



National Grid

CONSULTATION DOCUMENT

**CUSC Amendment Proposal CAP009
Mandatory Frequency Response**

Amendment Ref	CAP009
Issue	1.0
Date of Issue	08 March 2002
Prepared by	National Grid

DOCUMENT CONTROL

Version	Date	Author	Change Reference
0.1	04/03/02	National Grid	Initial Draft for internal comment
1.0	08/03/02	National Grid	Document for formal release

DOCUMENT LOCATION

National Grid website:

http://www.nationalgridinfo.co.uk/cusc/mn_consultation_index.html

DISTRIBUTION

Name	Organisation
CUSC Parties	Various
Panel Members	Various
Interested Parties	Various
National Grid Industry Information Website	

I. CONTENTS TABLE

DOCUMENT CONTROL	2
DOCUMENT LOCATION	2
DISTRIBUTION	2
I. CONTENTS TABLE.....	3
1.0 EXECUTIVE SUMMARY	4
2.0 INTRODUCTION.....	6
3.0 RESPONSES TO CONSULTATION	6
4.0 AMENDMENT PROPOSAL, ALTERNATIVES CONSIDERED AND WORKING GROUP DISCUSSION.....	7
4.1 The Proposed Amendment Proposal.....	7
4.2 Alternative Amendments	9
4.3 Working Group Views and Discussion.....	9
5.0 SUMMARY OF VIEWS	12
5.1 National Grid Initial View.....	12
5.2 Amendments Panel Initial View.....	13
6.0 VIEWS INVITED	13
ANNEX 1 – CUSC AMENDMENT PROPOSAL	14
ANNEX 2 – PROPOSED TEXT TO MODIFY CUSC.....	18
ANNEX 3 – PROPOSED CHANGES TO SCHEDULE 2- EXHIBIT 4 OF THE CUSC (MANDATORY SERVICES AGREEMENT).....	32

1.0 Executive Summary

- 1.1 All licensed generators are required to provide the service of mandatory frequency response as set out in CC.8.1 of the Grid Code. Prior to the introduction of NETA it was recognised that generators would incur imbalance charges under the BSC when mandatory frequency response was provided. A mechanism was introduced at NETA Go-live that was intended to compensate generators for this imbalance exposure due to providing response. This mechanism was implemented via the NETA Implementation Scheme in the Mandatory Services Agreements (MSA) and codified into the CUSC.
- 1.2 Under NETA, imbalance charges arise for a number of reasons, frequency response provision being just one of them. However, following the introduction of NETA, a number of providers raised concerns that the level of imbalance compensation as calculated by the mechanism did not adequately reflect the actual imbalance charges incurred as a result of providing frequency response. In order to address these concerns, the arrangements were reviewed by an informal, pre-CUSC Working Group and resulted in the submission of CUSC Amendment Proposal CAP001 by National Grid. The Amendment proposed changes to the calculation methodology in order to provide a better approximation of the assumed energy imbalance used to calculate compensation payments. CAP001 followed the Urgent Amendment Procedure and was approved by the Authority on 15 November 2001 with an effective implementation date of 21 September 2001.
- 1.3 Prior to Authority approval of CAP001, First Hydro Company submitted CUSC Amendment Proposal CAP009 that proposed further changes to the methodology used for calculating imbalance volume. The Amendment was proposed by First Hydro as they believed that neither the mechanism put in place at NETA go-live nor that proposed in CAP001 accurately reflected the actual volume of mandatory frequency response delivered.
- 1.4 The frequency response tables contained in Ancillary Services Agreements contain tested values of response capability relative to a ramped change in frequency. First Hydro suggested that for certain types of plant (whose output continues to increase after the 10 second cut-off in Primary and High frequency response tables) the Primary, Secondary and High frequency table approach was inappropriate for calculating the volume of energy delivery over a period a time. The amendment therefore proposed to include an additional set of tables in the Mandatory Services Agreement that describes the response delivery for generators during normal 'frequency following'. This data would then be used in the calculation of delivered frequency response volume.

- 1.5 The CUSC Amendments Panel, at their meeting on 9 November 2001, actioned the Balancing Services Standing Group (BSSG) to act as a Working Group (in accordance with CUSC 8.17.1) to consider Amendment Proposal CAP009. Terms of Reference were agreed for the BSSG (in respect of CAP009) and further to three meetings and associated debate and correspondence, it was the combined view of the BSSG that the current mechanism for frequency response imbalance compensation should be modified as follows:
- (i) The response energy calculations set out in the CUSC should refer to a new set of Power Delivery tables to be included in the Mandatory Services Agreements (MSAs);
 - (ii) When used in the imbalance compensation calculations, the values in the new Power Delivery tables should aim to mimic response energy delivered by the generator; and
 - (iii) The values in the Power Delivery tables should be submitted by service providers and bilaterally agreed with National Grid. Changes to these Power Delivery values can be requested by either party in line with existing arrangements
- 1.6 In the BSSG debate, National Grid and another member argued that implementation of CAP009 should only be approved if BSC Modification P34/P36 (or similar) were implemented. This was on the grounds that such a BSC Modification would provide the correct incentives on service providers to submit accurate values in their Power Delivery tables.
- 1.7 The Working Group Report was presented to the CUSC Amendments Panel on 22 February 2002. At the meeting, the Amendments Panel endorsed the Working Group Report and agreed that the specific terms of reference for the Group had been met. The Amendments Panel also agreed that the issue should proceed to wider consultation by National Grid (in accordance with CUSC 8.19.1).
- 1.8 This document initiates this wider consultation process and invites views on Amendment Proposal CAP009. The consultation closing date is 5 April 2002.

2.0 Introduction

- 2.1 This is a consultation document issued by National Grid under the rules and procedures specified in the Connection and Use of System Code (CUSC) as designated by the Secretary of State. It addresses issues associated with the Mandatory Frequency Response provisions set out in Section 4 of the CUSC.
- 2.2 Further to the submission of Amendment Proposal CAP009 (see Annex 1) and the consideration of the Amendment Proposal by the Balancing Services Standing Group (BSSG), this document seeks views from Industry members relating to the proposed amendment. Such an amendment would result in changes to Section 4 of the CUSC (as detailed in Annex 2).
- 2.3 This document outlines the nature of the CUSC changes that are proposed for implementation. It indicates any relevant issues that arose in the BSSG discussions and also incorporates National Grid's and the Amendments Panel's views on the way forward concerning this Amendment. Representations received in response to this consultation document will be included in National Grid's Amendment Report that will be furnished to the Authority for their Direction.
- 2.4 This consultation document has been prepared in accordance with the terms of the CUSC. An electronic copy can be found on the National Grid website, at <http://www.nationalgridinfo.co.uk/cusc>.

3.0 Responses to Consultation

- 3.1 Please send your responses to this consultation document to National Grid by no later than close of business 5 April 2002.
- 3.2 Please address all comments to the following e-mail address: david.friend@uk.ngrid.com and entitle your email 'CAP009 Consultation Response'.

Alternatively, comments may be addressed to:

David Friend
Commercial Development
National Grid Company plc
National Grid House
Kirby Corner Road
Coventry
CV4 8JY Fax: 024 7642 3298

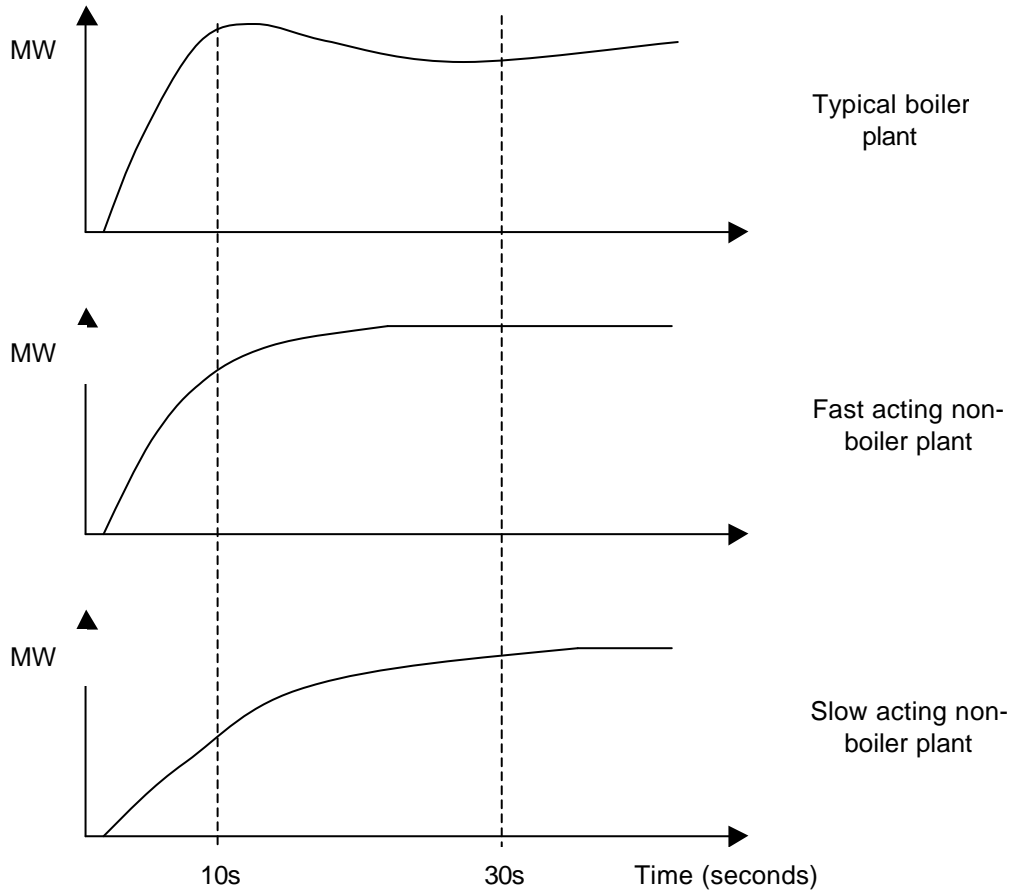
4.0 Amendment Proposal, Alternatives Considered and Working Group Discussion

A full copy of the CAP009 Working Group report is available on the National Grid website at:

http://www.nationalgridinfo.co.uk/cusc/admin/scripts/uploads/CAP009_WG_Report_-_Version_1.0.pdf

4.1 The Proposed Amendment Proposal

- 4.1.1 The current methodology for calculating the actual volume of energy delivered by a generator when it is providing mandatory frequency response is based on the Primary, Secondary and High frequency matrix values contained in the Mandatory Services Agreements (MSAs). The matrix values are determined by 'Compliance' testing, witnessed by National Grid in accordance with the Grid Code. These values are based on the response capability of generating units at a period of 10 seconds and 30 seconds after a low frequency incident (referred to as Primary and Secondary Response) and 10 seconds after a high frequency incident (referred to simply as High Frequency Response).
- 4.1.2 The compliance tests and resultant matrix tables included in the MSAs were devised to enable National Grid to determine the total quantity of frequency response that was needed on the system at any one time. This enables National Grid to instruct enough frequency response to cater for the instantaneous loss of the largest infeed of generation or demand i.e. to contain and recover large frequency deviations.
- 4.1.3 It is a Grid Code requirement that all generation is capable of operating in frequency sensitive mode. However, the output characteristics from different types of generating plant can vary quite significantly according to its primary fuel type and control system design. Typically, conventional 'boiler-plant' has a capability for storing significant quantities of energy that can be delivered in a short duration (i.e. primary response from coal or oil fired generating plant). However, in contrast, delivery from Hydro and CCGT generating plant is dependent on the rate of increase of primary fuel flow, meaning that for 'non-boiler-plant', any response energy is typically delivered in a more gradual manner. These typical response delivery characteristics are shown graphically below:



- 4.1.4 This means that the use of primary and secondary response values to calculate the response energy delivered over a period of time can be inappropriate for certain plant types. From the graphs above it can be seen that the Primary response value can be significantly lower than the steady state response output for slow acting non-boiler plant.
- 4.1.5 The matrix tables were not designed for the purpose of accurately calculating the volume of response energy produced by a generator over a period of time when it is operating in frequency sensitive mode and responding continuously to minor frequency fluctuations. To overcome this issue it is proposed that an additional set of Power Delivery tables are contained in the MSA and used in the imbalance compensation calculations. These values should aim to mimic the energy delivered by the generating unit when following frequency deviations (Annex 3 illustrates the new Power Delivery tables). The mechanism will continue to use the per-minute, dual linear interpolation methodology as introduced by CAP001.
- 4.1.6 The values are to be proposed by the service provider and agreed with National Grid. The CAP009 methodology also allows for the service provider or National Grid to propose revisions to the matrix values, in light of experience, in accordance with the existing amendment provisions set out in the CUSC.

4.2 Alternative Amendments

- 4.2.1 In accordance with their Terms of Reference, the BSSG also considered whether any Alternatives to CAP009 exist. Although no 'formal' Alternative Amendments were put forward by the BSSG members, National Grid did table a CAP009 'add-on' proposal that builds on the work already carried out in respect of CAP001 and CAP009. This proposal is known as the 'Metered Volume Approach'.
- 4.2.2 National Grid explained that to accurately calculate the delivered response energy volume over a period of time is a difficult task. A generator's actual responsive output is dependent on not only the frequency deviation at a point in time, but also the duration of the deviation and the size of deviations that have previously occurred. Although it may be possible to accurately model this characteristic over relatively short time periods, to do this over the longer periods of time required for settlement purposes is not feasible.
- 4.2.3 The proposed alternative compares the BMU's actual imbalance (metered output - expected output) to the calculated response energy volume (subject to a tolerance). This 'add-on' attribute could be applied alongside the current methodology or with the CAP009 methodology. National Grid argued that by creating a link to the actual metered imbalance a further degree of accuracy could be achieved. The proposal is explained in greater detail in [Annex 5 of the Working Group Report](#).

4.3 Working Group Views and Discussion

Assessment

- 4.3.1 The BSSG agreed that to assess the merits of CAP009 it was necessary to undertake some analysis to compare the accuracy of the CAP009 methodology with that of CAP001 (the extant position). In view of this, some of the BSSG generator representatives provided the additional 'Power Delivery' matrix information required under CAP009 to National Grid who calculated the frequency response imbalance volume for the different power stations under both the CAP001 and CAP009 methodologies. These results were then plotted against the metered output of the power stations together with a system frequency trace to allow comparisons of the two different methodologies to be made.
- 4.3.2 It should be noted that this was a limited exercise covering only a small number of generating units over a relatively short period of time. Clearly, the accuracy of the CAP009 methodology is dependent on the accuracy of the values in the Power Delivery tables, submitted by service providers. However, the BSSG concluded from this limited exercise that CAP009 has the potential to provide a better approximation of response energy volume than CAP001.

Furthermore, CAP009 can utilise default arrangements that have exactly the same effect as CAP001. [Annex 4 of the Working Group Report](#) shows some of the graphs produced from this exercise with comments and narrative.

Implementation

- 4.3.3 CUSC Amendment Proposal CAP009 will also require changes to MSA's. National Grid legal advice indicates that these changes can be effected if CAP009 is implemented. Sub-Clause 7.2 of the MSA indicates that National Grid and the User shall effect any Amendment required to the made to the MSA as a result of a change to the CUSC.
- 4.3.4 Upon implementation of CAP009, it should be possible for service providers to default to the extant methodology (i.e. using the existing response values within the MSA). This could be achieved by initially populating the new Power Delivery tables (see Annex 3) with values derived from the existing frequency response capability tables. For the avoidance of doubt:
- The new Primary Response Power Delivery table shall initially be populated with Primary Response data values (for corresponding frequency deviation and generator de-load) from the existing Low Frequency Response table;
 - The new Primary & Secondary Response Power Delivery table shall initially be populated with the average of the Primary and corresponding Secondary Response data values (for corresponding frequency deviation and generator de-load) from the existing Low Frequency Response table; and
 - The new High Frequency Response Power Delivery table shall initially be populated with the High Frequency Response data values (for corresponding frequency deviation and generator de-load) from the existing High Frequency Response table.
- 4.3.5 The BSSG agreed that the values contained within the new Power Delivery tables should be subject to the same procedure for amending levels of response as that currently described in CUSC. This states that National Grid or the User shall have the right to request levels of response be reviewed/amended. This is set out in CUSC paragraphs 4.1.3.13 to 4.1.3.16. These paragraphs will require amending to reflect the introduction of these new tables.
- 4.3.6 National Grid and another member expressed concerns that the values contained in the new Power Delivery tables would be untested values, submitted by service providers. They argued that the submitted values could be difficult to validate and could lead to a number of disputes being raised. In addition, use of untested values would not place the correct incentives on either service providers or National Grid to agree accurate values. Under a mechanism whereby imbalance exposure is refunded to service providers by National Grid,

providers would be encouraged to overstate the levels of response in the Power Delivery tables whilst National Grid would be encouraged to minimise the values. However, BSSG members noted that results obtained from Grid Code compliance testing could be used by National Grid as a 'check' that any submitted values were broadly in line with plant characteristics.

- 4.3.7 Notwithstanding the above, National Grid and another member of the BSSG suggested that correct incentives could be created if CAP009 was approved coincident with the approval of BSC Modification P34 or P36 (or similar BSC Modification such as P71¹). Without such coincident approval, these members stated that they would not support CAP009. Despite these concerns, the majority of BSSG members stated their support for CAP009 (with or without any coincident BSC Modifications) as they believed that the CUSC Objectives were better achieved under CAP009 when compared to the extant position.

Metered Volume Approach

- 4.3.8 The BSSG debated the Metered Volume Approach as an add-on to the CAP009 methodology. National Grid argued that to accurately calculate the delivered response energy volume over a period of time is a difficult task. National Grid suggested that the mechanism should reflect this difficulty by creating a link to the actual metered imbalance. This view was supported by a number of BSSG members.
- 4.3.9 However, some members of the BSSG did not support the approach. These members argued that the tolerance band would disadvantage good providers of response and provide the wrong incentives. Furthermore, the introduction of such an approach would over-complicate the mechanism. National Grid disagreed with these views and suggested that the tolerance band could be made small enough such that good providers were not disadvantaged. In addition, introducing such an approach would be relatively simple to implement within Settlement Systems.
- 4.3.10 National Grid also argued that the approach would further reduce the risk of exposure to imbalance due to providing mandatory frequency response. In addition, National Grid stated that this metered volume approach would also work with BSC Modification P34 and reduce the volume risk, associated with over or under delivery, that P34 might introduce. Some members of the BSSG did not support this argument and suggested that service providers should be allowed to reflect this risk in their Bid/Offer prices (i.e. implementation of CAP010 or P36 to value response energy at Bid/Offer prices).

¹ BSC Modification Proposal P71 proposes a prospective implementation of Modification Proposal P34 'Transfer of Imbalances caused by Balancing Services to the Transmission Company Energy Account but' but is the same as the original P34 in all other aspects.

Conclusion

- 4.3.11 There was general agreement within the BSSG that the methodology as proposed by CAP009 would provide a better methodology for approximating the actual imbalance incurred when providing mandatory frequency response. Furthermore, any generator that is of the view that the current CAP001 methodology is accurate may still use the same data for the purposes of the calculation of imbalance volume (i.e. the CAP001 methodology remains the default position).
- 4.3.12 On the basis of the views of the majority, the BSSG agreed that the Metered Volume Approach (in addition to the CAP009 methodology) would not be put forward as a formal Alternative Amendment Proposal by the group, although it was agreed to highlight this alternative to the Amendments Panel. Further to this the Amendments Panel also requested that the options that were discussed and debated within the BSSG should be documented in this Consultation Document, thereby providing an opportunity for the Industry to comment on them.
- 4.3.13 The BSSG debated the interaction of CAP009 (and alternative) with other relevant modifications (i.e. CAP010, P34 & P36). The BSSG agreed that although it is important that these interactions are fully debated and understood, it should be noted that the CAP009 proposal (and alternative) has been assessed against the CUSC objectives in isolation.

5.0 Summary of Views

5.1 National Grid Initial View

- 5.1.1 National Grid believes that Amendment Proposal CAP009 must only be implemented coincident with either BSC Modification P34 (or P71) or P36. The CAP009 proposal is based on the introduction of a new table of response values, which will be submitted by service providers and be untested. CAP009 alone will not provide the correct incentives on National Grid or service providers to agree accurate values. Service providers could be encouraged to overstate these values to increase compensation payments whilst National Grid could be encouraged to minimise payments. Submitted values will be difficult to validate and with these perverse incentives could lead to a number of disputes being raised.
- 5.1.2 However, National Grid believes that if CAP009 is implemented coincident with either BSC Modification P34 (or P71) or P36 then it would place the correct incentives on service providers to submit accurate values. This is because under P34 (or P71) or P36 the volume of energy delivered would be transferred from the service provider's energy account. If this volume is incorrect then the service provider could be exposed to imbalance.

- 5.1.3 It is National Grid's view that CAP009 implemented coincident with P34 (or P71) or P36 will better facilitate achievement of the Applicable CUSC Objectives set out in Condition C7F. This is on the grounds that CAP009 in conjunction with P34 (or P71) or P36 would more closely align payments made with the actual costs incurred because the delivered energy volume would be more accurately calculated. This in turn would ensure that the most economic sources of mandatory frequency response continue to make their full capability available for despatch by National Grid.

5.2 Amendments Panel Initial View

- 5.2.1 The CUSC Amendments Panel were satisfied that the BSSG had discharged its Terms of Reference and agreed that the matter be subject to consultation by National Grid (in accordance with CUSC 8.19.1). The Amendments Panel also agreed that the alternative proposal and issues discussed by the BSSG should be included in the Consultation document, thereby providing an opportunity for the industry to comment on them.

6.0 Views Invited

- 6.1 National Grid is seeking the views of interested parties relating to CUSC Amendment Proposal CAP009. In particular views are invited on:
- Whether CAP009 does provide an improved and more accurate mechanism for approximating the assumed Frequency Response delivery of a generator and thereby better facilitating the applicable CUSC objectives;
 - Whether CAP009 should only be implemented coincident with BSC Modification P34 (or P71) or P36 as recommended by National Grid; and
 - National Grid's proposed alternative to adopt a "metered volume approach" in conjunction with the CAP009 methodology.
- 6.2 Responses should be sent to National Grid by no later than close of business Friday, 5 April 2002 to the address shown in Paragraph 3.2 above.

Annex 1 – CUSC Amendment Proposal

Amendment Proposal Form

Those wishing to propose an Amendment to the CUSC should do so by filling in this "Amendment Proposal Form" that is based on the provisions contained in Section 8.15 of the CUSC. The form seeks to ascertain details about the Amendment Proposal so that the CUSC Panel can determine more clearly whether the proposal should be considered by a Working Group or go straight to wider National Grid Consultation.

The Panel Secretary will check that the form has been completed, in accordance with the requirements of the CUSC, prior to submitting it to the Panel. If the Panel Secretary accepts the Amendment Proposal form as complete, then he will write back to the Proposer informing him of the reference number for the Amendment Proposal and the date on which the Proposal will be considered by the Panel. If, in the opinion of the Panel Secretary, the form fails to provide the information required in the CUSC, then he may reject the Proposal. The Panel Secretary will inform the Proposer of the rejection and report the matter to the Panel at their next meeting. The Panel can reverse the Panel Secretary's decision and if this happens the Proposer will be informed by the Panel Secretary.

The completed form should be returned to:

Mark Cox
Panel Secretary
Commercial Development
National Grid Company plc
National Grid House
Kirby Corner Road
Coventry, CV4 8JY

Or via e-mail to:

CUSC.Team@uk.ngrid.com

(Participants submitting this form by email will need to send a statement to the effect that the proposer acknowledges that on acceptance of the proposal for consideration by the Amendments Panel, a proposer which is not a CUSC Party shall grant a licence in accordance with Paragraph 8.15.7 of the CUSC. A Proposer which is a CUSC Party shall be deemed to have granted this Licence.)

Proposers Name:

(Name of party making the proposal. An Amendment Proposal may be made by a CUSC Party, a BSC Party or by "energywatch")

First Hydro Company

Proposers Representative:

(The name of the person representing the Proposer (and his alternate) for the purposes of the Amendment Process)

Simon Lord (Alternate - Libby Glazebrook)

Organisations Name and Address:

(Organisation on whose behalf the Amendment is proposed)

First Hydro Company
Bala House
St Davids Park
Deeside
Flintshire
CH5 3XJ

Capacity in which the Organisation Proposes to make an Amendment:

(i.e. CUSC Party, BSC Party or "energywatch")

CUSC Party

Description of the issue or defect which the proposed Amendment seeks to address:

(This should be in reasonable, but not excessive detail)

Neither the current mechanism nor that proposed in CAP001 accurately reflect imbalance volume that occurs as a result of the provision of mandatory frequency response.

For certain types of plant the output of the plant continues to increase after the 10s cut off in the Primary and High frequency response tables. It is these tables that this proposal seeks to modify by cutting the link between the Primary and High frequency response tables and the payment volume. A new set of tables would be produced that would more accurately reflect the energy produced when providing mandatory frequency response.

Description of the proposed Amendment and of its nature and purpose:

(This should be in reasonable but not excessive detail)

Two methods could be used to determine the volume:

- 1) The characteristic curve of the BMU could be used that tracks output with changing frequency.
- 2) An approximation for 1) could be used that produces for each BMU a new pair of tables (for each mode of operation) based on the format of the High Frequency Response table. These tables (High Frequency Volume and Low Frequency Volume) would initially contain the same data as the current Primary and High Frequency Response tables.

The tables would then be re-populated with data based on the stable output that is achieved by the BM unit following a change in frequency. The effect of this would be to move the 10-second cut off for Primary and High Frequency Response to a different time, based on the time to achieve stable output.

It is suggested that method 2) could be used as a step towards the ideal solution detailed in 1).

An indication of those parts of the CUSC which would require amendment in order to give effect to (or would otherwise be affected by) the proposed amendment and an indication of the nature of those amendments or effects.

(This should be given where possible)

Section 4.1.3 – calculation of volume's formulae. Amendment required to reflect revised tables that will be used for calculating the volumes for delivery of energy as outlined above.

Modification of the CUSC Mandatory Services agreement to reflect the inclusion of High Frequency Volume and Low Frequency Volume tables.

Reasons why the Proposer believes that the proposed Amendment would better facilitate achievement of the Applicable CUSC Objectives as compared with the current version of the CUSC with background information in support thereof.

The Transmission Licence obligates National Grid to purchase ancillary services from the most economical sources available to it having regard to the quantity and nature of the ancillary services.

This proposed amendment would better facilitate the efficient discharge of this licence obligation by aligning more accurately payments made with costs incurred, as the volume would now be more accurately calculated.

This in turn will ensure that the most economic sources of mandatory frequency response continue to make their full capability available for despatch by National Grid.

An indication of the impact of the proposed Amendment on Core Industry Documents.

(This should be given where possible)

No impact on BSC, Grid Code or any other core industry document is foreseen.

An indication of the impact of the proposed Amendment on relevant computer systems and processes used by CUSC Parties.

(This should be given where possible)

The proposed amendment will require modification to the payment calculation system (GENRES) used by National Grid to calculate the Frequency Response payments.

A statement to the effect that the Proposer acknowledges that on acceptance of the proposal for consideration by the Amendments Panel a Proposer shall grant a Licence in accordance with Clause 8.15.7 of the CUSC.

(A signature to this effect must be given by a proposer which is not a CUSC Party)

Annex 2 – Proposed Text to Modify CUSC

LEGAL TEXT TO ACCOMPANY CAP009

4.1.3 Frequency Response

Introduction

4.1.3.1 Each applicable **User** is obliged to provide (for the avoidance of doubt, as determined by any direction in force from time to time and issued by the **Authority** relieving that **User** from the obligation under its **Licence** to comply with such part or parts of the **Grid Code** or any **Distribution Code** or, in the case of **NGC**, the **Transmission Licence**, as may be specified in such direction) the **Mandatory Ancillary Service of Frequency Response** referred to in **Grid Code CC 8.1** by means of **Frequency** sensitive generation in accordance with the terms of this Paragraph 4.1.3 and a **Mandatory Services Agreement** but subject always to and in accordance with the relevant part or parts of the **Grid Code** applicable thereto.

Definitions

4.1.3.2 For the purposes of this Paragraph 4.1.3:

- (i) “**Frequency Response Service**” means the **Mandatory Ancillary Service of Frequency Response** and any **Commercial Ancillary Service of Frequency Response** as may be agreed to be provided by a **User** from time to time;
- (ii) the **Mandatory Ancillary Service of Frequency Response** shall constitute operation of a **BM Unit** in accordance with **Grid Code CC 6.3.7** and **BC 3.5** (with the exception of **BC 3.5.2**), including, without limitation, under normal operating conditions with the speed governor set so that it operates with an overall speed droop of between 3% and 5% so as to provide the applicable levels of **Response** referred to in Paragraph 4.1.3.7;
- (iii) the term "instruction" means a communication whether by telephone or automatic logging device or facsimile from **NGC** to the **User** instructing a **User** in accordance with **Grid Code BC 2.8** and this Paragraph 4.1.3 to provide any **Frequency Response Service**, and derivations of the term shall be construed accordingly;
- (iv) the amendment of an existing instruction shall be deemed to be a new instruction;
- (v) an instruction will prevail until either it is countermanded by **NGC** or until the **BM Unit** to which the instruction relates is **De-synchronised** (whichever is first to occur).

NGC’s Instructions to provide Mode A Frequency Response

4.1.3.3 For the purposes of instructions and calculation of payments, the **Mandatory Ancillary Service of Frequency Response**

as described in this Paragraph 4.1.3 shall be referred to as "**Mode A Frequency Response**".

4.1.3.4 **NGC** may at any time instruct a **User** to operate any one or more **BM Unit(s)** so as to provide the following components of **Mode A Frequency Response**:-

- (a) **Primary Response**;
- (b) **Secondary Response**;
- (c) **High Frequency Response**,

in any of the permissible combinations set out in the relevant table in the **Mandatory Services Agreement**.

4.1.3.5 **NGC** shall not instruct a **User** to provide **Mode A Frequency Response** and any **Commercial Ancillary Service of Frequency Response** simultaneously.

4.1.3.6 In the event that any instruction to provide **Frequency Response** does not state whether the instruction is to provide **Mode A Frequency Response** or any **Commercial Ancillary Service of Frequency Response**, such instruction shall be deemed to be an instruction to provide **Mode A Frequency Response**.

User's Obligation to Provide Response

4.1.3.7 When a **User** is instructed in accordance with Paragraphs 4.1.3.4 and/or 4.1.3.6 to operate a **BM Unit** so as to provide any component(s) of **Mode A Frequency Response**, that **User** shall operate that **BM Unit** so as to provide, for any **Frequency Deviation** and at any level of **De-Load**, at least the amount of **Primary Response** and/or **Secondary Response** and/or **High Frequency Response** set out respectively in the relevant **Frequency Response Capability Data** tables in the **Mandatory Services Agreement** (as such tables are to be interpreted in accordance with Paragraph 4.1.3.11).

Calculation of Payments

4.1.3.8 The payments to be made by **NGC** to a **User** hereunder in respect of the provision of any **Mode A Frequency Response** from a **BM Unit** shall be comprised of **Holding Payments** and **Imbalance Compensation Payments** and shall be determined in accordance with the formulae in, respectively, Paragraphs 4.1.3.9 and 4.1.3.9A and in accordance with Paragraphs 4.1.3.10 to 4.1.3.12 inclusive.

Payment Formulae - Holding Payments

4.1.3.9 The **Holding Payments** for a **BM Unit** to be made by **NGC** to a **User** referred to in Paragraph 4.1.3.8 shall be calculated in accordance with the following formula:-

$$HP_M = P_M + H_M + S_M$$

Where:

HP_M is the **Holding Payment** to be made to the **User** calculated in £ per minute.

P_M is the payment per minute to be made by **NGC** to the **User** for the **Ancillary Service of Primary Response** provided by the **User** from the **BM Unit** concerned pursuant to an instruction from **NGC** to provide **Mode A Frequency Response**, and is calculated as follows:-

$$P_M = (P_{PR} \times P_{MW} (1 - SF_P)) \times K_T \times K_{GRC} \times \left[\frac{1}{60} \right]$$

H_M is the payment per minute to be made by **NGC** to the **User** for the **Ancillary Service of High Frequency Response** provided by the **User** from the **BM Unit** concerned pursuant to an instruction from **NGC** to provide **Mode A Frequency Response**, and is calculated as follows:-

$$H_M = (H_{PR} \times H_{MW} (1 - SF_H)) \times K_T \times K_{GRC} \times \left[\frac{1}{60} \right]$$

S_M is the payment per minute to be made by **NGC** to the **User** for the **Ancillary Service of Secondary Response** provided by the **User** from the **BM Unit** concerned pursuant to an instruction from **NGC** to provide **Mode A Frequency Response**, and is calculated as follows:-

$$S_M = (S_{PR} \times S_{MW} (1 - SF_S)) \times K_T \times K_{GRC} \times \left[\frac{1}{60} \right]$$

In this Paragraph 4.1.3.9, the following terms shall have the following meanings:-

- P_{PR} = the appropriate payment rate for **Primary Response** set out in the **Mandatory Services Agreement**;
- P_{MW} = the **Primary Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;
- H_{PR} = the appropriate payment rate for **High Frequency Response** set out in the **Mandatory Services Agreement**;
- H_{MW} = the **High Frequency Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;
- S_{PR} = the appropriate payment rate for **Secondary Response** set out in the **Mandatory Services Agreement**;
- S_{MW} = the **Secondary Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit**

- concerned at the end of the minute in which the service is provided;
- K_T = the ambient temperature adjustment factor. **NGC** and each **User** acknowledge and agree, as between **NGC** and that **User**, that K_T shall be deemed to be 1 for the purposes of calculating payments until such time as they agree upon an appropriate formula and a suitable method of measuring the ambient temperature on a minute by minute basis which shall be set out in the **Mandatory Services Agreement**. In the event that any agreed method of measuring the ambient temperature on a minute by minute basis should fail following its implementation, then **NGC** and each **User** acknowledge and agree, as between **NGC** and that **User**, that K_T shall be deemed to be 1 until the method of measuring the ambient temperature on a minute by minute basis is restored;
- K_{GRC} = where the **BM Unit** is a **CCGT Module**, the plant configuration adjustment factor set out in the relevant table in the **Mandatory Services Agreement** for the configuration of the **BM Unit** concerned at the time at which the capability to provide the service is carried, otherwise 1;
- SF_P = 0, subject to Paragraph 4.1.3.25 (e);
- SF_S = 0, subject to Paragraph 4.1.3.25 (e);
- SF_H = 0, subject to Paragraph 4.1.3.25 (e).

Payment Formulae - Imbalance Compensation Payment

- 4.1.3.9A (a) The **Imbalance Compensation Payments** for **BM Unit i** in **Settlement Period j** to be made by **NGC** to a **User** referred to in Paragraph 4.1.3.8 shall be comprised of an **Imbalance Energy Payment** and a **Non-Delivery Payment**, and shall be calculated in accordance with the following formulae:-

$$ICP_{ij} = IEP_{ij} + RNDC_{ij}$$

But so that where ICP_{ij} is negative such amount shall be paid by the **User** to **NGC**.

Where:

ICP_{ij} is the **Imbalance Compensation Payment** to be made to or, as the case may be, by the **User**;

IEP_{ij} is the **Imbalance Energy Payment** for **BM Unit i**, in **Settlement Period j**, calculated in accordance with Paragraph 4.1.3.9A (b) below; and

$RNDC_{ij}$ is the **Non-Delivery Payment** for **BM Unit i**, in **Settlement Period j**, calculated in accordance with Paragraph 4.1.3.9A (c) below.

- (b) The **Imbalance Energy Payment** (IEP_{ij}) shall be calculated as follows:-

$$IEP_{ij} = LFIEP_{ij} + HFIEP_{ij}$$

Where:

LFIEP_{ij} is the low frequency response imbalance energy payment for **BM Unit i**, in **Settlement Period j**, and HFIEP_{ij} is the high frequency response imbalance energy payment for **BM Unit i**, in **Settlement Period j**, and are calculated as follows:-

if $IE_{ij} > 0$, then

$$LFIEP_{ij} = |IE_{ij}| * (\text{reference price} - SSP_j)$$

and

$$HFIEP_{ij} = 0$$

otherwise

$$LFIEP_{ij} = 0$$

and

$$HFIEP_{ij} = |IE_{ij}| * (SBP_j - \text{reference price})$$

Where IE_{ij} is the expected imbalance energy for **BM Unit i** in **Settlement Period j** calculated as follows:-

$$IE_{ij} = \int_0^{SPD} FR_{ij}(t) dt$$

Where:

$\int_0^{SPD} dt$ is the integral at times t , over the **Settlement Period** duration.

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit i**, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant [Frequency Response Power Delivery Data](#) table set out in the **Mandatory Services Agreement** (as such table is interpreted in accordance with Paragraph 4.1.3.11) by reference to the level of **De-Load** of the **BM Unit** concerned at the end of the minute and the mean **Frequency Deviation** over that minute when that **BM Unit** is providing **Mode A Frequency Response** and zero at all other times.

For this purpose:-

- (i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit i** shall be derived from the [high-frequency](#)

~~response table~~ table entitled “High Frequency Response Power Delivery – Mode A” set out in the **Mandatory Services Agreement** and shall be signed negative; and

(ii) for a negative **Frequency Deviation**, the expected change in **Active Power** output of **BM Unit i** shall be derived from:

A) the ~~table~~ table entitled “Primary Response ~~data~~Power Delivery – Mode A” in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the ~~mean of the Primary Response and~~ table entitled “Primary & Secondary Response ~~data~~Power Delivery – Mode A” in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

in each case ~~shown in the low frequency response tables~~ set out in the **Mandatory Services Agreement** and shall be signed positive.

$$\text{reference price} = \frac{(\overline{SBP}_{month} + \overline{SSP}_{month})}{2}$$

Where:

\overline{SBP}_{month} and \overline{SSP}_{month} are the calculated time weighted average of SBP_j and SSP_j respectively (each as defined in the **Balancing and Settlement Code**) for the preceding calendar month in which the service is provided.

(c) The **Non-Delivery Payment** ($RNDC_{ij}$) shall be calculated as follows:-

$$RNDC_{ij} = CND_{ij} - CNDR_{ij}$$

Where:

$CNDR_{ij}$ is a quantity referred to in this Paragraph 4.1.3.9A (c) as the **BM Unit Period Non-Delivery Charge (Revised)** determined as follows:-

In respect of each **Settlement Period j**, for each **BM Unit i**, a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Period BM Unit Non-Delivered Offer Volume (Revised)** ($QNDOR_{ij}$) will be determined as follows:-

$$QNDOR_{ij} = \min\left(\max(QME_{ij} + IE_{ij} - QM_{ij}, 0), \sum_n QAO_{ij}^n\right)$$

where \sum_n represents the sum over all **Bid-Offer Pair Numbers** for the **Accepted Offer Volumes** for the **BM Unit**.

In respect of each **Settlement Period j**, for each **BM Unit i**, a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Period BM Unit Non-Delivered Bid Volume (Revised)** ($QNDBR_{ij}$) will be determined as follows:-

$$QNDBR_{ij} = \max\left(\min(QME_{ij} + IE_{ij} - QM_{ij}, 0), \sum_n QAB_{ij}^n\right)$$

where \sum_n represents the sum over all **Bid-Offer Pair Numbers** for the **Accepted Bid Volumes** for the **BM Unit**.

Now, in respect of each **Settlement Period j**, for each **BM Unit i**, if the **Period BM Unit Non-Delivered Offer Volume (Revised)** is greater than zero then to determine values of a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Offer Non-Delivery Volume (Revised)** ($QNDOR_{ij}^n$), the **Period BM Unit Non-Delivered Offer Volume (Revised)** will be apportioned across accepted **Offers**, in the following way:-

In respect of each **Settlement Period j**, for each **BM Unit i**, the set of all accepted **Offers** will be ranked in order of decreasing price. The accepted **Offer** with the highest price will be allocated **Non-Delivery Order Number 1**, the next highest priced accepted **Offer** will be allocated **Non-Delivery Order Number 2** and so on until all accepted **Offers** for the **Settlement Period** have been allocated a **Non-Delivery Order Number**. The set of accepted **Offers** $\{QAO_{ij}^{n_1}, QAO_{ij}^{n_2}, \dots, QAO_{ij}^{n_u}, \dots\}$ is then a ranked set of accepted **Offers**.

The **Offer Non-Delivery Volume (Revised)** will be allocated to the first accepted **Offer** in the list first, then, once the first accepted **Offer** has been wholly accepted, to the second accepted **Offer** and so on until the **Period BM Unit Non-Delivered Offer Volume (Revised)** is fully apportioned.

Then the **Offer Non-Delivery Volume (Revised)** for accepted **Offer n**, is:

$$QNDOR_{ij}^n = \min(QAO_{ij}^{n_u}, RQNDOR_{ij}^{u-1})$$

where $RQNDOR_{ij}^{u-1}$ is a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Remaining Period BM Unit Non-Delivered Offer Volume (Revised)** determined as:

$$RQNDOR_{ij}^u = RQNDOR_{ij}^{u-1} - QNDOR_{ij}^{n_u-1}$$

$$\text{and } RQNDOR_{ij}^0 = QNDOR_{ij}$$

$$\text{and } QNDOR_{ij}^{n_o} = 0 .$$

Now, in respect of each **Settlement Period** j , for each **BM Unit** i , if the **Period BM Unit Non-Delivered Bid Volume (Revised)** is less than zero then to determine values of a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Bid Non-Delivery Volume (Revised)** ($QNDBR_{ij}^n$), the **Period BM Unit Non-Delivered Bid Volume (Revised)** will be apportioned across accepted **Bids**, in the following way:-

In respect of each **Settlement Period** j , for each **BM Unit** i , the set of all accepted **Bids** will be ranked in order of increasing price. The accepted **Bid** with the lowest price is allocated **Non-Delivery Order Number** 1, the next lowest priced accepted **Bid** is allocated **Non-Delivery Order Number** 2 and so on until all accepted **Bids** for the **Settlement Period** have been allocated a **Non-Delivery Order Number**. The set of accepted **Bids** $\{QAB_{ij}^{n_1}, QAB_{ij}^{n_2}, \dots, QAB_{ij}^{n_u}, \dots\}$ is then a ranked set of accepted **Bids**.

The **Bid Non-Delivery Volume (Revised)** will be allocated to the first accepted **Bid** in the list first, then, once the first accepted **Bid** has been wholly accepted, to the second accepted **Bid** and so on until the **Period BM Unit Non-Delivered Bid Volume (Revised)** is fully apportioned.

Then the **Bid Non-Delivery Volume (Revised)** for accepted **Bid** n , is:

$$QNDBR_{ij}^n = \max(QAB_{ij}^{n_u}, RQNDOR_{ij}^{u-1})$$

where $RQNDOR_{ij}^{u-1}$ is a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Remaining Period BM Unit Non-Delivered Bid Volume (Revised)** determined as:

$$RQNDOR_{ij}^u = RQNDOR_{ij}^{u-1} - QNDBR_{ij}^{n_u-1}$$

$$\text{and } RQNDOR_{ij}^0 = QNDBR_{ij}$$

$$\text{and } QNDBR_{ij}^{n_p} = 0 .$$

In respect of each **Settlement Period** j , for each **BM Unit** i , for each accepted **Offer**, a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Non-Delivered Offer Charge (Revised)** will be determined as follows:-

$$CNDOR_{ij}^n = QNDOR_{ij}^n \times \max((PO_{ij}^n - SBP_j), 0) \times TLM_{ij}$$

In respect of each **Settlement Period** *j*, for each **BM Unit** *i*, for each accepted **Bid**, a quantity referred to in this Paragraph 4.1.3.9A (c) as the **Non-Delivered Bid Charge (Revised)** will be determined as follows:-

$$CNDBR_{ij}^n = QNDBR_{ij}^n \times \min((PB_{ij}^n - SSP_j), 0) \times TLM_{ij}$$

In respect of each **Settlement Period** *j*, for each **BM Unit** *i*, the **BM Unit Period Non-Delivery Charge (Revised)** (CND_{ij}) will be determined as follows:-

$$CND_{ij} = \sum_n (CDNOR_{ij}^n + CNDBR_{ij}^n)$$

where \sum_n represents the sum over all **Bid-Offer Pair Numbers** for the **BM Unit**.

- (d) In this Paragraph 4.1.3.9A, the following terms shall have the meanings ascribed to them in the **Balancing and Settlement Code**:-

“Accepted Offer Volumes”

“Accepted Bid Volumes”

“Bid”

“Bid-Offer Pair Numbers”

“BM Unit Period Non-Delivery Charge”

“CND_{ij}”

“Non-Delivery Order No.1”

“Non-Delivery Order No.2”

“Offer”

“QABⁿ_{ij}”

“QAOⁿ_{ij}”

“QM_{ij}”

“QME_{ij}”

“SSP_j”

“SBP_j”

“SPD”

- 4.1.3.10 **NGC** and each **User** acknowledge and agree, as between **NGC** and that **User**, that no **Holding Payment** or **Imbalance Compensation Payment** shall be payable except in relation to periods in respect of which instructions have been issued by **NGC** pursuant to this Paragraph 4.1.3.

- 4.1.3.11 *Interpretation of Tables – Levels of Response*
The figures for **Response** set out in the [response Frequency Response Capability Data tables and Frequency Response Power Delivery Data](#) tables in the **Mandatory Services Agreements** shall be given in relation to specific **Frequency Deviations** and to specific levels of **De-Load** for a **BM Unit**. Such tables shall, for the purposes of [Paragraph 4.1.3.7, Paragraphs 4.1.3.7 and 4.1.3.9A\(b\)](#), be construed in accordance with this Paragraph 4.1.3.11. Subject to Paragraphs 4.1.3.11(d) and (e):-

- (a) for a **Frequency Deviation** at a given time differing from the figures given in ~~the relevant response tables in the Mandatory Services Agreement, a table,~~ the level of **Response required** shall be calculated by linear interpolation from the figures specified in the ~~relevant~~ table(s) in respect of **Frequency Deviations**;
- (b) for a level of **De-Load** at a given time differing from the figures given in ~~the relevant response tables in the Mandatory Services Agreement, a table,~~ the level of **Response required** shall be calculated by linear interpolation from the figures ~~in the relevant table(s) specified in the table~~ in respect of levels of **De-Load**. For the avoidance of doubt, **Frequency Sensitive Mode** shall not be instructed for any **De-Load** greater than the maximum level of **De-Load** given in the ~~response tables; relevant Frequency Response Capability Data table;~~
- (c) in respect of any time in relation to which both Paragraphs 4.1.3.11(a) and (b) apply, the level of **Response required** shall be calculated by dual linear interpolation from the figures specified in the ~~relevant table(s) table~~ in respect of **Frequency Deviations** and in respect of levels of **De-Load**;
- and
- (d) for any **Frequency Deviation** greater than the greatest **Frequency Deviation** given in ~~the relevant response tables in the Mandatory Services Agreement, a table~~ (whether positive or negative), the level of **Response required** shall be calculated by reference to the greatest **Frequency Deviation** (positive or negative, as the case may be) given in ~~the relevant table(s); that table;~~ and
- (e) for the purposes of calculating levels of **Response** ~~to be provided in response to in respect of~~ **Frequency Deviations** lower than those specified in ~~the response tables in the Mandatory Services Agreement, a table,~~ the relevant table(s) shall be deemed to specify ~~that a level of zero Response is to be provided~~ for a **Frequency Deviation** of zero.

Interpretation of Tables – Levels of Holding Payment

4.1.3.12

The ~~summary response~~ **Frequency Response Summary Data** table in the **Mandatory Services Agreement** shall set out figures in respect of given levels of **De-Load** for the purposes of calculating payment in accordance with the formulae in Paragraph 4.1.3.9. Where the level of **De-Load** of the **BM Unit** is other than one of the levels given in such table, then, ~~for the purposes of the payment table in the Mandatory Services Agreement,~~ the figure for P_{MW} , S_{MW} or H_{MW} as the case may be, shall be calculated by linear interpolation from the figures in such table in respect of levels of **De-Load**.

User's Request to Amend Levels of and/or Payment Rates for Response

4.1.3.13 Each **User** shall have the right, as between **NGC** and that **User**, not more than once every two months (or otherwise at any time with the specific agreement of **NGC**) to request in writing an amendment to the levels of **Response** set out in the ~~Frequency Response response~~ Frequency Response Capability Data tables and/or the Frequency Response Power Delivery Data tables in the **Mandatory Services Agreement** and/or, provided such request is made in accordance with the relevant charging principles set out in Paragraph 4.4, the payment rates referred to in the ~~payment~~ Payment Rates table(s) in the **Mandatory Services Agreement**. **NGC's** agreement to such a request shall not be unreasonably withheld or delayed.

4.1.3.14 **NGC's Requests to Amend Levels of Response**
Where **NGC** reasonably considers in light of operating experience that the levels of **Response** set out in the ~~response~~ Frequency Response Capability Data tables and/or the Frequency Response Power Delivery Data tables in the **Mandatory Services Agreement** do not represent the true operating capabilities of a **BM Unit(s)**, **NGC** shall have the right not more than once every two months (or otherwise at any time with the specific agreement of the relevant **User**) to request (provided always that such request be accompanied by a reasonable justification therefor) that the levels of **Response** set out in the relevant response table(s) in the **Mandatory Services Agreement** be reviewed and, if appropriate, amended by agreement with such **User** such agreement not to be unreasonably withheld or delayed.

4.1.3.15 **Procedure for Amendments to Levels of and/or Payment Rates for Response**
Any amendments agreed by **NGC** and a **User** pursuant to Paragraphs 4.1.3.13 or 4.1.3.14 or determined by an arbitrator or panel of arbitrators under the **Dispute Resolution Procedure** in the circumstances referred to in Paragraph 4.1.3.16 shall not become effective until (in the case of agreed amendments) a date at least five **Business Days** after an amending agreement is entered into between **NGC** and the **User** in accordance with the **Mandatory Services Agreement** or, in the case of determined amendments, such other date as may be determined by an arbitrator or panel of arbitrators under the **Dispute Resolution Procedure** subject always to Paragraphs 4.1.3.17 and 4.1.3.19.

4.1.3.16 **Failure to Agree Amendments**
If **NGC** and a **User** are unable to agree any amendments requested pursuant to Paragraphs 4.1.3.13 or 4.1.3.14 within 28 days of either of them serving on the other notice of its intention to invoke the **Dispute Resolution Procedure** then either party may initiate the procedure for resolution of the issue as an **Other Dispute** in accordance with Paragraph 7.4.

4.1.3.17 **Dispute Resolution Procedure**
NGC and each **User** acknowledge and agree, as between **NGC** and that **User**, that rule 12.1(p) of the **Electricity Arbitration Association** shall apply to any arbitration proceedings initiated pursuant to Paragraph 7.4 in the

circumstances referred to in Paragraph 4.1.3.16, but that the changes determined by any arbitrator or panel of arbitrators shall not apply in respect of any period prior to the date on which the **Dispute Resolution Procedure** is invoked.

Implementation of Determinations

4.1.3.18 Subject to Paragraph 4.1.3.17, any changes to payment rates determined by an arbitrator or panel of arbitrators under the **Dispute Resolution Procedure** in the circumstances referred to in Paragraph 4.1.3.16 shall apply with effect from the date specified in the determination and consequential adjustments shall be made in the next practicable **Provisional Monthly Statement** issued following the date of the determination. If any such changes are so determined to apply in respect of any period prior to the date of determination then in respect of such period until actual payment (or, as the case may be, repayment) **NGC** shall pay to the **User** (where such payment rates are determined to be greater than current payment rates) the excess together with interest thereon at the **Base Rate** and the **User** shall repay to **NGC** (where such payment rates are determined to be less than current payment rates) the amount by which **NGC** has overpaid the **User** together with interest thereon at the **Base Rate**.

4.1.3.19 Any amendments to levels of **Response** determined by an arbitrator or panel of arbitrators under the **Dispute Resolution Procedure** in the circumstances referred to in Paragraph 4.1.3.16 shall take effect from the date five **Business Days** following the relevant determination.

Triennial Review

4.1.3.20 Without prejudice to Paragraphs 4.1.3.13 to 4.1.3.19 inclusive, **NGC** and each **User** shall review the payment rates for the **Mandatory Ancillary Service of Frequency Response** set out in each relevant **Mandatory Services Agreement** and shall adjust such payment rates by such amount or in such manner as shall be fair and reasonable (on the basis of the charging principles set out in Paragraph 4.4) on the date specified for such purpose in the **Mandatory Services Agreement** and on each third successive anniversary thereof during the currency of that **Mandatory Services Agreement** ("**Triennial Review Date**").

4.1.3.21 **NGC** and the **User** shall meet to discuss and endeavour to agree any such adjustment to the payment rates (which shall be calculated on the basis of the charging principles set out in Paragraph 4.4) no later than five months prior to the **Triennial Review Date**. If **NGC** and the **User** have not agreed the amount of any such adjustment by the date which is one month prior to the **Triennial Review Date**, either of them may initiate the procedure for resolution of the issue as an **Other Dispute** in accordance with Paragraph 7.4. **NGC** and the **User** acknowledge and agree that rule 12.1(p) of the **Electricity Arbitration Association** shall apply to any arbitration proceedings initiated in consequence thereof.

4.1.3.22 If any adjustment to the payment rates has not been ascertained (by agreement or determination) by the **Triennial Review Date** in accordance with the provisions of

Paragraphs 4.1.3.20 and 4.1.3.21, **NGC** and the **User** shall pay to the other for any interval between the **Triennial Review Date** and the date when such payment rates have been ascertained as aforesaid any sums due to that other party for the **Mandatory Ancillary Service of Frequency Response** calculated at the corresponding payment rates applicable during the period immediately preceding the **Triennial Review Date** without indexation. Upon any adjustment to the payment rates (or any of them) being ascertained as aforesaid, any additional amount or reduced amount payable or repayable for the period commencing on the **Triennial Review Date** and ending on the date when the payment rates shall have been ascertained, shall be paid or repaid by the party liable for such payment or repayment together with interest on the additional amounts which would have been payable (or the amounts by which the payments would have been reduced as the case may be) had the adjustment been ascertained at the **Triennial Review Date** at the rate applicable to overdue payments provided in Paragraph 4.3.

Paragraphs 4.1.3.23 to 4.1.3.27 remain unchanged by this Amendment Proposal.

**Annex 3 – Proposed Changes to Schedule 2- Exhibit 4 of the CUSC
(Mandatory Services Agreement)**

4. FREQUENCY RESPONSE

4.1 Paragraph 4.1.3 of CUSC

The provisions of this Clause 4 give effect to the provisions of Paragraph 4.1.3 of the **CUSC** in respect of the provision by the **User** from the **BM Units** of the **Mandatory Ancillary Service of Frequency Response** and the payments to be made by **NGC** to the **User** in respect thereof.

4.2 Term

4.2.1 The provisions of this Clause 4 shall be deemed to have applied in relation to each **BM Unit** with effect from 00.00 hours on the [date hereof] [**Commencement Date**] and shall continue thereafter unless and until this **Mandatory Services Agreement** is terminated. For the avoidance of doubt, in the event this **Mandatory Services Agreement** is terminated in relation to any individual **BM Unit**, the provisions of this Clause 4 shall terminate in relation to that **BM Unit** only.

4.2.2 Termination of this Clause 4 shall not affect the rights and obligations of **NGC** and the **User** accrued as at the date of termination.

4.3 Provision of Frequency Response

4.3.1 The **Parties** agree that:-

- (a) [subject always to Sub-Clause 4.6,] for the purposes of Paragraph 4.1.3.7 of the **CUSC**, the figures set out in the response tables in Appendix 1, Section B, Part I represent the amount of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein;
- (b) [subject always to Sub-Clause 4.6,] for the purposes of Paragraph ~~4.1.3.8(i)~~4.1.3.9 of the **CUSC**, the figures set out in the summary response table in Appendix 1, Section B, Part II represent the capabilities in respect of **Primary Response**, **Secondary Response** and **High Frequency Response** at given levels of **De-Load** referred to therein;
- (c) for the purposes of Paragraph 4.1.3.4 of the **CUSC**, the table in Appendix 1, Section B, Part III shows the permissible combinations of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein;
- (d) for the purposes of Paragraph ~~4.1.3.8(iv)~~4.1.3.9 of the **CUSC**, the figures (if any) set out in the plant configuration table in Appendix 1, Section B, Part II represent the plant configuration adjustment factors referred to therein to be applied where the **BM Unit** is a **CCGT Module**; ~~and~~
- (e) for the purposes of Paragraph ~~4.1.3.8(ii)~~4.1.3.9 of the **CUSC**, the payment rates in Appendix 2, Section B constitute the payment rates in respect of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to ~~therein~~ therein; ~~and~~

(f) [subject always to Sub-Clause 4.6.] for the purposes of Paragraph 4.1.3.9A(b) of the CUSC in respect of calculation of the Imbalance Energy Payment, the response values in Appendix 1, Section B, Part IV represent the Frequency Response Power that is deemed to be delivered in respect of Primary Response, Secondary Response and High Frequency Response.

4.4 Indexation

The payment rates set out in Appendix 2, Section B are specified at April [] base, and shall from 1st April each year be indexed in accordance with Paragraph 4.5 of the CUSC.

4.5 Triennial Review

For the purposes of Paragraph 4.1.3.20 of the CUSC, the first **Triennial Review Date** shall be [].

4.6 [Commissioning and Provisional Response Levels

Without prejudice to Paragraphs 4.1.3.13 and 4.1.3.14 of the CUSC, the **User** acknowledges that the levels of **Response** set out in the response tables in Appendix 1, Section B, ~~Part~~ Parts I, II and IV are indicative figures only during the period in which the relevant **Generating Unit(s)** is being commissioned and the **User** hereby undertakes to use its reasonable endeavours to forward to **NGC** levels of **Response** which represent the true operating characteristics of such **Generating Unit(s)** for inclusion in Appendix 1, Section B, ~~Part~~ Parts I, II and IV as soon as possible following completion of commissioning.]

APPENDIX 1 – DATA (Cont.)
SECTION B (FREQUENCY RESPONSE)
Part I - Frequency Response Capability Data

Station:
BM Unit Nos.

Table 1		Low Frequency Response – Mode A					
Genset De-Load (MW)	δf_p (Hz)	Primary Response (MW)	Secondary Response (MW)				
			$\delta f_s = -0.1\text{Hz}$	$\delta f_s = -0.2\text{Hz}$	$\delta f_s = -0.3\text{Hz}$	$\delta f_s = -0.4\text{Hz}$	$\delta f_s = -0.5\text{Hz}$
	-0.1						
	-0.2						
	-0.3						
	-0.4						
	-0.5						
	-0.6						
	-0.7						
	-0.8						
	-0.1						
	-0.2						
	-0.3						
	-0.4						
	-0.5						
	-0.6						
	-0.7						
	-0.8						
	-0.1						
	-0.2						
	-0.3						
	-0.4						
	-0.5						
	-0.6						
	-0.7						
	-0.8						
	-0.1						
	-0.2						
	-0.3						
	-0.4						
	-0.5						
	-0.6						
	-0.7						
	-0.8						
	-0.1						
	-0.2						
	-0.3						
	-0.4						
	-0.5						
	-0.6						
	-0.7						
	-0.8						
	-0.1						
	-0.2						
	-0.3						
	-0.4						
	-0.5						
	-0.6						
	-0.7						
	-0.8						

Station:
BM Unit Nos:

Table 2	High Frequency Response (MW) - Mode A				
Genset De-Load (MW)	Frequency Deviation from Target Frequency				
	$\delta f_h = +0.1$ Hz	$\delta f_h = +0.2$ Hz	$\delta f_h = +0.3$ Hz	$\delta f_h = +0.4$ Hz	$\delta f_h = +0.5$ Hz

[In relation to the levels of **Response required capability** pursuant to Paragraph 4.1.3 of **CUSC** and Table 2 above it is agreed that for low operating outputs, the **High Frequency Response capability** will be limited such that the generation level will under normal operating conditions not be caused to drop below [] MW.]

For the purpose of Paragraph 4.1.3.11(a) of the **CUSC** the level of **Response required capability** for a **Frequency Deviation** of 0.0 Hz shall be 0.0 MW.

Part II

Frequency Response Summary Data

Station:
BM Unit Nos:

Table 1		Frequency Response Capability Summary - Mode A		
Genset De-Load (MW)	Primary Response @-0.5Hz (MW)	Secondary Response @-0.2Hz (MW)	High Frequency Response @+0.5Hz (MW)	
	P _{MW}	S _{MW}	H _{MW}	

Table 2		Plant Configuration Adjustment Factor K _{GRC} – Mode A	
1 Gas Turbine and 1 Steam Turbine			
1 Gas Turbine			

(or whatever configuration is appropriate)

Part III
Frequency Response - Permissible Combinations

Station:
BM Unit Nos:

Table 1	Mode A Response	
Primary Response	✓	✓
Secondary Response		✓
High Frequency Response	✓	✓

Part IV
Frequency Response Power Delivery Data

Station: _____

BM Unit Nos: _____

Primary Response Power Delivery – Mode A						
Frequency Deviation (Hz)	Genset De-load (MW)					
	-0.1					
-0.2						
-0.3						
-0.4						
-0.5						

Primary & Secondary Response Power Delivery – Mode A						
Frequency Deviation (Hz)	Genset De-load (MW)					
	-0.1					
-0.2						
-0.3						
-0.4						
-0.5						

High Frequency Response Power Delivery – Mode A						
Frequency Deviation (Hz)	Genset De-load (MW)					
	+0.1					
+0.2						
+0.3						
+0.4						
+0.5						

The figures for genset deload in the tables shall be taken from the figures for genset deload shown in the tables Frequency Response Capability Data tables in Part I.