



# National Grid

**A REPORT TO THE AUTHORITY**  
**Pursuant to Paragraph 2 of Condition 7 of the**  
**Transmission Licence.**

**Proposed Grid Code Modification**  
**Operating Margin - OC4**

**The purpose of this document is to assist the Authority in its**  
**decision of whether to implement the proposed**  
**Grid Code Modification**

Consultation Paper Ref	G/01
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Prepared by	National Grid

DISTRIBUTION

Name	Organisation
Authority	Ofgem
Grid Code Review Panel Members	Various

1. Paragraph 2 of Condition 7 of the Transmission Licence granted to the National Grid Company plc ("National Grid") provides that National Grid shall, in consultation with authorised electricity operators liable to be materially affected thereby, periodically review the Grid Code and its implementation. That paragraph also requires National Grid, following such review, to send to the Authority:-
  - (a) a report on the outcome of such review;
  - (b) any proposed revisions to the Grid Code as National Grid (having regard to the outcome of such review) reasonably thinks fit for the achievement of the objectives set out in sub-paragraph (b) of Condition 7 of the Transmission Licence; and
  - (c) any written representations or objections from authorised electricity operators (including any proposals by such operators for revisions to the Grid Code not accepted by National Grid in the course of the review) arising during the consultation process and subsequently maintained.
2. National Grid has just completed a review of the Grid Code. This review relates to the requirements contained in Grid Code Operating Code No4 (OC4) and the continued need for OC4. Attached as Appendix A are the proposed revisions to the current Grid Code OC4, the Planning Code (PC), Balancing Code No 1 (BC1), Operating Code No 2 (OC2) and Data Registration Code (DRC) along with consequential changes to the Preface, Connection Conditions (CC) and Balancing Code No 3 (BC3). The proposed revisions are shown in typed form with the deletions crossed through and additions double underlined.
3. The proposed changes to the Grid Code were discussed at the Grid Code Review Panel on 13<sup>th</sup> September 2001 and it was agreed that National Grid should issue a Consultation Paper.
4. National Grid, in accordance with its obligations under its Transmission Licence, consulted those authorised electricity operators listed in Appendix B by circulating to them Consultation Paper G/01, which was dated 24<sup>th</sup> September 2001 and which contained the proposed amendments to the Grid Code. A copy of Consultation Paper G/01 is attached to this Report as Appendix C. National Grid also placed a copy of the Consultation Paper on its website to ensure its wide availability. It should be noted that Consultation Paper G/01 was prepared on the basis of Revision 2 of the Grid Code which was current at the time. Since there have been further revisions to the Grid Code since the Consultation Paper was issued, the appendix to this report now shows the proposed changes to the current version of the Grid Code, i.e. Revision 5.
5. Comments were invited from all such authorised electricity operators by 26<sup>th</sup> October 2001. National Grid has received responses from 8 authorised electricity operators. Some of the responses raised concerns with the proposed changes, in particular with respect to the effect of the proposals on certain standing Ancillary Services Agreements which reference OC4. National Grid has confirmed that less than twenty Ancillary Services Agreements will need minor amendments and these

can be dealt with by issuing amending agreements to take effect from the implementation date of the Grid Code modifications, should the Authority approve the proposed changes. Other comments were related to points of clarification and where appropriate some amendments have been made to the proposals, indicated in Appendix A by a vertical line in the right hand margin. National Grid has replied to each of those responding to the consultation and reached agreement that the latest proposals are satisfactory.

6. The proposed revisions to the Grid Code are, as indicated above, set out in Appendix A to this Report. By way of summary, the proposed changes are described below :-

#### Background

- 6.1 The proposed amendments to the Grid Code text are shown in Appendix A. These proposals include the relocation of the text of Operating Code 4 to other sections of the Grid Code. OC4 will then become an unused code within the Grid Code.
- 6.2 OC4 sets out and describes the types of reserve which make up the Operating Margin that National Grid uses in the Control Phase. National Grid's review of OC4 has concluded that most of the provisions contained within OC4 are duplicated elsewhere in the Grid Code. The review also concluded that those provisions not duplicated elsewhere would be better located in other codes within the Grid Code.

#### The Proposed Changes

- 6.3 The definitions of Primary and Secondary Response, Contingency and Operating Reserve are currently duplicated between the Glossary & Definitions (G&D) and OC4. It is proposed that the definitions in OC4 are deleted and the definition of Operational Reserve in the G&D amended in line with the current OC4 definition. In addition it is proposed that BC1.5.4 is enhanced to include references to Contingency Reserve and Operating Reserve.
- 6.4 OC4 requires National Grid to produce a weekly statement known as the "Weekly Operational Policy" (WOP). The main purpose of the WOP is to notify Generators of National Grid's desired L.F. relay settings on generation (or H.F. relay settings for demand / interconnectors). As changes to these settings occur rarely in practice, it is proposed to amend the text to introduce a "when necessary" statement rather than continue to require a weekly process. In addition OC4 requires National Grid to provide Users with a notification of the Total System Operating Reserve. It is proposed that the provision of all of this information can be transferred into Operating Code 2 (OC2), which will ensure consistency of timescales with other data provided to Users by National Grid.
- 6.5 OC4 contains obligations on Generators with Large Generating Plant to supply data to National Grid. It is proposed to move these requirements to the Planning Code (PC). As part of this change, it is also proposed to clarify the data provisions within the Data Registration Code (DRC) in particular with respect to the collection of Droop and Response data, relocating this data from Schedule 1 to a new Schedule 4 (currently not used).

- 6.6 It is also proposed to correct an inconsistency in the Grid Code with respect to the use of the term Minimum Generation between OC4 and other parts of the Code when the term is applied to multi-unit (modular) CCGT's.
- 6.7 The Grid Code defines Minimum Generation as:
- 'The minimum output ... which a Genset can generate under stable operating conditions, as registered with National Grid under the PC'
- and 'Genset' is defined as:
- 'A Generating Unit or CCGT Module at a Large Power Station'.
- 6.8 For a typical modular CCGT with 2 Gas Turbines and 1 Steam Turbine, these definitions will generally apply to a condition where 1 Gas Turbine and 1 Steam Turbine are running or a single Gas Turbine is running on open cycle.
- 6.9 However, in the Appendix to the Connection Conditions (CC), the phrase Minimum Generation is intended to apply to the condition where a CCGT Module has *all units synchronised* although this is contrary to the definition. Some of the data provisions of the Appendix to OC4 are also intended to apply to this condition. Therefore to align the data provisions to National Grid's requirements, amendments to the CC and the DRC are proposed.
7. As indicated above, having regard to the outcome of the review described in this Report, National Grid proposes the revisions to the Grid Code set out in Appendix A, which revisions we reasonably think fit for the achievement of the objectives referred to in sub-paragraph (b) of paragraph 1 of Condition 7 of the Transmission Licence. In view of this, National Grid would be grateful if the Authority would approve the revisions pursuant to paragraph 3 of Condition 7 of the Transmission Licence.
8. Given the logistic exercise of organising replacement pages to reflect the changes required by your letter of approval, I would be grateful if you would contact me prior to issuing any letter specifying an effective date, in order to seek to ensure that the date is consistent with any other Code changes which may then be approved or be close to being approved.

SIGNED BY

For and on behalf of The National Grid Company plc  
1<sup>st</sup> February 2002



## APPENDIX A

### Removal of **OC4** (Based on Rev 5 of the Grid Code) (with indication of relocation of paragraphs)

#### ~~OC4.1~~ — ~~INTRODUCTION~~

~~Operating Code No. 4 ("OC4") sets out the different types of reserve which make up the Operating Margin that NGC may use in the Control Phase.~~

#### ~~OC4.2~~ — ~~OBJECTIVE~~

~~The objective of OC4 is to set out and describe the types of reserve which may be utilised by NGC pursuant to the BCs.~~

~~[The description of each type of reserve is already contained within the Glossary and Definitions (G&D), therefore the objective of OC4 no longer applies]~~

#### ~~OC4.3~~ — ~~SCOPE~~

~~OC4 applies to NGC and to Users, which in OC4 means:~~

- ~~(a) Generators with Large Power Stations;~~
- ~~(b) Pumped Storage Generators acting in their capacity as a Non-Embedded Customer with respect to pumping load reduction offered as reserve;~~
- ~~(c) Other persons bound by the Grid Code with respect to control of Demand offered as an Ancillary Service.~~

#### ~~OC4.4~~ — ~~CONSTITUENTS OF OPERATING MARGIN~~

~~The Operating Margin comprises Contingency Reserve plus Operating Reserve.~~

~~[This description of operating margin is repeating that contained within the G&D]~~

#### ~~OC4.4.1~~ — ~~Contingency Reserve~~

~~Contingency Reserve is the margin of generation over forecast Demand which is required in the period from 24 hours ahead down to real time to cover against uncertainties in Large Power Station availability and against both weather forecast and Demand forecast errors. It is provided by Large Power Stations which are not required to be Synchronised but which must be held available to Synchronise within a defined timescale.~~

~~[This description of contingency reserve is repeating that contained within the G&D]~~

#### OC4.4.2 — Operating Reserve

~~Operating Reserve~~ is additional output from ~~Large Power Stations~~ or a reduction in ~~Demand~~ which must be realisable in real time operation to respond in order to contribute to containing and correcting any ~~System Frequency~~ fall to an acceptable level in the event of a loss of generation or a loss of import from an ~~External Interconnection~~ or mismatch between generation and ~~Demand~~. The ~~Operating Reserve~~ must be capable of providing response in three distinct timescales:

*[This description of operating reserve is repeating that contained within the G&D]*

##### OC4.4.2.1 — Primary Response

~~The automatic increase in Active Power~~ output of a ~~Genset~~ or, as the case may be, the decrease in ~~Active Power Demand~~ in response to a ~~System Frequency~~ fall. This increase in ~~Active Power~~ output or, as the case may be, the decrease in ~~Active Power Demand~~ must be in accordance with the provisions of the relevant ~~Ancillary Services Agreement~~ which will provide that it will be released increasingly with time over the period 0 to 10 seconds from the time of the start of the ~~Frequency~~ fall on the basis set out in the ~~Ancillary Services Agreement~~ and fully available by the latter, and sustainable for at least a further 20 seconds.

*[This description of primary response is repeating that contained within the G&D]*

##### OC4.4.2.2 — Secondary Response

~~The automatic increase in Active Power~~ output of a ~~Genset~~ or, as the case may be, the decrease in ~~Active Power Demand~~ in response to a ~~System Frequency~~ fall. This increase in ~~Active Power~~ output or, as the case may be, the decrease in ~~Active Power Demand~~ must be in accordance with the provisions of the relevant ~~Ancillary Services Agreement~~ which will provide that it will be fully available by 30 seconds from the time of the start of the ~~Frequency~~ fall and be sustainable for at least a further 30 minutes.

*[This description of contingency reserve is repeating that contained within the G&D]*

#### OC4.4.3 — Provision of Operating Margin

~~The categories of Operating Margin~~ set down in OC4.4.1 and OC4.4.2 can be fulfilled by a number of different types of ~~Gensets~~.

*[This statement adds no value and should be deleted]*

##### OC4.4.3.1 — Contingency Reserve

~~The amount of Contingency Reserve~~ required at the day ahead stage under ~~BC1~~ and in subsequent timescales will be decided by ~~NGC~~ on the basis of historical trends in the reduction in availability of ~~Large Power Stations~~ and increases in forecast ~~Demand~~ up to real time operation. Where ~~Contingency Reserve~~ is to be held on thermal ~~Gensets~~, ~~NGC~~ will include in any instruction by which the ~~Generator~~ in relation to these ~~Gensets~~ is notified of and/or instructed into the ~~Contingency Reserve~~ role, the length of time from ~~NGC~~ giving the Notice to Deviate from Zero in which these ~~Gensets~~ have to reach ~~Synchronous Speed~~.

*[This paragraph to be included in Balancing Code No1]*

#### OC4.4.3.2 — Operating Reserve

~~The amount of **Operating Reserve** required at any time will be determined by **NGC** having regard to the **Demand** levels, **Large Power Station** availability shortfalls and the greater of the largest secured loss of generation (ie, the loss of generation against which, as a requirement of the **Licence Standards**, the **NGC Transmission System** must be secured) or loss of import from or sudden export to **External Interconnections**. **NGC** will allocate the **Operating Reserve** to the various classes of **Large Power Stations** so as to fulfil the required levels of **Primary Response** and **Secondary Response** according to the **Ancillary Services** available to it and as provided in the **BCs**.~~

*[This paragraph to be included in Balancing Code No1]*

#### OC4.4.4 — Instruction of Operating Margin

~~**NGC** will issue instructions so as to fulfil in total the required levels of **Contingency Reserve** and **Operating Reserve** with the required levels of response.~~

~~Such instructions will be issued pursuant to the **BCs**, where appropriate.~~

*[This statement adds no value and should be deleted]*

#### OC4.5 — DATA REQUIREMENTS

~~The response capability data required, in connection with **Operating Reserve**, **High Frequency Response**, and **Limited High Frequency Response**, for each **Genset** and for **Demand** is listed in the Appendix to OC4. (**Gas Turbine Plant** should only supply the data applicable to them). This data for all such units should be provided when a **Statement of Readiness** under the **Bilateral Agreement** and/or **Construction Agreement** is submitted and thereafter in week 24 in each calendar year and shall be within the parameters set out in CC.6. Any changes to these parameters should be notified to **NGC** promptly upon them taking effect.~~

*[This section to be included in the Planning Code (PC)]*

#### OC4.6 — WEEKLY OPERATIONAL POLICY

##### **Generating Units used as Fast Start on Low Frequency Start-Up**

~~OC4.6.1 — Each week **NGC** will issue to each **Generator** in respect of its **Large Power Stations** by 1500 hours on Wednesday a **Weekly Operational Policy** which will run from 1000 hours on the Monday following to immediately before 1000 hours on the subsequent Monday. The **Weekly Operational Policy** will be in respect of all **Generators' Gensets** available for start from standstill by low frequency relay initiation with a **Fast Start Capability** agreed pursuant to the **Bilateral Agreement**, at **System Frequencies** of 49.70Hz and 49.60Hz (or such **System Frequencies** as **NGC** shall specify). The **Weekly Operational Policy** will specify the location and capacity of such **Gensets**. Account will be taken of existing **Low Frequency Relay** settings in selecting **Gensets** for the **Weekly Operational Policy**.~~

*[The Weekly Operational Policy to be suspended, to be replaced with ad-hoc changes to relay settings, defined within OC2]*

- ~~(a) Each **Generator** will by 1000 hours on each Friday confirm in writing acceptance or otherwise of the **Gensets** specified for **Fast Start** duty in the **Weekly Operational Policy** as it applies to it. The settings allocated to particular **Gensets** may be interchanged between 49.70Hz and 49.60Hz (or such other **System Frequencies** as **NGC** may have specified) provided the overall capacity at each setting and **System** requirements can, in **NGC's** view, be met.~~

~~If a **Generator** wishes to interchange settings it should contact **NGC** by 1000 hours on the Friday prior to the Monday on which it would like to institute the changes to seek **NGC's** agreement. If **NGC** agrees, the changes will be reflected in the up-dated version of the policy referred to in (b) below.~~

- ~~(b) The policy will be up-dated when necessary by **NGC** to take account of **Genset** unavailability or reflect changes in settings referred to in (a) above.~~

~~OC4.6.2 Once accepted, each **Generator** (if that **Genset** is declared available and is not subject to forced outage or **Planned Outage**) will abide by the terms of the **Weekly Operational Policy**.~~

~~[This section has been rewritten to become an ad-hoc change and included within OC2]~~

#### ~~Operating Margins~~

~~OC4.6.3 The **Weekly Operational Policy** will include an indication of the level of **Operating Reserve** to be utilised by **NGC** in connection with the operation of the **Balancing Mechanism** in the week beginning with the **Operational Day** commencing during the subsequent Monday, which level shall be purely indicative.~~

~~OC4.6.4 The **Weekly Operational Policy** will also indicate the possible level of **Operating Reserve** (if any) which may be provided by **Interconnector Users** in the week beginning with the **Operational Day** commencing during the subsequent Monday.~~

~~OC4.6.5 The **Weekly Operational Policy** will also indicate the possible level of **High Frequency Response** to be utilised by **NGC** in connection with the operation of the **Balancing Mechanism** in the week beginning with the **Operational Day** commencing during the subsequent Monday, which level shall be purely indicative.~~

~~[This section to be included in OC2]~~

## OC4 APPENDIX

[This section to be moved into the PC]

### OC4.A.1 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.

In the case of a **CCGT Module** at a **Large Power Station**, the information is required in respect of each **CCGT Unit** within that **Module** unless it has been agreed in an **Ancillary Services Agreement** to be treated on a modular basis, in which case the information is required in respect of each **CCGT Module** at that **Large Power Station**.

#### OC4.A.1.1 MW loading points at which data is required

Response values are required at up to six MW loading points (MLP1 to MLP6) for the **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.

When data is provided with a **Statement of Readiness** under the **Bilateral Agreement** and/or **Construction Agreement**, 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 thereafter in week 24 in each calendar year, the MW loading points may take any value between **Designed Minimum Operating Level** and **Registered Capacity**. The data submitted via OC4 may be identical to the data contained in the relevant **Ancillary Services Agreement** but is not intended to constrain any such **Ancillary Services Agreement**.

The **Generator** must continue to provide **Designed Minimum Operating Level** even if it does not form one of the MW loading points.

#### OC4.A.1.2 Primary Response to Frequency fall

**Primary Response** values for a -0.5Hz ramp are required at up to six MW loading points (MLP1 to MLP6) as detailed in OC4.A.1.1.

#### OC4.A.1.3 Secondary Response to Frequency fall

**Secondary Response** values for a -0.5Hz ramp are required at up to six MW loading points (MLP1 to MLP6) as detailed in OC4.A.1.1.

OC4.A.1.4 ~~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 in OC4.A.1.1.

OC4.A.2 ~~Genset's Governor Deadband and Droop Characteristics~~

~~Note:~~ The data items requested under Option 1 below may continue to be provided by ~~Generators~~ in relation to ~~Gensets~~ 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. ~~Generators~~ must supply the data as set out under Option 2 (and not those under Option 1) for ~~Genset~~ governor control systems commissioned after the relevant date, those ~~Genset~~ governor control systems recommissioned for any reason such as refurbishment after the relevant date and ~~Genset~~ governor control systems where, as a result of testing or other process, the ~~Generator~~ is aware of the data items listed under Option 2 in relation to that ~~Genset~~.

Option 1

Droop at <b>Minimum Generation:</b>	_____	%
Intermediate load 1	_____	MW
Droop at intermediate load 1	_____	%
Intermediate load 2	_____	MW
Droop at intermediate load 2	_____	%
Droop at <b>Registered Capacity</b>	_____	%

These should be stated as at design conditions.

Note: Intermediate loads 1 and 2 must lie in the range 80%–100% rated MW at, in the case of **Steam Unit**, rated steam pressure.

In the case of a **CCGT Module** at a **Large Power Station**, the information is required in respect of each **CCGT Unit** within that **Module** unless it has been agreed in an **Ancillary Services Agreement** to be treated on a modular basis, in which case the information is required in respect of each **CCGT Module** at a **Large Power Station**.

Boiler & Steam Turbine Data

Boiler Time Constant (Stored **Active Energy**) \_\_\_\_\_ S

\_\_\_\_\_ HP turbine response ratio:  
proportion of **Primary Response** \_\_\_\_\_ %  
arising from HP turbine.

\_\_\_\_\_ HP turbine response ratio:  
proportion of **High Frequency Response** \_\_\_\_\_ %  
arising from HP turbine.

Option 2

Deadband

Governor Deadband \_\_\_\_\_  
Maximum Setting \_\_\_\_\_  $\pm$ Hz  
Normal Setting \_\_\_\_\_  $\pm$ Hz  
Minimum Setting \_\_\_\_\_  $\pm$ Hz

Where the **Genset** governor does not have a selectable deadband facility, then the actual value of the deadband need only be provided.

Drop

*Incremental Droop values (in %) are required at six MW loading points (MLP1 to MLP6) as detailed in OC4.A.1.1.*

The data submitted via OC4 are not intended to constrain any **Ancillary Services Agreement**.

[Data should be supplied for each **Genset**.]

OC4.A.3 Unit Control Options

Maximum droop \_\_\_\_\_ %  
Normal droop \_\_\_\_\_ %  
Minimum droop \_\_\_\_\_ %

Maximum **Frequency** deadband \_\_\_\_\_  $\pm$ Hz  
Normal **Frequency** deadband \_\_\_\_\_  $\pm$ Hz  
Minimum **Frequency** deadband \_\_\_\_\_  $\pm$ Hz

Maximum output deadband  $\pm$ MW  
Normal output deadband \_\_\_\_\_  $\pm$ MW  
Minimum output deadband  $\pm$ MW

**Frequency** settings between which Unit Load Controller droop applies:

\_\_\_\_\_ Maximum \_\_\_\_\_ Hz  
\_\_\_\_\_ Normal \_\_\_\_\_ Hz  
\_\_\_\_\_ Minimum \_\_\_\_\_ Hz

State if sustained response is normally selected.

OC4.A.4 Control of **Demand** or Reduction of Pumping Load Offered as Reserve

\_\_\_\_\_ Magnitude of **Demand** or pumping load  
which is tripped \_\_\_\_\_ MW

\_\_\_\_\_ **System Frequency** at which tripping  
is initiated \_\_\_\_\_ Hz

\_\_\_\_\_ Time duration of **System Frequency**  
below trip setting for tripping to be initiated \_\_\_\_\_ S

Time delay from trip initiation to tripping S

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← End of OC4 →

## Extract from Glossary and Definitions

(including proposed amendments plus all existing terms relevant to Operating Margin)

**Contingency Reserve** The margin of generation over forecast ~~demand~~ **Demand** which is required in the period from 24 hours ahead down to real time to cover against uncertainties in **Large Power Station** availability and against both weather forecast and **Demand** forecast errors.

**Operating Reserve** The additional output from **Large Power Stations** or the reduction in **Demand**, which must be realisable in real-time operation to respond in order to contribute to containing and correcting any **System Frequency** fall to an acceptable level in the event of a loss of generation or a loss of import from an **External Interconnection** or mismatch between generation and **Demand**.

**Weekly Operational Policy** A statement issued by **NGC** each week (to **Generators** as set out in **OC4**) of specific requirements to enable **NGC** to operate the **NGC Transmission System** within the requirements of the **Transmission Licence**.

## Extract from BC1.5.4

### BC1.5.4 Reserve and Inadequate System Margin

#### Contingency Reserve

- (a) The amount of **Contingency Reserve** required at the day ahead stage and in subsequent timescales will be decided by **NGC** on the basis of historical trends in the reduction in availability of **Large Power Stations** and increases in forecast **Demand** up to real time operation. Where **Contingency Reserve** is to be allocated to thermal **Gensets**, **NGC** will instruct through a combination of **Ancillary Services** instructions and **Bid-Offer Acceptances**, the time at which such **Gensets** are required to synchronise, such instructions to be consistent with **Dynamic Parameters** and other contractual arrangements.

#### Operating Reserve

- (b) The amount of **Operating Reserve** required at any time will be determined by **NGC** having regard to the **Demand** levels, **Large Power Station** availability shortfalls and the greater of the largest secured loss of generation (ie, the loss of generation against which, as a requirement of the **Licence Standards**, the **NGC Transmission System** must be secured) or loss of import from or sudden export to **External Interconnections**. **NGC** will allocate **Operating Reserve** to the appropriate **BM Units** so as to fulfil its requirements according to the **Ancillary Services** available to it and as provided in the **BCs**.

#### Inadequate System Margin

- (ac) In the period following 1200 hours each day and in relation to the following **Operational Day**, **NGC** will monitor the total of the Maximum Export Limit component of the **Export and Import Limits** received against forecast **NGC Demand** and the **Operating Margin** and will take account of **Dynamic Parameters** to see whether the anticipated level of the **System Margin** for any period is insufficient.
- (bd) Where the level of the **System Margin** for any period is, in **NGC's** reasonable opinion, anticipated to be insufficient, **NGC** will send (by such data transmission facilities as have been agreed) a **NGC System Warning - Inadequate System Margin** in accordance with OC7.4.8 to each **Generator, Supplier, Externally Interconnected System Operator, Network Operator** and **Non-Embedded Customer**.
- (ee) Where, in **NGC's** judgement the **System Margin** at any time during the current **Operational Day** is such that there is a high risk of **Demand**

reduction being instructed, a **NGC System Warning - High Risk of Demand Reduction** will be issued, in accordance with OC7.4.8.

- (df) The monitoring will be conducted on a regular basis and a revised **NGC System Warning - Inadequate System Margin** or **High Risk of Demand Reduction** may be sent out from time to time, including within the post **Gate Closure** phase. This will reflect any changes in **Physical Notifications** and **Export and Import Limits** which have been notified to **NGC**, and will reflect any **Demand Control** which has also been so notified. This will also reflect generally any changes in the forecast **Demand** and the relevant **Operating Margin**.
- (eg) To reflect changing conditions, a **NGC System Warning - Inadequate System Margin** may be superseded by a **NGC System Warning - High Risk of Demand Reduction** and vice-versa.
- (fh) If the continuing monitoring identifies that the **System Margin** is anticipated, in **NGC's** reasonable opinion, to be sufficient for the period for which previously a **NGC System Warning** had been issued, **NGC** will send (by such data transmission facilities as have been agreed) a **Cancellation of NGC System Warning** to each **User** who had received a **NGC System Warning - Inadequate System Margin** or **High Risk of Demand Reduction** for that period. The issue of a **Cancellation of NGC System Warning** is not an assurance by **NGC** that in the event the **System Margin** will be adequate, but reflects **NGC's** reasonable opinion that the insufficiency is no longer anticipated.
- (gi) If continued monitoring indicates the **System Margin** becoming inadequate **NGC** may issue further **NGC System Warnings - Inadequate System Margin** or **High Risk of Demand Reduction**.
- (hj) **NGC** may issue a **NGC System Warning - Inadequate System Margin** or **High Risk of Demand Reduction** for any period, not necessarily relating to the following **Operational Day**, where it has reason to believe there will be inadequate **System Margin** over a period (for example in periods of protracted **Plant** shortage, the provisions of OC7.4.8.6 apply).

## Additions to OC2

### OC2.4.6 OPERATING MARGIN DATA REQUIREMENTS

#### OC2.4.6.1 Modifications to relay settings

'Relay settings' in this OC2.4.6.1 refers to the settings of **Low Frequency Relays** in respect of **Gensets** that are available for start from standby by **Low Frequency Relay** initiation with **Fast Start Capability** agreed pursuant to the **Bilateral Agreement**.

#### By 1600 hours each Wednesday

A change in relay settings will be sent by **NGC** no later than 1600 hours on a Wednesday to apply from 1000 hours on the Monday following. The settings allocated to particular **Large Power Stations** may be interchanged between 49.70Hz and 49.60Hz (or such other **System Frequencies** as **NGC** may have specified) provided the overall capacity at each setting and **System** requirements can, in **NGC's** view, be met.

#### Between 1600 hours each Wednesday and 1200 hours each Friday

If a **Generator** wishes to discuss or interchange settings it should contact **NGC** by 1200 hours on the Friday prior to the Monday on which it would like to institute the changes to seek **NGC's** agreement. If **NGC** agrees, **NGC** will then send confirmation of the agreed new settings.

#### By 1500 hours each Friday

If any alterations to relay settings have been agreed, then the updated version of the current relay settings will be sent to affected **Users** by 1500 hours on the Friday prior to the Monday on which the changes will take effect. Once accepted, each **Generator** (if that **Large Power Station** is not subject to forced outage or **Planned Outage**) will abide by the terms of its latest relay settings.

In addition, **NGC** will take account of any **Large Power Station** unavailability (as notified under OC2.4.1.2 submissions) in its total **Operating Reserve** policy.

**NGC** may from time to time, for confirmation purposes only, issue the latest version of the current relay settings to each affected **Generator**

#### OC2.4.6.2 Operating Margins

#### By 1600 hours each Wednesday

No later than 1600 hours on a Wednesday, **NGC** will provide an indication of the level of **Operating Reserve** to be utilised by **NGC** in connection with the operation of the **Balancing Mechanism** in the week beginning with the **Operational Day** commencing during the subsequent Monday, which level shall be purely indicative.

This **Operating Margin** indication will also note the possible level of **Operating Reserve** (if any) which may be provided by **Interconnector Users** in the week beginning with the **Operational Day** commencing during the subsequent Monday.

This **Operating Margin** indication will also note the possible level of **High Frequency Response** to be utilised by **NGC** in connection with the operation of the **Balancing Mechanism** in the week beginning with the **Operational Day** commencing during the subsequent Monday, which level shall be purely indicative.

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### Extracts from PC

PC.A.1.6 The following paragraphs in this Appendix relate to **Forecast Data**:

3.2.2(b), (h), (i) and (j)(part)  
4.2.1  
4.2.3  
4.3.1  
4.3.2  
4.3.3  
4.3.4  
4.3.5  
4.5(a)(ii) and (b)(ii)  
~~4.6.1~~  
4.7.1  
5.2.1.  
5.2.2

PC.A.1.7 The following paragraphs in this Appendix relate to **Registered Data** and **Estimated Registered Data**:

2.2.1  
2.2.4  
2.2.5  
2.2.6  
2.3.1  
2.4.1  
3.2.2(a), (c), (d), (e), (f), (g), (j) (part) and (k)  
3.4.1  
3.4.2  
4.5(a)(i), (a)(iii), (b)(i) and (b)(iii)  
4.6  
5.3.42  
5.4  
6.2  
6.3

.....

PC.A.1.10 **Registered Data** must contain validated actual values, parameters or other information (as the case may be) which replace the estimated values, parameters or other information (as the case may be) which were given in relation to those data items when they were **Preliminary Project Planning Data** and **Committed Project Planning Data**, or in the case of changes, which replace earlier actual

values, parameters or other information (as the case may be). Until amended pursuant to the **Grid Code**, these actual values, parameters or other information (as the case may be) will be the basis upon which **NGC** plans, designs, builds and operates the **NGC Transmission System** in accordance with, amongst other things, the **Transmission Licence** and the **Grid Code**, and on which **NGC** therefore relies. In following the processes set out in the **BCs**, **NGC** will use the data which has been supplied to it under the **BCs** and the data supplied under **OC2** and **OC4** (as provided in those sections of the **Grid Code**) in relation to **Gensets**, but the provision of such data will not alter the data supplied by **Users** under the **PC**, which may only be amended as provided in the **PC**.

.....

PC.A.4.6      Control of **Demand** or Reduction of Pumping Load Offered as Reserve

- Magnitude of **Demand** or pumping load which is tripped      MW
- **System Frequency** at which tripping is initiated      Hz
- Time duration of **System Frequency** below trip setting for tripping to be initiated      s
- Time delay from trip initiation to tripping      s

PC.A.4.67      General **Demand** Data

PC.A.4.67.1      .....

.....

PC.A.5.3      Synchronous Machine and Associated Control System Data

PC.A.5.3.1      The data submitted below are not intended to constrain any **Ancillary Services Agreement**.

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

- (a)      .....
- .....

(d)      Governor Parameters

Incremental Droop values (in %) are required for each **Generating Unit** at six MW loading points (MLP1 to MLP6) as detailed in PC.A.5.4.1 (this data item needs only be provided for **Large Power Stations**)

**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. **Generators** must supply the data as set out under Option 2 (and not those under Option 1) for **Generating Unit** governor control systems commissioned after the relevant date, those **Generating Unit** governor control systems recommissioned for any reason such as refurbishment after the relevant date and **Generating Unit** governor control systems where, as a result of testing or other process, the **Generator** is aware of the data items listed under Option 2 in relation to that **Generating Unit**.

Option 1

(i) Governor Parameters (for Reheat **Steam Units**)

HP governor average gain MW/Hz  
Speeder motor setting range  
HP governor valve time constant  
HP governor valve opening limits  
HP governor valve rate limits  
Reheater time constant (**Active Energy** stored in reheater)

IP governor average gain MW/Hz  
IP governor setting range  
IP governor valve time constant  
IP governor valve opening limits  
IP governor valve rate limits

Details of acceleration sensitive elements in HP & IP governor loop.  
A governor block diagram showing transfer functions of individual elements.

(ii) Governor Parameters (for Non-Reheat **Steam Units** and **Gas Turbine Units**)

Governor average gain  
Speeder motor setting range  
Time constant of steam or fuel governor valve  
Governor valve opening limits  
Governor valve rate limits  
Time constant of turbine  
Governor block diagram

The following data items need only be supplied for **Large Power Stations**:-

(iii) Boiler & Steam Turbine Data

Boiler Time Constant (Stored <b>Active Energy</b> )	s
HP turbine response ratio: proportion of <b>Primary Response</b>	%

arising from HP turbine.

HP turbine response ratio:  
proportion of **High Frequency Response**                      %  
arising from HP turbine.

[End of Option 1]

Option 2

(i) Governor and associated prime mover Parameters - All  
Generating Units

Governor Block Diagram showing transfer function of  
individual elements including acceleration sensitive  
elements.

Governor Time Constant (in seconds)

Speeder Motor Setting Range (%)

Average Gain (MW/Hz)

Governor Deadband (this data item needs only be provided  
for Large Power Stations)

- Maximum Setting                      ±Hz

- Normal Setting                      ±Hz

- Minimum Setting                      ±Hz

Where the **Generating Unit** governor does not have a  
selectable deadband facility, then the actual value of the  
deadband need only be provided

(ii) Governor and associated prime mover Parameters - Steam  
Units

HP Valve Time Constant (in seconds)

HP Valve Opening Limits (%)

HP Valve Opening Rate Limits (%/second)

HP Value Closing Rate Limits (%/second)

HP Turbine Time Constant (in seconds)

IP Valve Time Constant (in seconds)

IP Valve Opening Limits (%)

IP Valve Opening Rate Limits (%/second)

IP Value Closing Rate Limits (%/second)

IP Turbine Time Constant (in seconds)

LP Valve Time Constant (in seconds)

LP Valve Opening Limits (%)

LP Valve Opening Rate Limits (%/second)

LP Value Closing Rate Limits (%/second)

LP Turbine Time Constant (in seconds)

Reheater Time Constant (in seconds)

Boiler Time Constant (in seconds)  
HP Power Fraction (%)  
IP Power Fraction (%)

(iii) Governor and associated prime mover Parameters - Gas Turbine Units

Inlet Guide Vane Time Constant (in seconds)  
Inlet Guide Vane Opening Limits (%)  
Inlet Guide Vane Opening Rate Limits (%/second)  
Inlet Guide Vane Closing Rate Limits (%/second)  
Fuel Valve Constant (in seconds)  
Fuel Valve Opening Limits (%)  
Fuel Valve Opening Rate Limits (%/second)  
Fuel Valve Closing Rate Limits (%/second)

Waste Heat Recovery Boiler Time Constant (in seconds)

(iv) Governor and associated prime mover Parameters - Hydro Generating Units

Guide Vane Actuator Time Constant (in seconds)  
Guide Vane Opening Limits (%)  
Guide Vane Opening Rate Limits (%/second)  
Guide Vane Closing Rate Limits (%/second)  
Water Time Constant (in seconds)

[End of Option 2]

(e) Unit Control Options

The following data items need only be supplied with respect to **Large Power Stations**

Maximum droop %  
Normal droop %  
Minimum droop %

Maximum **Frequency** deadband  $\pm$ Hz  
Normal **Frequency** deadband  $\pm$ Hz  
Minimum **Frequency** deadband  $\pm$ Hz

Maximum output deadband  $\pm$ MW  
Normal output deadband  $\pm$ MW

Minimum output deadband  $\pm$ MW

**Frequency** settings between which Unit Load Controller droop applies:

- Maximum Hz  
- Normal Hz  
- Minimum Hz

State if sustained response is normally selected.

(e)(f) Plant Flexibility Performance

The following data items need only be supplied with respect to **Large Power Stations**, and should be provided ~~The following data is required~~ with respect to each **Genset**:

- # Run-up rate to **Registered Capacity**,
- # Run-down rate from **Registered Capacity**,
- # **Synchronising Generation**,  
Regulating range  
**Load rejection capability while still Synchronised** and able to supply **Load**.

Data items marked with a hash (#) should be applicable to a **Genset** which has been **Shutdown** for 48 hours.

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

PC.A.5.4 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**.

In this **PC.A.5.4**, 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**.

**PC.A.5.4.1** **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.5.4.2      **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.5.4.3      **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.

## Extracts from the DATA REGISTRATION CODE

DRC.4.4            **Operational Data**

DRC.4.4.1        **Operational Data** is data which is required by the **Operating Codes** and the **Balancing Codes**. Within the **DRC**, **Operational Data** is sub-categorised according to the **Code** under which it is required, namely **OC1**, **OC2**, ~~**OC4**~~, **BC1** or **BC2**.

.....

DRC.6.1.4        SCHEDULE 4 - **LARGE POWER STATION** Droop and Response data ~~Not Used~~.  
Comprising data on Governor droop settings, and **Primary**, **Secondary** and **High Frequency Response** data for **Large Power Stations**.

.....

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

**Generators with Large Power Stations**            Sched 1, 2, 3, **4**, 9, 14

.....

**SCHEDULE 1**  
 Page 6 of 10

DATA DESCRIPTION	UNITS	DATA CAT.	GENERATING UNIT OR STATION DATA						
			G1	G2	G3	G4	G5	G6	STN
<b>GOVERNOR AND ASSOCIATED PRIME MOVER PARAMETERS</b>									
<p><b>Note:</b> The data items requested under Option 1 below may continue to be provided by <b>Generators</b> in relation to <b>Generating Units</b> on the <b>System</b> at 9 January 1995 (in this paragraph, the "relevant date") or they may provide the new data items set out under Option 2. <b>Generators</b> must supply the data as set out under Option 2 (and not those under Option 1) for <b>Generating Unit</b> governor control systems commissioned after the relevant date, those <b>Generating Unit</b> governor control systems recommissioned for any reason such as refurbishment after the relevant date and <b>Generating Unit</b> governor control systems where, as a result of testing or other process, the <b>Generator</b> is aware of the data items listed under Option 2 in relation to that <b>Generating Unit</b>.</p>									
<b>Option 1</b>									
<u>GOVERNOR PARAMETERS (REHEAT UNITS)</u>									
HP Governor average gain	MW/Hz	DPD							
Speeder motor setting range	Hz	DPD							
HP governor valve time constant	S	DPD							
HP governor valve opening limits		DPD							
HP governor valve rate limits		DPD							
Re-heat time constant (stored <b>Active Energy</b> in reheater)	S	DPD							
IP governor average gain	MW/Hz	DPD							
IP governor setting range	Hz	DPD							
IP governor time constant	S	DPD							
IP governor valve opening limits		DPD							
IP governor valve rate limits		DPD							
Details of acceleration sensitive elements HP & IP in governor loop		DPD	(please attach)						
Governor block diagram showing transfer functions of individual elements		DPD	(please attach)						
<u>GOVERNOR (Non-reheat steam and Gas Turbines)</u>									
Governor average gain	MW/Hz	DPD							
Speeder motor setting range		DPD							
Time constant of steam or fuel governor valve	S	DPD							
Governor valve opening limits		DPD							
Governor valve rate limits		DPD							
Time constant of turbine	S	DPD							
Governor block diagram		DPD	(please attach)						
<b>GENERATING UNIT</b>									
<u>GOVERNOR DROOP CHARACTERISTICS*</u>									
Droop at Min-Gen	%	OC4							
Intermediate load 1	MW	OC4							
Droop at intermediate load 1	%	OC4							
Intermediate load 2	MW	OC4							
Droop at intermediate load 2	%	OC4							
Droop at RC	%	OC4							

**SCHEDULE 1**

Page 7 of 10

DATA DESCRIPTION	UNITS	DATA CAT.	GENERATING UNIT OR STATION						
			DATA						
			G1	G2	G3	G4	G5	G6	STN
<p><del>Note: — Intermediate loads 1 and 2 must lie in the range 80% – 100% rated MW, in the case of steam units at rated steam pressure. In the case of a CCGT Module at a Large Power Station, the information is required in respect of each CCGT Unit within that Module unless it has been agreed in an Ancillary Services Agreement to be treated on a modular basis, in which case the information is required in respect of each CCGT Module at a Large Power Station.</del></p>									
<b><u>BOILER &amp; STEAM TURBINE DATA*</u></b>									
Boiler time constant (Stored <b>Active Energy</b> )	S	<del>OC4</del> <del>DPD</del>							
HP turbine response ratio: (Proportion of <b>Primary Response</b> arising from HP turbine)	%	<del>OC4</del> <del>DPD</del>							
HP turbine response ratio: (Proportion of <b>High Frequency Response</b> arising from HP turbine)	%	<del>OC4</del> <del>DPD</del>							
End of Option 1									
<b>Option 2</b>									
<b><u>All Generating Units</u></b>									
Governor Block Diagram showing transfer function of individual elements including acceleration sensitive elements		<del>DPD</del>							
Governor Time Constant	Sec	<del>DPD</del>							
#Governor Deadband									
- Maximum Setting		<del>OC4</del>							
- Normal Setting		<del>DPD</del>							
- Minimum Setting		<del>OC4</del>							
	±Hz	<del>DPD</del>							
	±Hz	<del>OC4</del>							
	±Hz	<del>DPD</del>							
Speeder Motor Setting Range	%	<del>DPD</del>							
Average Gain	MW/Hz	<del>DPD</del>							
<del>=Droop</del>									
<del>Incremental Droop at MLP1</del>	%	<del>OC4</del>							
<del>Incremental Droop at MLP2</del>	%	<del>OC4</del>							
<del>Incremental Droop at MLP3</del>	%	<del>OC4</del>							
<del>Incremental Droop at MLP4</del>	%	<del>OC4</del>							
<del>Incremental Droop at MLP5</del>	%	<del>OC4</del>							
<del>Incremental Droop at MLP6</del>	%	<del>OC4</del>							

# Where the generating unit governor does not have a selectable deadband facility, then the actual value of the deadband need only be provided.

~~= The data submitted via OC4 are not intended to constrain any **Ancillary Services Agreement**.~~

DATA DESCRIPTION	UNITS	DATA CAT.	GENERATING UNIT OR STATION DATA						
			G1	G2	G3	G4	G5	G6	STN
<b>UNIT CONTROL OPTIONS*</b>									
Maximum droop	%	OC4DPD							
Normal droop	%	OC4DPD							
Minimum droop	%	OC4DPD							
Maximum frequency deadband	±Hz	OC4DPD							
Normal frequency deadband	±Hz	OC4DPD							
Minimum frequency deadband	±Hz	OC4DPD							
Maximum Output deadband	±MW	OC4DPD							
Normal Output deadband	±MW	OC4DPD							
Minimum Output deadband	±MW	OC4DPD							
Frequency settings between which Unit Load Controller droop applies:									
Maximum	Hz	OC4DPD							
Normal	Hz	OC4DPD							
Minimum	Hz	OC4DPD							
Sustained response normally selected	Yes/No	OC4DPD							
<u>RESPONSE CAPABILITY*</u>									
Note that the data items requested below may be identical to data contained in the relevant <b>Ancillary Services Agreement</b> but data submitted via OC4 is not intended to constrain any such <b>Ancillary Services Agreement</b> .									
<b>Designed Minimum Operating Level</b>	<i>MW</i>								
MW loading points at which response data is required:									
MLP1	<i>MW</i>	OC4							
MLP2	<i>MW</i>	OC4							
MLP3	<i>MW</i>	OC4							
MLP4	<i>MW</i>	OC4							
MLP5	<i>MW</i>	OC4							
MLP6	<i>MW</i>	OC4							
<b>Primary Response to frequency fall:</b>									
<b>Primary Response</b> values to -0.5Hz ramp at six MW loading points as follows:									
Response at MLP1	<i>MW</i>	OC4							
Response at MLP2	<i>MW</i>	OC4							
Response at MLP3	<i>MW</i>	OC4							
Response at MLP4	<i>MW</i>	OC4							
Response at MLP5	<i>MW</i>	OC4							
Response at MLP6	<i>MW</i>	OC4							

DATA DESCRIPTION	UNITS	DATA GAT.	GENERATING UNIT (OR CD CCGT MODULE, AS THE CASE MAY BE) OR STATION DATA					
			G1	G2	G3	G4	G5	G6
<p><b>Secondary Response</b> to frequency fall:</p> <p><b>Secondary Response</b> values to -0.5Hz ramp at six MW loading points as follows:</p> <p>Response at MLP1                      Response at MLP2                      Response at MLP3                      Response at MLP4                      Response at MLP5                      Response at MLP6</p> <p><b>High Frequency Response</b> to frequency rise:</p> <p><b>High Frequency Response</b> values to +0.5Hz ramp at six MW loading points as follows:</p> <p>Response at MLP1                      Response at MLP2                      Response at MLP3                      Response at MLP4                      Response at MLP5                      Response at MLP6</p> <p>In the case of a <b>CCGT Module</b> at a <b>Large Power Station</b>, the information is required in respect of each <b>CCGT Unit</b> within that <b>Module</b> unless it has been agreed in an <b>Ancillary Services Agreement</b> to be treated on a modular basis, in which case the information is required in respect of each <b>CCGT Module</b>.</p>	<p>MW                      MW                      MW                      MW                      MW                      MW</p> <p>MW                      MW                      MW                      MW                      MW                      MW</p>	<p>OC4                      OC4                      OC4                      OC4                      OC4                      OC4</p> <p>OC4                      OC4                      OC4                      OC4                      OC4                      OC4</p>						

**NOTE:**

**Users** are referred to Schedules 5 & 14 which set down data required for all **Users** directly connected to the **NGC Transmission System**, including **Power Stations**.

**DATA REGISTRATION CODE**

**SCHEDULE 4**  
 Page 1 of 1

**GOVERNOR DROOP AND RESPONSE**

The Data in this Schedule 4 is to be supplied by **Generators** with respect to all **Large Power Stations**, whether directly connected or **Embedded**.

DATA DESCRIPTION	NORMAL VALUE	MW	DATA CAT	DROOP %			RESPONSE CAPABILITY		
				Unit 1	Unit 2	Unit 3	Primary	Secondary	High Frequency
MLP1	<b>Designed Minimum Operating Level</b> (for a <b>CCGT Module</b> , on a Modular basis assuming all units are synchronised)		DPD						
MLP2	<b>Minimum Generation</b> (for a <b>CCGT Module</b> , on a Modular basis assuming all units are synchronised)		DPD						
MLP3	70% of <b>Registered Capacity</b>		DPD						
MLP4	80% of <b>Registered Capacity</b>		DPD						
MLP5	95% of <b>Registered Capacity</b>		DPD						
MLP6	<b>Registered Capacity</b>		DPD						

Notes:

1. The data provided in this Schedule 4 is not intended to constrain any **Ancillary Services Agreement**
2. **Registered Capacity** should be identical to that provided in Schedule 2.
3. The Governor Droop should be provided for each **Generating Unit**. The Response Capability should be provided for each **Genset**.
4. **Primary, Secondary and High Frequency Response** are defined in CC.A.3.2, and are based on a frequency ramp of 0.5Hz over 10 seconds. **Primary Response** is the minimum value of response between 10s and 30s after the frequency ramp starts, **Secondary Response** between 30s and 30 minutes, and **High Frequency Response** is the minimum value after 10s on an indefinite basis.

5. For plants which have not yet **Synchronised**, the data values of MLP1 to MLP6 should be as described above. For plants which have already **Synchronised**, the values of MLP1 to MLP6 can take any value between **Designed Minimum Operating Level** and **Registered Capacity**. If MLP1 is not provided at the **Designed Minimum Operating Level**, the value of the **Designed Minimum Operating Level** should be separately stated.

**DATA REGISTRATION CODE**

DATA SUPPLIED BY **NGC TO USERS**  
 (Example of data to be supplied)

CODE	DESCRIPTION
CC	Operation Diagram
CC	Site Responsibility Schedules
PC	Day of the peak <b>NGC Demand</b> Day of the minimum <b>NGC Demand</b>
OC2	<b>Surpluses</b> and OU requirements for each <b>Generator</b> over varying timescales  Equivalent networks to <b>Users</b> for <b>Outage Planning</b>  <b>Negative Reserve Active Power Margins</b> (when necessary)  <b>Operating Reserve</b> information
OC4	<b>Weekly Operational Policy</b>
BC1	<b>Demand</b> Estimates, <b>Indicated Margin</b> and <b>Indicated Imbalance</b> , indicative <b>Synchronising</b> and <b>Desynchronising</b> times of <b>Embedded Power Stations</b> to <b>Network Operators</b> , special actions.
BC2	<b>Bid-Offer Acceptances</b> , <b>Ancillary Services</b> instructions to relevant <b>Users</b> , <b>Emergency Instructions</b>
BC3	Location, amount, and <b>Low Frequency Relay</b> settings of any <b>Low Frequency Relay</b> initiated <b>Demand</b> reduction for <b>Demand</b> which is <b>Embedded</b> .

**DATA TO BE SUPPLIED BY NGC TO USERS**

**PURSUANT TO THE TRANSMISSION LICENCE**

1. The **Transmission Licence** requires **NGC** to publish annually the **Seven Year Statement** which is designed to provide **Users** and potential **Users** with information to enable them to identify opportunities for continued and further use of the **NGC Transmission System**.

When a **User** is considering a development at a specific site, certain additional information may be required in relation to that site which is of such a level of detail that it is inappropriate to include it in the **Seven Year Statement**. In these circumstances the **User** may contact **NGC** who will be pleased to arrange a discussion and the provision of such additional information relevant to the site under consideration as the **User** may reasonably require.

2. The **Transmission Licence** also requires **NGC** to offer terms for an agreement for connection to and use of the **NGC Transmission System** and further information will be given by **NGC** to the potential **User** in the course of the discussions of the terms of such an agreement.

SCHEDULE 12  
 Page 2 of 2

DATA DESCRIPTION	UNITS	TIME COVERED	UPDATE TIME	DATA CAT.
<b>*Demand Control or Pump Tripping Offered as Reserve</b>				
Magnitude of <b>Demand</b> or pumping load which is tripped	MW	Year ahead from week 24	Week 24	<b>OC4 DPD</b>
<b>System Frequency</b> at which tripping is initiated	Hz	"	"	"
Time duration of <b>System Frequency</b> below trip setting for tripping to be initiated	S	"	"	"
Time delay from trip initiation to Tripping	S	"	"	"
<u>Emergency Manual Load Disconnection</u>				
Method of achieving load disconnection	Text	Year ahead from week 24	Annual in week 24	OC6
<b>Annual ACS Peak Demand (Active Power) at Connection Point</b> (requested under Schedule 11 - repeated here for reference)	MW	"	"	"
Cumulative percentage of <b>Connection Point Demand (Active Power)</b> which can be disconnected by the following times from an instruction from <b>NGC</b>				
5 mins	%	"	"	"
10 mins	%	"	"	"
15 mins	%	"	"	"
20 mins	%	"	"	"
25 mins	%	"	"	"
30 mins	%	"	"	"
<u>Automatic Low Frequency Disconnection</u>				
Magnitude of <b>Demand</b> disconnected, and frequency at which <b>Disconnection</b> is initiated, for each frequency setting for each <b>Grid Supply Point</b>	MW Hz	Year ahead from week 24	Annual in week 24	OC6

Notes

1. **Network Operators** may delay the submission until calendar week 28.

## Consequential Grid Code Changes to reflect loss of OC4

### Extract from PREFACE

- 3(c) an **Operating Code**, which is split into a number of sections and deals with **Demand** forecasting (**OC1**); the co-ordination of the outage planning process in respect of **Large Power Stations**, the **NGC Transmission System** and **User Systems** for construction, repair and maintenance (~~**OC2**~~); ~~the specification of different types of reserve, and~~ the provision of certain types of **Operating Margin** data ~~and the issue of a Weekly Operational Policy~~ (~~**OC2**~~); testing and monitoring of **Users** (**OC5**); different forms of reducing **Demand** (**OC6**); the reporting of scheduled and planned actions, and unexpected occurrences such as faults (**OC7**); the co-ordination, establishment and maintenance of **Isolation** and **Earthing** in order that work and/or testing can be carried out safely (**OC8**); certain aspects of contingency planning (**OC9**); the provision of written reports on occurrences such as faults in certain circumstances (**OC10**); the procedures for numbering and nomenclature of **HV Apparatus** at certain sites (**OC11**); and the procedures for the establishment of **System Tests** (**OC12**);

### Extracts from CONNECTION CONDITIONS

#### Steady state Load Inaccuracies

- CC.6.3.9 The standard deviation of **Load** error at steady state **Load** over a 30 minute period must not exceed 2.5 per cent of a **Genset's Registered Capacity**. Where a **Genset** is instructed to **Frequency** sensitive operation, allowance will be made in determining whether there has been an error according to the governor droop characteristic registered under ~~**PCOC4**~~.
- .....

- CC.6.3.14 It may be agreed in the **Supplemental Agreement** that a **Genset** shall have a **Fast-Start Capability**. Such **Gensets** may be used for **Operating Reserve** and their **Start-Up** may be initiated by **Frequency**-level relays with settings in the range 49Hz to 50Hz as specified pursuant to ~~**OC4OC2**~~.
- .....

Extract from **CC APPENDIX 3**

**MINIMUM FREQUENCY RESPONSE REQUIREMENT PROFILE AND  
OPERATING RANGE**  
**for new Generating Units and/or CCGT Modules with a Completion Date  
after 1 January 2001**

CC.A.3.1      SCOPE

The frequency response capability is defined in terms of **Primary Response**, **Secondary Response** and **High Frequency Response**. This appendix defines the minimum frequency response requirement profile for each **Generating Unit** and/or **CCGT Module** which has a **Completion Date** after 1 January 2001. For the avoidance of doubt, this appendix does not apply to **Generating Units** and/or **CCGT Modules** which have a **Completion Date** before 1 January 2001 or to **Small Power Stations**. The functional definition provides appropriate performance criteria relating to the provision of frequency control by means of frequency sensitive generation in addition to the other requirements identified in CC.6.3.7.

In this Appendix 3 to the **CC**, 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**.

The minimum frequency response requirement profile is shown diagrammatically in Figure CC.A.3.1. The capability profile specifies the minimum required levels of **Primary Response**, **Secondary Response** and **High Frequency Response** throughout the normal plant operating range. The definitions of these frequency response capabilities are illustrated diagrammatically in Figures CC.A.3.2 & CC.A.3.3.

Extract from **BC1**

BC1.4.2 Day Ahead Submissions

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(f) Other Relevant Data

By 11:00 hours each day each **BM Participant**, in respect of each of its **BM Units** for which **Physical Notifications** are being submitted, shall, if it has not already done so, submit to **NGC** in respect of the next following **Operational Day** the following:

- (i) in the case of a **CCGT Module**, a **CCGT Module Matrix** as described in **BC1** Appendix 1;
- (ii) details of any special factors which in the reasonable opinion of the **BM Participant** may have a material effect or present an enhanced risk of a material effect on the likely output (or consumption) of such **BM Unit(s)**. Such factors may include risks, or potential interruptions, to **BM Unit** fuel supplies, or developing plant problems, details of tripping tests, etc. This information will normally only be used to assist in determining the appropriate level of **Operating Margin** that is required under ~~OC2.4.6.2~~**OC4.4.3**;

Extract from **BC3**

BC3.6 RESPONSE TO LOW FREQUENCY

BC3.6.1 Low Frequency Relay Initiated Response from Gensets

(a) **NGC** may utilise **Gensets** with the capability of **Low Frequency Relay** initiated response as:

- (i) synchronisation and generation from standstill;
- (ii) generation from zero generated output;
- (iii) increase in generated output

in establishing its requirements for **Operating Reserve**.

(b) (i) **NGC** will specify within the range agreed with **Generators, Low Frequency Relay** settings to be applied to the **Gensets** pursuant to BC3.6.1 (a) ~~in the Weekly Operational Policy~~ and instruct the **Low Frequency Relay** initiated response placed in and out of service.

Extract from the Contents Page

**OPERATING CODES**

(OC)

OC1	Demand Forecasts
OC2	Operational Planning and Data Provision
OC3	Deleted
OC4	<del>Operating Margin Deleted</del>
OC5	Testing and Monitoring
OC6	Demand Control
OC7	Operational Liaison
OC8	Safety Co-ordination
OC9	Contingency Planning
OC10	Event Information Supply
OC11	Numbering and Nomenclature of HV Apparatus at Certain Sites
OC12	System Tests



## APPENDIX B

### AEO Distribution List for Consultation Paper G/01

24 Seven	ICI Chemicals & Polymers Ltd
Accord Energy Limited	Impkemix Energy Ltd
AES (for Barry Ltd + Fifoots Point Ltd + Partington Ltd + Drax Ltd)	Innogy + NP (Cogen Trading) Ltd
AES Indian Queens Power	International Power
AES NEWENERGY LTD (UK)	Keadby Development Ltd
Alcan Aluminium UK Ltd	Keadby Gen Ltd + HE Cogen Ltd + HE Energy Ltd
Allied Steel & Wire	Lakeland Power Ltd
AMERADA	London Energy Company Ltd
Aquila Energy Supplies Ltd	LPN
Atlantic Electric & Gas Ltd	MANWEB plc
Atmel North Tyneside Limited	Marubeni Europower Ltd
Barking Power	Maverick Energy Ltd
BIZZENERGY LIMITED	Medway Power Ltd
BNFL + Magnox Electric Ltd	Norsk Hydro (UK) Ltd
BOC Limited	Northern Electric Distribution Ltd
BP Chemicals Ltd	Northern Electric Supply Ltd
British Energy Generation Ltd	Norweb (supply)
British Energy Retail Markets Ltd	Pentex Oil and Gas Ltd
British Gas Plc	PowerGen UK plc + PowerGen CHP Ltd
British Gas Trading Ltd (3th Floor North)	Railtrack plc
Celtpower Ltd	Regional Power Generators Limited
Cinergy Global Power (UK) Ltd	Renewable Energy Co
Commercial Electricity Supplies Ltd	Rocksavage Power Company Ltd
Conoco Global Power Developments UK Limited	Saltend Cogeneration Co Ltd
Corby Power Ltd	Scottish & Southern Energy
Corus UK Ltd	Scottish and Southern Energy plc
Coryton Energy Co Ltd	Scottish Power plc
Cottam Development Centre	Seabank Power Ltd
Cottam Power Ltd	SEEBOARD plc (distribution)
Damhead Creek Ltd	SEEBOARD plc (supply)
Derwent Co-Generation Limited	Shell Gas Direct Limited
East Midlands Electricity	Slough Energy Supplies Ltd
Eastern Energy Ltd	SMARTESTENERGY LTD
Economy Power Ltd	South Coast Power Ltd
ECOTRICITY	Southern Electric
Edison First Power Ltd	Southern Energy UK Generation Ltd
Electricite de France	Spalding Energy Company Ltd
Electricity Direct (UK) Ltd	Sutton Bridge Power Ltd
Energy Power Resources Limited	Teesside Power Ltd
Enfield Energy Centre Ltd	TXU Europe
Enron Direct Ltd + Enron Gas & Petrochemical Trading	TXU Europe Merchant Generation + Peterborough Power Ltd + Anglian Power Generators + Shotton CHP Ltd + Citigen (London) Ltd

Enron Teesside Operations Ltd  
Fellside Heat & Power Ltd  
First Hydro Company  
First Hydro Company  
GPU Power UK Ltd  
Great Yarmouth Power Limited  
Heartlands Power Ltd  
Humber Power Ltd

UK Electric Power Ltd  
UKAEA  
Unit Energy Limited  
United Utilities  
Wainstones Power Ltd  
Western Power Distribution  
Yorkshire Electricity Group plc (distribution)  
Yorkshire Electricity plc (supply)

**APPENDIX C**  
**CONSULTATION PAPER G/01**