

Our Ref:

Your Ref:

Date: December 2006

To: All Recipients of the Serviced  
Grid Code

Regulatory Frameworks  
Electricity Codes

National Grid Electricity  
Transmission plc  
National Grid House  
Warwick Technology Park  
Gallows Hill  
Warwick  
CV34 6DA

Tel No: 01926 656368  
Fax No: 01926 656601

Dear Sir/Madam

### **THE SERVICED GRID CODE – ISSUE 3 REVISION 18**

Revision 18 of Issue 3 of the Grid Code has been approved by the Authority for implementation on **20<sup>th</sup> December 2006**.

I have enclosed the replacement pages that incorporate the agreed changes necessary to update the Grid Code Issue 3 to Revision 18 standard.

The enclosed note provides a brief summary of the changes made to the text.

Yours faithfully

L Macleod  
Electricity Codes



INVESTOR IN PEOPLE

Registered Office:  
1-3 Strand  
London  
WC2N 5EH

Registered in  
England and Wales  
No 2366977



**THE GRID CODE – ISSUE 3 REVISION 18**

**INCLUSION OF REVISED PAGES**

Title Page

Glossary and Definitions                      **G&D**                      -                      **Pages 7 to 12, Pages 33 and 34, Page 47**

Planning Code                                      **PC**                                      -                                      **Pages 51 and 52**

Connection Conditions                      **CC**                                      -                                      **Pages 1 and 2, Pages 25 and 26**

Operating Code 1                                      **OC1**                                      -                                      **Page 5**

Revisions    -                                      **Pages 19 to 21**

NOTE:                      See Page 1 of the Revisions section of the Grid Code for details of how the revisions are indicated on the pages.

# **NATIONAL GRID ELECTRICITY TRANSMISSION PLC**

## **THE GRID CODE – ISSUE 3 REVISION 18**

### **SUMMARY OF CHANGES**

The changes arise from the implementation of modifications proposed in the following Consultation Paper:

- **D/06** – Consequential Changes from B/06 and Housekeeping Amendments

# **THE GRID CODE**

**Issue 3**

**Revision 18**  
**20<sup>th</sup> December 2006**

Copyright © NATIONAL GRID ELECTRICITY TRANSMISSION plc

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise, without written permission.

**THIS DOCUMENT IS ISSUED BY:-**

**NATIONAL GRID ELECTRICITY TRANSMISSION plc  
ELECTRICITY CODES, REGULATORY FRAMEWORKS  
NATIONAL GRID HOUSE  
WARWICK TECHNOLOGY PARK  
GALLOWS HILL  
WARWICK  
CV34 6DA**

**REGISTERED OFFICE: 1-3 Strand  
London  
WC2N 5EH**

<b><u>Completion Date</u></b>	Has the meaning set out in the <b>Bilateral Agreement</b> with each <b>User</b> to that term or in the absence of that term to such other term reflecting the date when a <b>User</b> is expected to connect to or start using the <b>GB Transmission System</b> . In the case of an <b>Embedded Medium Power Station</b> or <b>Embedded DC Converter Station</b> having a similar meaning in relation to the <b>Network Operator's System</b> as set out in the <b>Embedded Development Agreement</b> .
<b><u>Complex</u></b>	A <b>Connection Site</b> together with the associated <b>Power Station</b> and/or <b>Network Operator</b> substation and/or associated <b>Plant</b> and/or <b>Apparatus</b> , as appropriate.
<b><u>Connection Conditions or CC</u></b>	That portion of the <b>Grid Code</b> which is identified as the <b>Connection Conditions</b> .
<b><u>Connection Entry Capacity</u></b>	Has the meaning set out in the <b>CUSC</b>
<b><u>Connected Planning Data</u></b>	Data which replaces data containing estimated values assumed for planning purposes by validated actual values and updated estimates for the future and by updated forecasts for <b>Forecast Data</b> items such as <b>Demand</b> .
<b><u>Connection Point</u></b>	A <b>Grid Supply Point</b> or <b>Grid Entry Point</b> , as the case may be.
<b><u>Connection Site</u></b>	A <b>Transmission Site</b> or <b>User Site</b> , as the case may be.
<b><u>Construction Agreement</u></b>	Has the meaning set out in the <b>CUSC</b>
<b><u>Contingency Reserve</u></b>	The margin of generation over forecast <b>Demand</b> which is required in the period from 24 hours ahead down to real time to cover against uncertainties in <b>Large Power Station</b> availability and against both weather forecast and <b>Demand</b> forecast errors.
<b><u>Control Calls</u></b>	A telephone call whose destination and/or origin is a key on the control desk telephone keyboard at a <b>Transmission Control Centre</b> and which has the right to exercise priority over (ie. disconnect) a call of a lower status.
<b><u>Control Centre</u></b>	A location used for the purpose of control and operation of the <b>GB Transmission System</b> or <b>DC Converter Station</b> owner's <b>System</b> or a <b>User System</b> other than a <b>Generator's System</b> or an <b>External System</b> .
<b><u>Control Engineer</u></b>	A person nominated by the relevant party for the control of its <b>Plant</b> and <b>Apparatus</b> .

<b><u>Control Person</u></b>	The term used as an alternative to " <b>Safety Co-ordinator</b> " on the <b>Site Responsibility Schedule</b> only.
<b><u>Control Phase</u></b>	The <b>Control Phase</b> follows on from the <b>Programming Phase</b> and covers the period down to real time.
<b><u>Control Point</u></b>	<p>The point from which:-</p> <p>a) A <b>Non-Embedded Customer's Plant and Apparatus</b> is controlled; or</p> <p>b) A <b>BM Unit</b> at a <b>Large Power Station</b> or at a <b>Medium Power Station</b> or representing a <b>Cascade Hydro Scheme</b> or with a <b>Demand Capacity</b> with a magnitude of:</p> <p style="margin-left: 40px;">(i) 50MW or more in <b>NGET's Transmission Area</b>; or</p> <p style="margin-left: 40px;">(ii) 30MW or more in <b>SPT's Transmission Area</b>; or</p> <p style="margin-left: 40px;">(iii) 10MW or more in <b>SHETL's Transmission Area</b>,</p> <p style="margin-left: 40px;">is physically controlled by a <b>BM Participant</b>; or</p> <p>c) In the case of any other <b>BM Unit</b> or <b>Generating Unit</b>, data submission is co-ordinated for a <b>BM Participant</b> and instructions are received from <b>NGET</b>,</p> <p>as the case may be. For a <b>Generator</b> this will normally be at a <b>Power Station</b> but may be at an alternative location agreed with <b>NGET</b>. In the case of a <b>DC Converter Station</b>, the <b>Control Point</b> will be at a location agreed with <b>NGET</b>. In the case of a <b>BM Unit</b> of an <b>Interconnector User</b>, the <b>Control Point</b> will be the <b>Control Centre</b> of the relevant <b>Externally Interconnected System Operator</b>.</p>
<b><u>Control Telephony</u></b>	The method by which a <b>User's Responsible Engineer/Operator</b> and <b>NGET Control Engineer(s)</b> speak to one another for the purposes of control of the <b>Total System</b> in both normal and emergency operating conditions.
<b><u>CUSC</u></b>	Has the meaning set out in <b>NGET's Transmission Licence</b>
<b><u>CUSC Contract</u></b>	<p>One or more of the following agreements as envisaged in Standard Condition C1 of <b>NGET's Transmission Licence</b>:</p> <p>(a) the <b>CUSC Framework Agreement</b>;</p> <p>(b) a <b>Bilateral Agreement</b>;</p> <p>(c) a <b>Construction Agreement</b></p> <p>or a variation to an existing <b>Bilateral Agreement</b> and/or <b>Construction Agreement</b>;</p>
<b><u>CUSC Framework Agreement</u></b>	Has the meaning set out in <b>NGET's Transmission Licence</b>



<b><u>Customer</u></b>	A person to whom electrical power is provided (whether or not he is the same person as the person who provides the electrical power).
<b><u>Customer Demand Management</u></b>	Reducing the supply of electricity to a <b>Customer</b> or disconnecting a <b>Customer</b> in a manner agreed for commercial purposes between a <b>Supplier</b> and its <b>Customer</b> .
<b><u>Customer Demand Management Notification Level</u></b>	The level above which a <b>Supplier</b> has to notify <b>NGET</b> of its proposed or achieved use of <b>Customer Demand Management</b> which is 12 MW in England and Wales and 5 MW in Scotland.
<b><u>Customer Generating Plant</u></b>	A <b>Power Station</b> or <b>Generating Unit</b> of a <b>Customer</b> to the extent that it operates the same exclusively to supply all or part of its own electricity requirements, and does not export electrical power to any part of the <b>Total System</b> .
<b><u>Data Registration Code or DRC</u></b>	That portion of the <b>Grid Code</b> which is identified as the <b>Data Registration Code</b> .
<b><u>Data Validation, Consistency and Defaulting Rules</u></b>	The rules relating to validity and consistency of data, and default data to be applied, in relation to data submitted under the <b>Balancing Codes</b> , to be applied by <b>NGET</b> under the <b>Grid Code</b> as set out in the document "Data Validation, Consistency and Defaulting Rules" - Issue 7, dated 11 <sup>th</sup> October 2004. The document is available on the National Grid website or upon request from <b>NGET</b> .
<b><u>DC Converter</u></b>	Any <b>Apparatus</b> with a <b>Completion Date</b> after 1 April 2005 used to convert alternating current electricity to direct current electricity, or vice-versa. A <b>DC Converter</b> is a standalone operative configuration at a single site comprising one or more converter bridges, together with one or more converter transformers, converter control equipment, essential protective and switching devices and auxiliaries, if any, used for conversion. In a bipolar arrangement, a <b>DC Converter</b> represents the bipolar configuration.
<b><u>DC Converter Station</u></b>	An installation comprising one or more <b>DC Converters</b> connecting a direct current interconnector:  to the <b>NGET Transmission System</b> ; or,  (if the installation has a rating of 50MW or more) to a <b>User System</b> ,  and it shall form part of the <b>External Interconnection</b> to which it relates.
<b><u>DC Network</u></b>	All items of <b>Plant</b> and <b>Apparatus</b> connected together on the direct current side of a <b>DC Converter</b> .

<b><u>De-Load</u></b>	The condition in which a <b>Genset</b> has reduced or is not delivering electrical power to the <b>System</b> to which it is <b>Synchronised</b> .
<b><u>Demand</u></b>	The demand of MW and Mvar of electricity (i.e. both <b>Active</b> and <b>Reactive Power</b> ), unless otherwise stated.
<b><u>Demand Capacity</u></b>	Has the meaning as set out in the <b>BSC</b> .
<b><u>Demand Control</u></b>	Any or all of the following methods of achieving a <b>Demand</b> reduction: <ul style="list-style-type: none"> <li>(a) <b>Customer</b> voltage reduction initiated by <b>Network Operators</b> (other than following an instruction from <b>NGET</b>);</li> <li>(b) <b>Customer Demand</b> reduction by <b>Disconnection</b> initiated by <b>Network Operators</b> (other than following an instruction from <b>NGET</b>);</li> <li>(c) <b>Demand</b> reduction instructed by <b>NGET</b>;</li> <li>(d) automatic low <b>Frequency Demand Disconnection</b>;</li> <li>(e) emergency manual <b>Demand Disconnection</b>.</li> </ul>
<b><u>Demand Control Notification Level</u></b>	The level above which a <b>Network Operator</b> has to notify <b>NGET</b> of its proposed or achieved use of <b>Demand Control</b> which is 12 MW in England and Wales and 5 MW in Scotland.
<b><u>Designed Minimum Operating Level</u></b>	The output (in whole MW) below which a <b>Genset</b> or a <b>DC Converter</b> at a <b>DC Converter Station</b> (in any of its operating configurations) has no <b>High Frequency Response</b> capability.
<b><u>De-Synchronise</u></b>	a) The act of taking a <b>Generating Unit, Power Park Module</b> or <b>DC Converter</b> off a <b>System</b> to which it has been <b>Synchronised</b> , by opening any connecting circuit breaker; or  b) The act of ceasing to consume electricity at an importing <b>BM Unit</b> ;  and the term " <b>De-Synchronising</b> " shall be construed accordingly.
<b><u>De-synchronised Island(s)</u></b>	Has the meaning set out in OC9.5.1(a)
<b><u>Detailed Planning Data</u></b>	Detailed additional data which <b>NGET</b> requires under the <b>PC</b> in support of <b>Standard Planning Data</b> . Generally it is first supplied once a <b>Bilateral Agreement</b> is entered into.
<b><u>Discrimination</u></b>	The quality where a relay or protective system is enabled to pick out and cause to be disconnected only the faulty <b>Apparatus</b> .

<b><u>Disconnection</u></b>	The physical separation of <b>Users</b> (or <b>Customers</b> ) from the <b>GB Transmission System</b> or a <b>User System</b> as the case may be.
<b><u>Disputes Resolution Procedure</u></b>	The procedure described in the <b>CUSC</b> relating to disputes resolution.
<b><u>Distribution Code</u></b>	The distribution code required to be drawn up by each <b>Electricity Distribution Licence</b> holder and approved by the <b>Authority</b> , as from time to time revised with the approval of the <b>Authority</b> .
<b><u>Droop</u></b>	The ratio of the steady state change in speed in the case of a <b>Generating Unit</b> , or in <b>Frequency</b> in the case of a <b>Power Park Module</b> , to the steady state change in power output of the <b>Generating Unit</b> or <b>Power Park Module</b> .
<b><u>Dynamic Parameters</u></b>	Those parameters listed in Appendix 1 to <b>BC1</b> under the heading <b>BM Unit Data – Dynamic Parameters</b> .
<b><u>Earth Fault Factor</u></b>	At a selected location of a three-phase <b>System</b> (generally the point of installation of equipment) and for a given <b>System</b> configuration, the ratio of the highest root mean square phase-to-earth power <b>Frequency</b> voltage on a sound phase during a fault to earth (affecting one or more phases at any point) to the root mean square phase-to-earth power <b>Frequency</b> voltage which would be obtained at the selected location without the fault.
<b><u>Earthing</u></b>	<p>A way of providing a connection between conductors and earth by an <b>Earthing Device</b> which is either:</p> <p>(a) Immobilised and <b>Locked</b> in the earthing position. Where the <b>Earthing Device</b> is <b>Locked</b> with a <b>Safety Key</b>, the <b>Safety Key</b> must be secured in a <b>Key Safe</b> and the <b>Key Safe Key</b> must be, where reasonably practicable, given to the authorised site representative of the <b>Requesting Safety Co-Ordinator</b> and is to be retained in safe custody. Where not reasonably practicable the <b>Key Safe Key</b> must be retained by the authorised site representative of the <b>Implementing Safety Co-Ordinator</b> in safe custody: or</p> <p>(b) maintained and/or secured in position by such other method which must be in accordance with the <b>Local Safety Instructions</b> of <b>NGET</b> or the <b>Safety Rules</b> of the <b>Relevant Transmission Licensee</b> or that <b>User</b>, as the case may be.</p>
<b><u>Earthing Device</u></b>	A means of providing a connection between a conductor and earth being of adequate strength and capability.
<b><u>Electrical Standard</u></b>	A standard listed in the Annex to the <b>General Conditions</b> .
<b><u>Electricity Council</u></b>	That body set up under the Electricity Act, 1957.

<b><u>Electricity Distribution Licence</u></b>	The licence granted pursuant to Section 6(1) (c) of the <b>Act</b> .
<b><u>Electricity Supply Industry Arbitration Association</u></b>	The unincorporated members' club of that name formed inter alia to promote the efficient and economic operation of the procedure for the resolution of disputes within the electricity supply industry by means of arbitration or otherwise in accordance with its arbitration rules.
<b><u>Electricity Supply Licence</u></b>	The licence granted pursuant to Section 6(1) (d) of the <b>Act</b> .
<b><u>Electromagnetic Compatibility Level</u></b>	Has the meaning set out in <b>Engineering Recommendation G5/4</b> .
<b><u>Embedded</u></b>	Having a direct connection to a <b>User System</b> or the <b>System</b> of any other <b>User</b> to which <b>Customers</b> and/or <b>Power Stations</b> are connected, such connection being either a direct connection or a connection via a busbar of another <b>User</b> or of a <b>Transmission Licensee</b> (but with no other connection to the <b>GB Transmission System</b> ).
<b><u>Embedded Development</u></b>	Has the meaning set out in PC.4.4.3(a)
<b><u>Embedded Development Agreement</u></b>	An agreement entered into between a <b>Network Operator</b> and an <b>Embedded Person</b> , identifying the relevant site of connection to the <b>Network Operator's System</b> and setting out other site specific details in relation to that use of the <b>Network Operator's System</b> .
<b><u>Embedded Person</u></b>	The party responsible for a <b>Medium Power Station</b> not subject to a <b>Bilateral Agreement</b> or <b>DC Converter Station</b> not subject to a <b>Bilateral Agreement</b> connected to or proposed to be connected to a <b>Network Operator's System</b> .
<b><u>Emergency Instruction</u></b>	An instruction issued by <b>NGET</b> in emergency circumstances, pursuant to BC2.9, to the <b>Control Point</b> of a <b>User</b> . In the case of such instructions applicable to a <b>BM Unit</b> , it may require an action or response which is outside the <b>Dynamic Parameters</b> , <b>QPN</b> or <b>Other Relevant Data</b> , and may include an instruction to trip a <b>Genset</b> .
<b><u>Engineering Recommendations</u></b>	The documents referred to as such and issued by the Electricity Association or the former Electricity Council.
<b><u>Estimated Registered Data</u></b>	Those items of <b>Standard Planning Data</b> and <b>Detailed Planning Data</b> which either upon connection will become <b>Registered Data</b> , or which for the purposes of the <b>Plant</b> and/or <b>Apparatus</b> concerned as at the date of submission are <b>Registered Data</b> , but in each case which for the seven succeeding <b>Financial Years</b> will be an estimate of what is expected.

**Quiescent Physical Notification or QPN**

Data that describes the MW levels to be deducted from the **Physical Notification** of a **BM Unit** to determine a resultant operating level to which the **Dynamic Parameters** associated with that **BM Unit** apply, and the associated times for such MW levels. The MW level of the **QPN** must always be set to zero.

**Range CCGT Module**

A **CCGT Module** where there is a physical connection by way of a steam or hot gas main between that **CCGT Module** and another **CCGT Module** or other **CCGT Modules**, which connection contributes (if open) to efficient modular operation, and which physical connection can be varied by the operator.

**Rated Field Voltage**

Shall have the meaning ascribed to that term in **IEC 34-16-1:1991** [equivalent to **British Standard BS4999** Section 116.1 : 1992].

**Rated MW**

The “rating-plate” MW output of a **Generating Unit, Power Park Module** or **DC Converter**, being:

- (a) that output up to which the **Generating Unit** was designed to operate (Calculated as specified in **British Standard BS EN 60034 – 1: 1995**);  
or
- (b) the nominal rating for the MW output of a **Power Park Module** being the maximum continuous electric output power which the **Power Park Module** was designed to achieve under normal operating conditions;  
or
- (c) the nominal rating for the MW import capacity and export capacity (if at a **DC Converter Station**) of a **DC Converter**.

**Reactive Energy**

The integral with respect to time of the **Reactive Power**.

**Reactive Power**

The product of voltage and current and the sine of the phase angle between them measured in units of voltamperes reactive and standard multiples thereof, ie:

$$\begin{aligned} 1000 \text{ VAr} &= 1 \text{ kVAr} \\ 1000 \text{ kVAr} &= 1 \text{ Mvar} \end{aligned}$$

**Record of Inter-System Safety Precautions or RISSP**

A written record of inter-system **Safety Precautions** to be compiled in accordance with the provisions of **OC8**.

## Registered Capacity

- (a) In the case of a **Generating Unit** other than that forming part of a **CCGT Module** or **Power Park Module**, the normal full load capacity of a **Generating Unit** as declared by the **Generator**, less the MW consumed by the **Generating Unit** through the **Generating Unit's Unit Transformer** when producing the same (the resultant figure being expressed in whole MW, or in MW to one decimal place).
- (b) In the case of a **CCGT Module** or **Power Park Module**, the normal full load capacity of the **CCGT Module** or **Power Park Module** (as the case may be) as declared by the **Generator**, being the **Active Power** declared by the **Generator** as being deliverable by the **CCGT Module** or **Power Park Module** at the **Grid Entry Point** (or in the case of an **Embedded CCGT Module** or **Power Park Module**, at the **User System Entry Point**), expressed in whole MW, or in MW to one decimal place.
- (c) In the case of a **Power Station**, the maximum amount of **Active Power** deliverable by the **Power Station** at the **Grid Entry Point** (or in the case of an **Embedded Power Station** at the **User System Entry Point**), as declared by the **Generator**, expressed in whole MW, or in MW to one decimal place. The maximum **Active Power** deliverable is the maximum amount deliverable simultaneously by the **Generating Units** and/or **CCGT Modules** and/or **Power Park Modules** less the MW consumed by the **Generating Units** and/or **CCGT Modules** in producing that **Active Power**.
- (d) In the case of a **DC Converter** at a **DC Converter Station**, the normal full load amount of **Active Power** transferable from a **DC Converter** at the **Grid Entry Point** (or in the case of an **Embedded DC Converter Station** at the **User System Entry Point**), as declared by the **DC Converter Station** owner, expressed in whole MW, or in MW to one decimal place.
- (e) In the case of a **DC Converter Station**, the maximum amount of **Active Power** transferable from a **DC Converter Station** at the **Grid Entry Point** (or in the case of an **Embedded DC Converter Station** at the **User System Entry Point**), as declared by the **DC Converter Station** owner, expressed in whole MW, or in MW to one decimal place.

## Registered Data

Those items of **Standard Planning Data** and **Detailed Planning Data** which upon connection become fixed (subject to any subsequent changes).

## Registered Import Capability

In the case of a **DC Converter Station** containing **DC Converters** connected to an **External System**, the maximum amount of **Active Power** transferable into a **DC Converter Station** at the **Grid Entry Point** (or in the case of an **Embedded DC Converter Station** at the **User System Entry Point**), as declared by the **DC Converter Station** owner, expressed in whole MW.

In the case of a **DC Converter** connected to an **External System** and in a **DC Converter Station**, the normal full load amount of **Active Power** transferable into a **DC Converter** at the **Grid Entry Point** (or in the case of an **Embedded DC Converter Station** at the **User System Entry Point**), as declared by the **DC Converter** owner, expressed in whole MW.

- (xii) (a) Save where (b) below applies, where there is a reference to an item of data being expressed in a whole number of MW, fractions of a MW below 0.5 shall be rounded down to the nearest whole MW and fractions of a MW of 0.5 and above shall be rounded up to the nearest whole MW;
- (b) In the case of the definition of **Registered Capacity**, fractions of a MW below 0.05 shall be rounded down to one decimal place and fractions of a MW of 0.05 and above shall be rounded up to one decimal place.

< End of GD >





- \* Data items marked with an asterisk are already requested under part 1, PC.A.3.3.1, to facilitate an early assessment by **NGET** 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.

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:

- (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.A.5.5 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**.

PC.A.5.5.1      MW loading points at which data is required

Response values are required at six MW loading points (MLP1 to MLP6) for each **Genset**. **Primary** and **Secondary Response** values need not be provided for MW loading points which are below **Minimum Generation**. MLP1 to MLP6 must be provided to the nearest MW.

Prior to the **Genset** being first **Synchronised**, the MW loading points must take the following values :-

MLP1	<b>Designed Minimum Operating Level</b>
MLP2	<b>Minimum Generation</b>
MLP3	70% of <b>Registered Capacity</b>
MLP4	80% of <b>Registered Capacity</b>
MLP5	95% of <b>Registered Capacity</b>
MLP6	<b>Registered Capacity</b>

When data is provided after the **Genset** is first **Synchronised**, the MW loading points may take any value between **Designed Minimum Operating Level** and **Registered Capacity** but the value of the **Designed**

**Minimum Operating Level** must still be provided if it does not form one of the MW loading points.

PC.A.5.5.2 **Primary and Secondary Response to Frequency fall**

**Primary** and **Secondary Response** values for a -0.5Hz ramp are required at six MW loading points (MLP1 to MLP6) as detailed above

PC.A.5.5.3 **High Frequency Response to Frequency rise**

**High Frequency Response** values for a +0.5Hz ramp are required at six MW loading points (MLP1 to MLP6) as detailed above.

PC.A.5.6 **Mothballed Generating Unit Mothballed Power Park Module or Mothballed DC Converter at a DC Converter Station and Alternative Fuel Information**

Data identified under this section PC.A.5.6 must be submitted as required under PC.A.1.2 and at **NGET's** reasonable request.

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 **NGET** each **Network Operator** shall provide the information required in PC.A.5.6.1, PC.A.5.6.2, PC.A.5.6.3 and PC.A.5.6.4 on respect of such **Embedded Medium Power Stations** and **Embedded DC Converters Stations** with their **System**.

PC.A.5.6.1 **Mothballed Generating Unit Information**

**Generators** and **DC Converter Station** owners must supply with respect to each **Mothballed Generating Unit, Mothballed Power Park Module or Mothballed DC Converter** at a **DC Converter Station** the estimated MW output which could be returned to service within the following time periods from the time that a decision to return was made:

< 1 month;

1-2 months;

2-3 months;

3-6 months;

6-12 months; and

>12 months.

The return to service time should be determined in accordance with **Good Industry Practice** assuming normal working arrangements and normal plant procurement lead times. The MW output values should be the incremental values made available in each time period as further described in the **DRC**.

PC.A.5.6.2 **Generators** and **DC Converter Station** owners must also notify **NGET** of any significant factors which may prevent the **Mothballed Generating**

## CONNECTION CONDITIONS

### CC.1 INTRODUCTION

CC.1.1 The **Connection Conditions** ("CC") specify both the minimum technical, design and operational criteria which must be complied with by any **User** connected to or seeking connection with the **GB Transmission System** or **Generators** (other than in respect of **Small Power Stations**) or **DC Converter Station** owners connected to or seeking connection to a **User's System** which is located in **Great Britain**, and the minimum technical, design and operational criteria with which **NGET** will comply in relation to the part of the **GB Transmission System** at the **Connection Site** with **Users**.

### CC.2 OBJECTIVE

CC.2.1 The objective of the **CC** is to ensure that by specifying minimum technical, design and operational criteria the basic rules for connection to the **GB Transmission System** and (for certain **Users**) to a **User's System** are similar for all **Users** of an equivalent category and will enable **NGET** to comply with its statutory and **Transmission Licence** obligations.

### CC.3 SCOPE

CC.3.1 The **CC** applies to **NGET** and to **Users**, which in the **CC** means:

- (a) **Generators** (other than those which only have **Embedded Small Power Stations**)
- (b) **Network Operators**;
- (c) **Non-Embedded Customers**;
- (d) **DC Converter Station** owners; and
- (e) **BM Participants** and **Externally Interconnected System Operators** in respect of CC.6.5 only.

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** (where the obligations are in each case 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 **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 **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 CC.6.3.11 equivalent provisions as co-ordinated and agreed with the **Network Operator** and **Generator** or **DC Converter Station** owner may be required. Details of 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.

CC.4

#### PROCEDURE

CC.4.1

The **CUSC** contains provisions relating to the procedure for connection to the **GB Transmission System** or, in the case of **Embedded Power Stations** or **Embedded DC Converter Stations**, becoming operational and includes provisions relating to certain conditions to be complied with by **Users** prior to **NGET** notifying the **User** that it has the right to become operational.

CC.5.

#### CONNECTION

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**);

(iv) To avoid unwanted island operation, **Non-Synchronous Generating Units** in Scotland or **Power Park Modules** in Scotland shall be tripped for the following conditions:-

- (1) Frequency above 52Hz for more than 2 seconds
- (2) Frequency below 47Hz for more than 2 seconds
- (3) Voltage as measured at the **Connection Point** or **User System Entry Point** below 80% for more than 2 seconds
- (4) Voltage as measured at the **Connection Point** or **User System Entry Point** above 120% (115% for 275kV) for more than 1 second.

The times in sections (1) and (2) are maximum trip times. Shorter times may be used to protect the **Non-Synchronous Generating Units** or **Power Park Modules**.

#### Additional Damping Control Facilities for DC Converters

- 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.
- (b) Where specified in the **Bilateral Agreement**, each **DC Converter** is required to be provided with power oscillation damping or any other identified additional control facilities.

#### System to Generator Operational Intertipping Scheme

- CC.6.3.17 **NGET** may require that a **System to Generator Operational Intertipping Scheme** be installed as part of a condition of the connection of the **Generator**. Scheme specific details shall be included in the relevant **Bilateral Agreement**.

#### CC.6.4 GENERAL NETWORK OPERATOR AND NON-EMBEDDED CUSTOMER REQUIREMENTS

- CC.6.4.1 This part of the **Grid Code** describes the technical and design criteria and performance requirements for **Network Operators** and **Non-Embedded Customers**.

#### Neutral Earthing

- CC.6.4.2 At nominal **System** voltages of 132kV and above the higher voltage windings of three phase transformers and transformer banks connected to the **GB Transmission System** must be star connected with the star point suitable for connection to earth. The earthing and lower voltage winding arrangement shall be such as to ensure that the **Earth Fault Factor** requirement of paragraph CC.6.2.1.1 (b) will be met on the **GB Transmission System** at nominal **System** voltages of 132kV and above.

### Frequency Sensitive Relays

- CC.6.4.3 As explained under **OC6**, each **Network Operator**, will make arrangements that will facilitate automatic low **Frequency Disconnection of Demand** (based on **Annual ACS Conditions**). The **Bilateral Agreement** will specify the manner in which **Demand** subject to low **Frequency** disconnection will be split into discrete MW blocks with associated **Low Frequency Relay** settings. Technical requirements relating to **Low Frequency Relays** are listed in Appendix 5.

### Operational Metering

- CC.6.4.4 Where **NGET** can reasonably demonstrate that an **Embedded 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 Medium Power Station** or **Embedded DC Converter Station** is situated to ensure that the operational metering equipment described in CC.6.5.6 is installed such that **NGET** can receive the data referred to in CC.6.5.6. **NGET** 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 **NGET**.

### CC.6.5 COMMUNICATIONS PLANT

- CC.6.5.1 In order to ensure control of the **GB Transmission System**, telecommunications between **Users** and **NGET** must, if required by **NGET**, be established in accordance with the requirements set down below.

### Control Telephony

- CC.6.5.2 **Control Telephony** is the method by which a **User's Responsible Engineer/Operator** and **NGET Control Engineers** speak to one another for the purposes of control of the **Total System** in both normal and emergency operating conditions. **Control Telephony** provides secure point to point telephony for routine **Control Calls**, priority **Control Calls** and emergency **Control Calls**.
- CC.6.5.3 Supervisory tones indicate to the calling and receiving parties dial, engaged, ringing, secondary engaged (signifying that priority may be exercised) and priority disconnect tones.
- CC.6.5.4 Where **NGET** requires **Control Telephony**, **Users** are required to use the **Control Telephony** with **NGET** in respect of all **Connection Points** with the **GB Transmission System** and in respect of all **Embedded Large Power Stations** and **Embedded DC Converter Stations**. **NGET** will install **Control Telephony** at the **User's** location where the **User's** telephony equipment is not capable of providing the required facilities or is otherwise incompatible with the **Transmission Control Telephony**. Details of and relating to the **Control Telephony** required are contained in the **Bilateral Agreement**.
- CC.6.5.5 Detailed information on **Control Telephony** facilities and suitable equipment required for individual **User** applications will be provided by **NGET** upon request.

### Operational Metering

- CC.6.5.6 (a) **NGET** shall provide system control and data acquisition (SCADA) outstation interface equipment. The **User** shall provide such voltage, current,

**Demand Management** equal to or greater than the **Customer Demand Management Notification Level** (averaged over any half hour on any **Grid Supply Point**) on a half hourly and **Grid Supply Point** basis during the previous calendar day.

OC1.6 **NGET FORECASTS**

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

- (a) Historic **Demand** data (this includes **GB Transmission System Losses**).
- (b) Weather forecasts and the current and historic weather conditions.
- (c) The incidence of major events or activities which are known to **NGET** in advance.
- (d) Anticipated interconnection flows across **External Interconnections**.
- (e) **Demand Control** equal to or greater than the **Demand Control Notification Level** (averaged over any half hour at any **Grid Supply Point**) proposed to be exercised by **Network Operators** and of which **NGET** has been informed.
- (f) **Customer Demand Management** equal to or greater than the **Customer Demand Management Notification Level** (averaged over any half hour at any **Grid Supply point**) proposed to be exercised by **Suppliers** and of which **NGET** has been informed.
- (g) Other information supplied by **Users**.
- (h) Anticipated **Pumped Storage Unit** demand.
- (i) the sensitivity of **Demand** to anticipated market prices for electricity.
- (j) **BM Unit Data** submitted by **BM Participants** to **NGET** in accordance with the provisions of **BC1** and **BC2**.
- (k) **Demand** taken by **Station Transformers**

OC1.6.2 Taking into account the factors specified in OC1.6.1 **NGET** uses **Demand** forecast methodology to produce forecasts of **GB Transmission System Demand**. A written record of the use of the methodology must be kept by **NGET** for a period of at least 12 months.

OC1.6.3 The methodology will be based upon factors (a), (b) and (c) above to produce, by statistical means, unbiased forecasts of **GB National Demand**. **GB Transmission System Demand** will be calculated from these forecasts but will also take into account factors (d), (e), (f), (g), (h), (i) and (j) above. No other factors are taken into account by **NGET**, and it will base its **GB Transmission System Demand** forecasts on those factors only.

< End of OC1 >





		OC5.6.1 amended OC5.6.3 amended
	15 to 18	OC5.8 added
OC12	1	OC12.2.1 (a) amended OC12.3 (a) amended
	2	OC12.3 (d) amended OC12.3.2 amended OC12.3.3 amended OC12.4.1.1 amended
	5	OC12.4.4.1 amended
DRC	5 and 6	DRC.6.2 amended
GC	8	GC.15.1 amended

Revision 16

Effective Date: 30 May 2006

CODE	PAGE	CLAUSE
G&D	18	Definition of Generating Unit Data revised
BC1	1	BC1.2 amended
	3	BC1.4.2 (a) amended
BC2	1	BC2.2 amended

Revision 17

Effective Date: 01 September 2006

CODE	PAGE	CLAUSE
G&D	23	Definition of Large Power Station revised
	25	Definition of Medium Power Station revised

	34	Definition of Registered Capacity revised
	38	Definition of Small Power Station revised
	47	Construction of References xii (a) inserted and amended, xii(b) added
CC	18	CC.6.3.6 amended
	19 and 20	CC.6.3.7 amended
	36	CC.8.1 amended
	26	CC.A.3.1 amended
BC1	3	BC1.4.2 (a) amended
BC2	7	BC2.5.5.1 amended
	7	BC2.5.5.2 amended
BC3	1	BC3.3 amended
	2	BC3.4.1 amended
	2	BC3.5.1 amended
	3	BC3.5.3 amended
	4	BC3.5.4 amended

Revision 18

Effective Date: 20 December 2006

CODE	PAGE	CLAUSE
G&D	8	Definition of Control Point revised
	34	Definition of Registered Capacity revised
	47	Construction of References xii (b) amended
PC	51	PC.A.5.5 amended
	52	PC.A.5.6 amended

CC	2	CC.3.4 amended
	26	CC.6.4.4 amended
OC1	5	OC1.6.1 (a) amended