating Unit, Power Park Module or DC Converter** would not then be unavailable by reason of forced outage or **Planned Outage** expected prior to the instruction.

The relevant **Network Operator** is responsible for ensuring the performance of any test so required by **NGENGET** and the **Network Operator** shall ensure that the **Embedded Person** retains the responsibility for ensuring the safety of personnel and plant during the test.

OC5.8.4 Test Failures/Re-tests and Disputes

The relevant **Network Operator** shall:

(a) ensure that provisions equivalent to OC5.5.4, OC5.5.5 and OC5.6 apply to **Embedded Medium Power Stations** not the subject of a **Bilateral Agreement** or **Embedded DC Converter Stations** not the subject of a **Bilateral Agreement** within its **System** in respect of test failures, re-tests and disputes as to test failures and re-tests;

(b) ensure that the provisions equivalent to OC5.5.4, OC5.5.5 and OC5.6 referred to in OC5.8.4(a) are effective so that **NGENGET** may require, if it so wishes, the provision to it of any reports or other information equivalent to those or that to which **NGENGET** would be entitled in relation to test failures, re-tests and disputes as to test failures and re-tests under the provisions of OC5.5.4, OC5.5.5 and OC5.6; and

(c) the provisions equivalent to OC5.5.4, OC5.5.5 and OC5.6 referred to in OC5.8.4(a) are effective to permit **NGENGET** to conduct itself and take decisions in such a manner in relation to test failures, re-tests and disputes as to test failures and re-tests in respect of **Embedded Medium Power Stations not the subject of a Bilateral Agreement or Embedded DC Converter Stations** not the subject of a **Bilateral Agreement** as it is able to conduct itself and take decisions in relation to test failures, re-tests and disputes as to test failures and re-tests under OC5.5.4, OC5.5.5 and OC5.6.

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OPERATING CODE 12 REVISIONS

OC12.2.1 to ensure, so far as possible, that **System Tests** proposed to be carried out either by:

- (a) a **User** (or certain persons in respect of **Systems Embedded within a Network Operator's System**) which may have an effect on the **Total System** or any part of the **Total System** (in addition to that **User's System**) including the **GB Transmission System**; or
- (b) by **NGENGET** which may have an effect on the **Total System** or any part of the **Total System** (in addition to the **GB Transmission System**)

do not threaten the safety of either their personnel or the general public, cause minimum threat to the security of supplies and to the integrity of **Plant** and/or **Apparatus**, and cause minimum detriment to **NGENGET** and **Users**;

OC12.3 SCOPE

OC12.3.1 **OC12** applies to **NGENGET** and to **Users**, which in **OC12** means: -

- (a) **Generators other than in respect of Embedded Medium Power Stations and Embedded Small Power Stations (and the term Generator in OC12 shall be construed accordingly);;**
- (b) **Network Operators**; and
- (c) **Non-Embedded Customers.**
- (d) **DC Converter Station owners other than in respect of Embedded DC Converter Stations**

The procedure for the establishment of **System Tests** on the **GB Transmission System**, with **Externally Interconnected**

System Operators which do not affect any **User**, is set out in the **Interconnection Agreement** with each **Externally Interconnected System Operator**. The position of **Externally Interconnected System Operators** and **Interconnector Users** is also referred to in OC12.4.2.

OC12.3.2 Each **Network Operator** will **liaise** with **NGGNET** as necessary in those instances where an **Embedded Person** intends to perform a **System Test** which may have an effect on the **Total System** or any part of the **Total System** (in addition to that **Generator's** or other **User's System**) including the **GB Transmission System**. **NGGNET** is not required to deal with such persons.

OC12.3.3 Each **Network Operator** shall be responsible for coordinating with the **Embedded Person** or such other person and assessing the effect of any **System Tests** upon:

- (a) any **Embedded Medium Power Station, - Embedded Small Power Station or Embedded DC Converter Station** within the **Network Operator's System**; or
- (b) any other **User** connected to or within the **Network Operator's System**.

NGGNET is not required to deal with such persons.

OC12.4.1.1 Where a **User** (or in the case of a **Network Operator**, a person in respect of **Systems Embedded** within its **System**, as the case may be) would like to undertake a **System Test** it shall submit a notice (a "**Proposal Notice**") to **NGGNET** at least twelve months in advance of the date it would like to undertake the proposed **System Test**.

OC12.4.4.1 Within two months of first meeting the **Test Panel** will submit a report (a "**Proposal Report**"), which will contain:

- (a) proposals for carrying out the **System Test** (including the manner in which the **System Test** is to be monitored);
- (b) an allocation of costs (including un-anticipated costs) between the affected parties (the general principle being that the **Test Proposer** will bear the costs); and
- (c) such other matters as the **Test Panel** considers appropriate.

The **Proposal Report** may include requirements for indemnities (including an indemnity from the relevant **Network Operator** to

NGGNET and other **Users** in relation to its **Embedded Persons**) to be given in respect of claims and losses arising from the **System Test**. All **System Test** procedures must comply with all applicable legislation.

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DATA REGISTRATION CODE REVISIONS

DRC.6.2 The **Schedules** applicable to each class of **User** are as follows:

15	<p>Generators with Large Power Stations</p> <p>Generators with Medium Power Stations (See notes <u>2, 3, 4</u>)</p> <p>Generators with Small Power Stations directly connected to the GB Transmission System</p> <p>All Users connected directly to GB Transmission System</p> <p>All Users connected directly to the GB Transmission System other than Generators</p> <p>All Users connected directly to GB Transmission System with Demand</p> <p>A Pumped Storage Generator, Externally Interconnected System Operator and Interconnector Users</p> <p>All Suppliers</p> <p>All Network Operators</p> <p>All BM Participants</p>	<p>Sched 1, 2, 3, 4, 9, 14, 15</p> <p>Sched 1, <u>2(part)</u>, 9, 14, 15</p> <p>Sched 1, 6, 14,</p> <p>Sched 5, 6, 9</p> <p>Sched 10,11,13</p> <p>Sched 7, 9</p> <p>Sched12 (as marked)</p> <p>Sched 12</p> <p>Sched 12</p> <p>Sched 8</p>
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Notes:

1. **Network Operators** must provide data relating to **Small Power Stations** and/or **Customer Generating Plant Embedded** in their **Systems** when such data is requested by **NGGNET** pursuant to PC.A.3.1.4 or PC.A.5.1.4.
2. The data in schedules 1, 2(part) 14 and 15 need not be supplied in relation to **Medium Power Stations** connected at a voltage level below the voltage level of the **Subtransmission System** except in connection with a **CUSC Contract** or unless specifically requested by **NGGNET**

3. Each **Network Operator** within whose **System** an **Embedded Medium Power Station** not subject to a **Bilateral Agreement** or **Embedded DC Converter Station** not subject to a **Bilateral Agreement** is situated shall provide the data to **NGGNET** in respect of each such **Embedded Medium Power Station** or **Embedded DC Converter Station**.
4. In the case of Schedule 2, **Generators, DC Converter Station** owners or **Network Operators** in the case of **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** or **Embedded DC Converter Stations** not subject to a **Bilateral Agreement**, would only be expected to submit data in relation to **Standard Planning Data** as required by the **Planning Code**.

GENERAL CONDITIONS REVISIONS

GC.15 *Embedded Exemptable Large and Medium Power Stations*

GC.15.1 This GC.15.1 shall have an effect until and including 31st March 2007.

- (i) CC.6.3.2, CC.6.3.7, CC.8.1 and BC3.5.1; and
- (ii) Planning Code obligations and other Connection Conditions;

shall apply to a **User** who owns or operates

~~a **an** Embedded Exemptable Large Power Station~~, or

~~(b) — an Embedded Exemptable Medium Power Station in Scotland~~

or a **Network Operator** in respect of an **Embedded Exemptable Medium Power Station** in Scotland.

~~except where and to the extent that, in respect of that **Embedded Exemptable Large Power Station** or **Embedded Exemptable Medium Power Station**, **NGGNET** agrees or where the relevant **User** or **Network Operator**, and **NGGNET** fail to agree, where and to the extent that the **Authority** consents.~~