GRID CODE REVIEW PANEL
13 September 2001

OPERATING MARGIN - OC4
(Paper by National Grid)

INTRODUCTION

1. National Grid has recently undertaken a review of OC4, and the findings are summarised below. The review has concluded that a number of the provisions within OC4 duplicate other parts of the Code, while the remainder would better fit into other parts of the Code. It is therefore proposed to remove OC4 in its entirety from the Grid Code, leading to a more streamlined Code. These proposals will not affect the ability of National Grid to discharge its statutory duties.

PROVISIONS OF OC4

Definition of Reserve

2. OC4 defines the different types of reserve that makes up the operating margin National Grid may use in the control phase. Definitions of Primary and Secondary Response, plus Five Minute, Contingency and Operating Reserve are duplicated between OC4 and the Glossary & Definitions (although references to Five Minute Reserve will be deleted from the Grid Code with the implementation of the Housekeeping changes due to be implemented shortly after the introduction of the CUSC). To reduce duplication (and possible inconsistencies) it is proposed to delete the definitions from OC4. As there are some small differences between the definitions in the G&D and in OC4, it is proposed to make some small modifications to the G&D definitions to combine the concepts from both OC4 and G&D.

Weekly Operational Policy and Operating Reserve Information

3. OC4 requires National Grid to produce a weekly statement (the “Weekly Operational Policy”) whose main purpose is to notify Generators of National Grid's desired L.F. relay settings on generation (or H.F. relay settings for demand / interconnectors). In practice changes occur rarely, and to reduce the administrative burden for all parties, it is therefore proposed 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. To ensure consistency of timescales with other data provided to Users by National Grid, it is proposed to transfer the provision of all of this information into OC2.

Data Provisions to National Grid

4. OC4 contains obligations on Generators with Large Generating Plant to supply data to National Grid. It is proposed to move these requirements to the PC, again streamlining the Code. As part of this change, it is proposed to clarify the data provisions within the DRC.

5. Currently the DRC may be considered to be confusing with respect to the collection of Droop and Response data. In particular:

DRC Schedule 1 Page 7 refers to the provision of droop data at 6 loading levels MLP1 to MLP6, but these six loading levels are not defined until Schedule 1 Page 9.

The values of MLP1 to 6, defined on DRC Schedule 1 Page 9, should be at fixed values (Designed Minimum Operating level, or DMOL, Minimum Generation, 70%, 80% 95% and 100% of Registered Capacity) for plant yet to be synchronised, but this is not stated in the DRC.

The DRC asks for the value of DMOL to be provided twice.

It is proposed to simplify the DRC to permit this data to be provided in tabular form. A new Schedule 4 is proposed.

6. The current Grid Code data requirements for droop characteristics for plant connected to the system at 9 January 1995 are slightly different to the requirements for plant connected later. However, the differences are not considered to be material and it is proposed that for the data provided in the new DRC Schedule 4 the distinction be removed.

Minimum Generation

7. The Grid Code contains an inconsistency 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.

   The Grid Code defines Minimum Generation as 'The minimum output … which a Genset can generate under stable operating conditions, as registered with NGC under the PC' and 'Genset' is defined as 'A Generating Unit or CCGT Module at a Large Power Station'. For a typical modular CCGT with 2 Gas Turbines and 1 Steam Turbine, this will generally apply to a 1GT and 1ST condition (or even a single GT running on open cycle)

8. However, in the Appendix to the 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 are proposed. The amendments to the DRC outlined above also cover this area.

THE PROPOSED CHANGES

9. The Appendices to this paper show the proposed changes to the Grid Code, including a number of consequential changes. The most significant changes are to the G&D, PC, CC, OC2, OC4 and DRC.

RECOMMENDATIONS

10. The Grid Code Review Panel is invited to discuss the issues raised in this paper and to **AGREE** that National Grid issues a Consultation Paper on the proposed amendments related to OC4.

Appendix 1 Removal of **OC4** (with indication of relocation of paragraphs)

~~OPERATING CODE NO. 4~~

~~OPERATING MARGIN~~

~~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 secondary response is repeating that contained within the G&D]

OC4.4.2.3 **Five Minute Reserve**

That component of the **Operating Reserve** which is fully available within 5 minutes from the time of a **Frequency** fall or an instruction pursuant to **BC2** and is sustainable for a period of four hours.

[This description of five minute 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 hence 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 those **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 those **Gensets** have to reach **Synchronous Speed**.

[This paragraph to be added to the definition of Contingency Reserve in the G&D]

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, Secondary Response** and **Five Minute Reserve** according to the **Ancillary Services** available to it and as provided in the **BCs**.

[This paragraph to be added to the definition of Operating Reserve in the G&D]

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 hence 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 **Supplemental 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]

OC4.6 WEEKLY OPERATIONAL POLICY

Generating Units used as **Five Minute Reserve** 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' Large Power Stations** available for start from standstill by low frequency relay initiation with a **Fast Start Capability** agreed pursuant to the **Supplemental 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 **Large Power Stations**.

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 **Large Power Stations** specified for **Five Minute Reserve** duty in the **Weekly Operational Policy** as it applies to it. 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.

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 **Large Power Station** unavailability or reflect changes in settings referred to in (a) above.

OC4.6.2 Once accepted, each **Generator** (if that **Large Power Station** 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 Planning Code]

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 **Generating Unit**. **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 **Supplemental Agreement**, the MW loading points must take the following values :-

MLP1 **Designed Minimum Operating Level**
MLP2 **Minimum Generation**
MLP3 70% of **Registered Capacity**
MLP4 80% of **Registered Capacity**
MLP5 95% of **Registered Capacity**
MLP6 **Registered Capacity**

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 **Generating Unit'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 **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

Droop at **Minimum Generation**: %
Intermediate load 1 MW
Droop at intermediate load 1 %
Intermediate load 2 MW
Droop at intermediate load 2 %
Droop at **Registered Capacity** %

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 ±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.

Droop

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 **Generating Unit**.]

OC4.A.3 Unit Control Options

Maximum droop %
Normal droop %
Minimum droop %

Maximum **Frequency** deadband ±Hz
Normal **Frequency** deadband ±Hz
Minimum **Frequency** deadband ±Hz

Maximum output deadband ±MW
Normal output deadband ±MW
Minimum output deadband ±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

< End of OC4 >

Appendix 2 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 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.

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 those **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 those **Gensets** have to reach **Synchronous Speed.**

Operating Margin **Contingency Reserve** plus **Operating Reserve**.

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**. The **Operating Reserve** must be capable of providing response in three distinct timescales: **Primary Response**, **Secondary Response** and **Five Minute 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, Secondary Response** and **Five Minute Reserve** according to the **Ancillary Services** available to it and as provided in the **BCs**.

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. The interpretation of the **Primary Response** to a - 0.5 Hz frequency change is shown diagrammatically in Figure CC.A.3.2.
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. The interpretation of the **Secondary Response** to a -0.5 Hz frequency change is shown diagrammatically in Figure CC.A.3.2.
Five Minute Reserve	That component of the **Operating Reserve** which is fully available within 5 minutes from the time of **Frequency** fall or an instruction pursuant to **BC2**, and which is sustainable for a period of four hours.
Fast Start	A start by a **Genset** with a **Fast Start Capability**.
Fast Start Capability	The ability of a **Genset** to be **Synchronised** and **Loaded** up to full **Load** within 5 minutes.
~~**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**.~~

Appendix 3 Additions to **OC2**

OC2.4.6 OPERATING MARGIN DATA REQUIREMENTS

OC2.4.6.1 Modifications to relay settings

By 1600 hours each Wednesday

A change in relay settings may be initiated 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 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, the changes will be reflected in an up-dated version of the current relay 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.

Appendix 4 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.~~1~~2
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.~~6~~7 General **Demand** Data

PC.A.4.~~6~~7.1 ……..

……

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 **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.

[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 ±Hz
Normal **Frequency** deadband ±Hz
Minimum **Frequency** deadband ±Hz

Maximum output deadband ±MW
Normal output deadband ±MW
Minimum output deadband ±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	**Designed Minimum Operating Level**
MLP2	**Minimum Generation**
MLP3	70% of **Registered Capacity**
MLP4	80% of **Registered Capacity**
MLP5	95% of **Registered Capacity**
MLP6	**Registered Capacity**

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 **Seconday Response** to **Frequency** fall

Primary and **Seconday 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.

Appendix 5 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

……..

DATA DESCRIPTION	UNITS	DATA CAT.	**GENERATING UNIT** OR STATION DATA						
			G1	G2	G3	G4	G5	G6	STN
GOVERNOR AND ASSOCIATED PRIME MOVER PARAMETERS									
Note: The data items requested under Option 1 below may continue to be provided by **Generators** in relation to **Generating Units** on the **System** at 9 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									
GOVERNOR PARAMETERS (REHEAT UNITS)									
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 **Active Energy** 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)						
GOVERNOR (Non-reheat steam and Gas Turbines)									
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)						
~~**GENERATING UNIT** GOVERNOR DROOP CHARACTERISTICS*~~									
~~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**~~							

DATA DESCRIPTION	UNITS	DATA CAT.	**GENERATING UNIT** OR STATION DATA						
			G1	G2	G3	G4	G5	G6	STN
~~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.**~~									
BOILER & STEAM TURBINE DATA*									
Boiler time constant (Stored **Active Energy**)	S	~~OC4~~ **DPD**							
HP turbine response ratio: (Proportion of **Primary Response** arising from HP turbine)	%	~~OC4~~ DPD							
HP turbine response ratio: (Proportion of **High Frequency Response** arising from HP turbine)	%	~~OC4~~ DPD							
	End of Option 1								
Option 2									
All **Generating Units**									
Governor Block Diagram showing transfer function of individual elements including acceleration sensitive elements		DPD							
Governor Time Constant	Sec	DPD							
#Governor Deadband									
- Maximum Setting		~~OC4~~							
- Normal Setting		DPD							
- Minimum Setting		~~OC4~~							
	±Hz	**DPD**							
	±Hz	~~OC4~~							
	±Hz	**DPD**							
Speeder Motor Setting Range	%	DPD							
Average Gain	MW/Hz	DPD							
~~♭Droop~~									
~~Incremental Droop at MLP1~~	~~%~~	~~OC4~~							
~~Incremental Droop at MLP2~~	~~%~~	~~OC4~~							
~~Incremental Droop at MLP3~~	~~%~~	~~**OC4**~~							
~~Incremental Droop at MLP4~~	~~%~~	~~**OC4**~~							
~~Incremental Droop at MLP5~~	~~%~~	~~**OC4**~~							
~~Incremental Droop at MLP6~~	~~%~~	~~**OC4**~~							

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
UNIT CONTROL OPTIONS*									
Maximum droop	%	~~**OC4**~~**DPD**							
Normal droop	%	~~**OC4**~~**DPD**							
Minimum droop	%	~~**OC4**~~**DPD**							
Maximum frequency deadband	±Hz	~~**OC4**~~**DPD**							
Normal frequency deadband	±Hz	~~**OC4**~~**DPD**							
Minimum frequency deadband	±Hz	~~**OC4**~~**DPD**							
Maximum Output deadband	±MW	~~**OC4**~~**DPD**							
Normal Output deadband	±MW	~~**OC4**~~**DPD**							
Minimum Output deadband	±MW	~~**OC4**~~**DPD**							
Frequency settings between which Unit Load Controller droop applies:									
Maximum	Hz	~~**OC4**~~**DPD**							
Normal	Hz	~~**OC4**~~**DPD**							
Minimum	Hz	~~**OC4**~~**DPD**							
Sustained response normally selected	Yes/No	~~**OC4**~~**DPD**							
~~RESPONSE CAPABILITY*~~									
~~Note that the data items requested below may be identical to data contained in the relevant **Ancillary Services Agreement** but data submitted via OC4 is not intended to constrain any such **Ancillary Services Agreement**.~~									
~~**Designed Minimum Operating Level**~~	~~W~~								
~~MW loading points at which response data is required:~~									
~~MLP1~~	~~MW~~	~~**OC4**~~							
~~MLP2~~	~~MW~~	~~**OC4**~~							
~~MLP3~~	~~MW~~	~~**OC4**~~							
~~MLP4~~	~~MW~~	~~**OC4**~~							
~~MLP5~~	~~MW~~	~~**OC4**~~							
~~MLP6~~	~~MW~~	~~**OC4**~~							
	~~MW~~	~~**OC4**~~							
~~**Primary Response** to frequency fall:~~									
~~**Primary Response** values to –0.5Hz ramp at six MW loading points as follows:~~									
~~Response at MLP1~~	~~MW~~	~~**OC4**~~							
~~Response at MLP2~~	~~MW~~	~~**OC4**~~							
~~Response at MLP3~~	~~MW~~	~~**OC4**~~							
~~Response at MLP4~~	~~MW~~	~~**OC4**~~							
~~Response at MLP5~~	~~MW~~	~~**OC4**~~							
~~Response at MLP6~~	~~MW~~	~~**OC4**~~							

DATA DESCRIPTION	UNITS	DATA CAT.	**GENERATING UNIT** (OR **CD CCGT MODULE**, AS THE CASE MAY BE) OR STATION DATA						
			G1	G2	G3	G4	G5	G6	STN
Secondary Response to frequency fall:									
Secondary Response values to –0.5Hz ramp at six MW loading points as follows:									
Response at MLP1	MW	**OC4**							
Response at MLP2	MW	**OC4**							
Response at MLP3	MW	**OC4**							
Response at MLP4	MW	**OC4**							
Response at MLP5	MW	**OC4**							
Response at MLP6	MW	**OC4**							
High Frequency Response to frequency rise:									
High Frequency Response values to +0.5Hz ramp at six MW loading points as follows:									
Response at MLP1	MW	**OC4**							
Response at MLP2	MW	**OC4**							
Response at MLP3	MW	**OC4**							
Response at MLP4	MW	**OC4**							
Response at MLP5	MW	**OC4**							
Response at MLP6	MW	**OC4**							
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.**									

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

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	**Designed Minimum Operating Level** (for a **CCGT Module**, on a Modular basis assuming all units are synchronised)		**DPD**						
MLP2	**Minimum Generation** (for a **CCGT Module**, on a Modular basis assuming all units are synchronised)		**DPD**						
MLP3	70% of **Registered Capacity**		**DPD**						
MLP4	80% of **Registered Capacity**		**DPD**						
MLP5	95% of **Registered Capacity**		**DPD**						
MLP6	**Registered Capacity**		**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

SCHEDULE 9
Page 1 of 1

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

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.

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

Notes

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

Appendix 6 Consequential Grid Code Changes to reflect loss of OC4

2. 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**);

2. 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 **PC~~OC~~4**.

…….

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 ~~**OC4**~~**OC2**.

……..

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.

3. Extract from **OC5**

TESTING AND MONITORING

OC5.5.2.5 If following the procedure set out in OC5.5.2.3 and OC5.5.2.4 it is accepted that the **Genset** has failed the test or re-test (as applicable), the **Generator** shall within 14 days, or such longer period as **NGC** may reasonably agree, following such failure, submit in writing to **NGC** for approval the date and time by which the **Generator** shall have brought the **Genset** concerned to a condition where it complies with its **Frequency Sensitive Mode** or **Limited Frequency Sensitive Mode** capability parameters submitted to **NGC** pursuant to ~~OC4.5~~ the **PC** , which shall be in accordance with the criteria set out in CC.6.3.7, or with the requirements of BC3.7.2 for **Limited Frequency Sensitive Response**, as the case may be, and would pass the test. **NGC** will not unreasonably withhold or delay its approval of the **Generator's** proposed date and time submitted. Should **NGC** not approve the **Generator's** proposed date or time (or any revised proposal), the **Generator** should amend such proposal having regard to any comments **NGC** may have made and re-submit it for approval.

OC5.5.2.6 If a **Genset** fails the test, the **Generator** may amend, with **NGC's** approval, the relevant registered parameters of that **Genset** relating to operation in **Frequency Sensitive Mode** or **Limited Frequency Sensitive Mode** registered pursuant to the **PC**~~OC4.5~~, for the period until the **Genset** can achieve the parameters previously registered, as demonstrated in a re-test.

OC5.5.2.7 Once the **Generator** has indicated to **NGC** the date and time that the **Genset** can achieve the parameters previously registered (or the requirements of BC3.7.2, as the case may be), **NGC** shall either accept this information or require the **Generator** to demonstrate that the **Frequency Sensitive Mode** capability or the capability to provide **Limited High Frequency Response,** as the case may be, at the **Genset** concerned has been restored so that it meets the **Frequency Sensitive Mode** or **Limited Frequency Sensitive Mode** capability parameters submitted to **NGC** pursuant to the **PC** ~~OC4.5~~, which shall be in accordance with the criteria set out in CC.6.3.7, or meets the requirements of BC3.7.2 for **Limited High Frequency Response**, as the case may be, by means of a repetition of the monitoring referred to in OC5.5.2.1 at any time after the time and date approved under OC5.5.2.5. The provisions of this OC5.5.2 will apply to such further test.

4. 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~~;