



**National Grid**

## **AMENDMENT REPORT**

### **CUSC Amendment Proposal CAP016**

*(Re-introduction of adjustment factors into imbalance calculations)*

*The purpose of this report is to assist the Authority in their decision of whether to implement Amendment Proposal CAP016*

Amendment Ref	CAP016
Issue	1.0
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Prepared by	National Grid

## DOCUMENT CONTROL

Issue	Date	Author	Change Reference
0.1	08/05/02	National Grid	Draft for internal comment
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1.0	17/5/02	National Grid	Formal version for submission to the Authority

## DOCUMENT LOCATION

National Grid website:

<http://www.nationalgridinfo.co.uk/cusc/index.html>

## DISTRIBUTION

Name	Organisation
The Gas and Electricity Markets Authority	Ofgem
CUSC Parties	Various
Panel Members	Various
National Grid Industry Information Website	

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## 1.0 SUMMARY AND RECOMMENDATIONS

### Summary

- 1.1 CUSC Amendment Proposal CAP001 as submitted by National Grid proposed changes to the calculation methodology for frequency response payments. The Amendment provided a better approximation of the assumed volume of 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.
- 1.2 As CAP001 had followed the Urgent Amendment Procedure, the CUSC Amendments Panel (at their meeting on 9 November 2001), actioned the Balancing Services Standing Group (BSSG) to review the implementation of CAP001 in line with the requirements of paragraph 8.21.8 of the CUSC. As a result of this review, an oversight in the legal drafting of CAP001 was highlighted relating to the omission of certain adjustment factors from the imbalance calculations. In view of this, National Grid submitted CUSC Amendment Proposal CAP016 that seeks to re-introduce the adjustment factors into the imbalance calculations.
- 1.3 CUSC Amendment Proposal CAP016 was considered by the CUSC Amendments Panel at their 22 March 2002 meeting. At the meeting, the Amendments Panel agreed that the issue was appropriate to proceed to wider consultation by National Grid in accordance with 8.17.12(b).
- 1.4 As a result of the above, National Grid circulated a Consultation Document to CUSC Parties and Panel Members (and other interested Parties) on 17 April 2002. Comments were requested by no later than close of business, 3 May 2002. Following the consultation, and in accordance with 8.20.3, a draft of this Amendment Report was circulated for comment on the 10 May 2002. Comments were requested by 12:00pm on the 17 May 2002.
- 1.5 This Amendment Report (Issue 1.0) was submitted to the Authority on 17 May 2002. The purpose of this document is to assist the Authority in their decision of whether to implement Amendment Proposal CAP016.

### Recommendations

#### National Grid Recommendation

- 1.6 National Grid recommends that Amendment Proposal CAP016 is implemented on the basis that it better facilitates achievement of the Applicable CUSC Objectives as set out in paragraph 1 of Condition C7F to National Grid's Transmission Licence.

- 1.7 This is on the grounds that by more closely aligning Ancillary Services payments to the costs incurred by providers, National Grid can purchase such services from the most economic sources. Furthermore, improving clarity and removing uncertainty from CUSC documentation enables National Grid to more easily and efficiently discharge its obligations under the Act and the Transmission Licence and fulfil its obligations to facilitate competition in the generation and supply of electricity.

## 2.0 INTRODUCTION

- 2.1 This Amendment Report has been 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 an issue relating to the re-introduction of certain adjustment factors into the imbalance calculations.
- 2.2 Further to the submission of Amendment Proposal CAP016 (see Annex 1) and the subsequent wider industry consultation that was undertaken by National Grid, this document is addressed and furnished to the Gas and Electricity Markets Authority (“the Authority”) in order to assist them in their decision whether to implement Amendment Proposal CAP016. Such an amendment would result in some minor 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 with effect from 5 business days after the Authority’s decision. It incorporates National Grid’s recommendations to the Authority concerning the Amendment. Copies of all representations received in response to the consultation have been included. Furthermore, a ‘summary’ of the representations received is also provided.
- 2.4 This Amendment Report 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 THE PROPOSED AMENDMENT PROPOSAL

- 3.1 CUSC Amendment Proposal CAP001 was approved via the Urgent CUSC Amendment Proposal procedure. Following such approval and implementation, the CUSC Amendments Panel initiated a Review of the Amendment in accordance with 8.21.8 of the CUSC. The Review (carried out by the Balancing Services Standing Group) highlighted a minor error in the legal drafting of Section 4 concerning adjustment factors  $K_T$  and  $K_{GRC}$  and shortfall factors  $SF_P$ ,  $SF_S$  and  $SF_H$  (that had mistakenly been omitted from the imbalance calculations). Although the error has no real material impact at this stage (as the factors are

either inactive or are very rarely used) it is important to correct the legal drafting in line with the intent of the original amendment.

3.2 The factors that have been omitted are set out in Paragraph 4.1.3.9 of the CUSC and serve the following purposes:

- $K_T$  is the ambient temperature adjustment factor and is currently set at 1 until such time that an appropriate methodology for use is developed and agreed;
- $K_{GRC}$  is the plant configuration factor where the BM unit is a CCGT and values are contained in the MSA; and
- $SF_P$ ,  $SF_S$  and  $SF_H$  are shortfall factors relating to Primary, Secondary and High frequency response and currently set at zero until such time that an appropriate methodology for use is developed and agreed.

## 4.0 ASSESSMENT AGAINST APPLICABLE CUSC OBJECTIVES

4.1 The applicable CUSC Objectives are set out in paragraph 1 of Condition C7F of the Transmission Licence. CUSC amendments should better facilitate achievement of the Applicable CUSC Objectives. These can be summarised as follows:

- (a) the efficient discharge by NGC of the obligations imposed on it by the Act and the Transmission Licence; and
- (b) facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the sale, distribution and purchase of electricity.

4.2 National Grid recommends that Amendment Proposal CAP016 is implemented on the basis that it better facilitates achievement of the Applicable CUSC Objectives as set out in paragraph 1 of Condition C7F to National Grid's Transmission Licence.

4.3 This is on the grounds that by more closely aligning Ancillary Services payments to the costs incurred by providers, National Grid can purchase such services from the most economic sources. Furthermore, improving clarity and removing uncertainty from CUSC documentation enables National Grid to more easily and efficiently discharge its obligations under the Act and the Transmission Licence and fulfil its obligations to facilitate competition in the generation and supply of electricity.

## **5.0 PROPOSED IMPLEMENTATION AND TIME-SCALES**

- 5.1 It is recommended that Amendment Proposal CAP016 as detailed in this Amendment Report be implemented with effect from 5 business days after the Authority's decision.

## **6.0 IMPACT ON CUSC**

- 6.1 The proposed Amendment Proposal will require the minor modification of Section 4 of the CUSC. The relevant legal drafting is contained in Annex 2 of this Amendment Report.

## **7.0 IMPACT ON CORE INDUSTRY DOCUMENTS**

- 7.1 It is envisaged that Amendment Proposal CAP016 will have no impact on any core industry documents.

### **Changes required & Timescales to be followed to give effect to the Proposed Amendment**

- 7.2 As it is envisaged that Amendment Proposal CAP016 will have no impact on any core industry documents, no changes are required.

### **Changes or Developments Required to Central Computer Systems & Timescales Involved**

- 7.3 It is envisaged that Amendment Proposal CAP016 will have no impact on Central Computer Systems established under core industry documentation.

### **Estimation of Costs**

- 7.4 Not applicable.

## **8.0 IMPACT ON CUSC PARTIES**

- 8.1 It is envisaged that Amendment Proposal CAP016 will have no impact on any CUSC Parties.

## **9.0 ALTERNATIVE AMENDMENTS**

### **Description of Alternative Amendment**

- 9.1 No Alternative Amendment Proposals were consulted on as part of the wider industry consultation exercise undertaken by National Grid in respect of CAP016. Notwithstanding this, one consultation respondent (Response Ref. CAP016-CR-02) did raise a possible

Alternative Amendment which was to implement CAP016 retrospectively (i.e. re-introduce the adjustment factors  $K_T$  and  $K_{GRC}$  and shortfall factors  $SF_P$ ,  $SF_S$  and  $SF_H$  with effect from 21 September 2001 - the effective date of CAP001).

### Assessment against Applicable CUSC Objectives

- 9.2 The proposer of the Alternative Amendment (London Electricity Group) believes that the Applicable CUSC Objectives are further enhanced by the proposed Alternative Amendment. In spite of this, they note that further information is required to ensure the Alternative is efficient.

## 10.0 SUMMARY OF VIEWS AND REPRESENTATIONS

### Amendments Panel Members Views

- 10.1 On the basis of the consultation and assessment undertaken in respect of CUSC Amendment Proposal CAP016, it was the opinion of those CUSC Amendments Panel Members expressing a view, that the CAP016 Amendment Proposal should be implemented to the time-scales as recommended.

### Core Industry Document Owners

- 10.2 No views have been received from Core Industry Document Owners.

### Respondents

- 10.3 National Grid received a total of 6 responses to the consultation on CUSC Amendment CAP016, of which 4 were fully supportive of the proposal as it stood. Of the remaining respondents, one proposed and supported an Alternative Amendment Proposal (over and above the original proposal) and one was unclear as to whether the change could better met the relevant objectives as stated in paragraph 5.1 of the Consultation Document.
- 10.4 The following table provides an overview of the representations received. Copies of the representations are attached as Annex 3.

Reference	Company Name	Supportive	Summary of Comments
CAP016-CR-01	TXU Companies	Yes	Support views that the Amendment Proposal better facilitates the relevant objectives and should be made.



Reference	Company Name	Supportive	Summary of Comments
CAP016-CR-02	London Electricity Group	Yes/but supports Alternative over and above CAP016	<p>In favour of CAP016, however, consider it can be improved upon using the Alternative proposed Amendment that effectively implements CAP016 retrospectively.</p> <p>The Alternative is brought forward on the basis that what should have been included from day 1 is corrected from day 1.</p> <p>Consider the Consultation Report in respect of CAP016 under estimates the significance of the issue by stating the error that CAP016 is designed to correct “has no real material impact at this stage”.</p> <p>Suggests some legal text is also changed.</p>
CAP016-CR-03	Elxon	Yes	Notes a number of factors have been omitted from the imbalance volume calculations for frequency response payments and supports CAP016 which seeks to re-introduce these factors.
CAP016-CR-04	British Energy	Yes	<p>Supportive of CAP016 as proposed</p> <p>Agree the omission of the factors was simply a result of a drafting error.</p> <p>Acknowledge that since the values presently allocated to these factors result in their materiality being insignificant, the their re-introduction will not have any significant consequences.</p>
CAP016-CR-05	Innogy	Yes	<p>Supports CAP016 in order to correct drafting errors.</p> <p>May be appropriate to review the way in which legal drafting is prepared in order to allow a more rigorous industry review prior to implementation.</p>
CAP016-CR-06	British Gas	No	<p>Acknowledge the fact that CAP016 is intended to correct an anomaly introduced when CAP001 was introduced.</p> <p>As there has been no real material impact caused by the omission of the factors, unclear how the change does better meet relevant objectives.</p> <p>Would welcome clarification on this point and some additional details on how and when these factors may have an impact.</p>

### National Grid's Views

- 10.5 National Grid's recommendation regarding this Amendment Proposal is outlined in paragraphs 4.2 and 4.3 above. National Grid has reviewed responses to the consultation on CAP016 and is satisfied that the proposal should be implemented to the time-scales proposed.

- 10.6 With regards the Alternative Amendment Proposal raised in consultation response CAP016-CR-02 (London Electricity Group), National Grid have identified that the omission of the various scaling factors has caused no material impact on any market participants to date (as the omitted factors have not been used). National Grid accept that ideally CAP016 should be implemented co-incident with CAP001, but remain conscious of the difficulties associated with retrospective implementations. As there is no material impact of a retrospective implementation of CAP016 we believe it should be implemented as previously recommended. In addition to this, we have received no responses or other correspondence from Market Participants that suggest any contrary views to this.
- 10.7 In their response to the consultation (CAP016-CR-02), London Electricity Group also note that there is an alternative method of calculating  $IE_{ij}$  by applying the primary shortfall factor to the primary delivery table only, and the secondary shortfall factor to the secondary delivery table only. This differs from the method incorporated in the proposed legal text where the average low frequency (i.e. average of primary and secondary) shortfall factor is applied to both the primary and secondary response delivery tables. Both methods produce identical results for all response delivery modes, except combined primary and secondary response. In the example that LE quote, they show a difference between the two methods of 1.8%. Where the primary and secondary shortfall factors are equal (as is currently the case for all providers) the two methods produce identical results.
- 10.8 CAP001 is an approximate method to estimate response energy delivery. In the legal drafting we have sought to apply the average of the response shortfall to the energy delivery calculation, rather than bias the calculation relative to the volumes of primary and secondary holding. Because there is no evidence of how a power station with different primary and secondary shortfall factors would actually deliver response energy, it is not possible to demonstrate which method would be more accurate. It is accepted that, should the situation arise where the two methods would produce different results, and the alternative method were more accurate, it may be appropriate to further amend CUSC. This would apply whichever method was adopted initially.
- 10.9 As LE state, the shortfall factors are currently inactive. It is National Grid's view that should shortfall factors be used to affect payments for frequency response, then it would be appropriate to review the clauses in CUSC that refer to them, and this review would capture the comment made by LE. We further accept LE's comment that CAP009 would better meet the CUSC objectives. If the Authority were to approve CAP009, the above issue would be removed. National Grid therefore believe that no change to the legal drafting is necessary.
- 10.10 With regards the issue of whether CAP016 does better meet the relevant CUSC Objectives (CAP016-CR-06), in spite of the fact that

omission of the scaling factors has caused no real material impact to date, National Grid believes it is important to correct the legal drafting of the CUSC in line with the intent of the original amendment. Furthermore, in the near future, it is possible for the scaling factors to become more 'prominent' particularly bearing in mind the different proposals that have been submitted under the CUSC/BSC that seek to change the arrangements for imbalance compensation.

- 10.11 Finally, with regards the comments raised in CAP016-CR-05 that relate to the way in which legal drafting is prepared for CUSC Amendments, it is National Grid's intention to review its internal procedures for preparing legal text in the near future.

**Annex 1 – CUSC Amendment Proposal**

<b>CUSC Amendment Proposal Form</b>	<b>CAP016</b>
<b>Title of Amendment Proposal:</b> Changes to re-introduce certain adjustment factors into imbalance calculations.	
<b>Description of the Proposed Amendment (mandatory by proposer):</b> Revisions made to the legal text of Section 4 of the CUSC following the approval and implementation of CUSC Amendment Proposal CAP001 have led to adjustment factors $K_T$ and $K_{GRC}$ and shortfall factors $SF_P$ , $SF_S$ and $SF_H$ being incorrectly omitted from the imbalance calculations. This Amendment seeks to rectify this omission by re-introducing the factors into the imbalance calculation methodology contained in Section 4 of the CUSC.	
<b>Description of Issue or Defect that Proposed Amendment seeks to Address (mandatory by proposer):</b> CUSC Amendment Proposal CAP001 was approved via the Urgent CUSC Amendment Proposal procedure. Following such approval and implementation, the CUSC Amendments Panel initiated a Review of the Amendment in accordance with 8.21.8 of the CUSC. The Review (carried out by the Balancing Services Standing Group) highlighted a minor error in the legal drafting of Section 4 concerning adjustment factors $K_T$ and $K_{GRC}$ and shortfall factors $SF_P$ , $SF_S$ and $SF_H$ (that had mistakenly been omitted from the imbalance calculations). Although the error has no real material impact at this stage (as the factors are either inactive or are very rarely used) it is important to correct the legal drafting in line with the intent of the original amendment.  The factors that have been omitted are set out in Paragraph 4.1.3.9 of the CUSC and serve the following purposes: <ul style="list-style-type: none"> <li>• <math>K_T</math> is the ambient temperature adjustment factor and is currently set at 1 until such time that an appropriate methodology for use is developed and agreed;</li> <li>• <math>K_{GRC}</math> is the plant configuration factor where the BM unit is a CCGT and values are contained in the MSA; and</li> <li>• <math>SF_P</math>, <math>SF_S</math> and <math>SF_H</math> are shortfall factors relating to Primary, Secondary and High frequency response and currently set at zero until such time that an appropriate methodology for use is developed and agreed.</li> </ul>	
<b>Impact on the CUSC (this should be given where possible):</b> See attached draft text.	
<b>Impact on Core Industry Documentation (this should be given where possible):</b> None.	
<b>Impact on Computer Systems and Processes used by CUSC Parties (this should be given where possible):</b> None.	
<b>Details of any Related Modifications to Other Industry Codes (where known):</b> CAP001/CAP009	
<b>Justification for Proposed Amendment with Reference to Applicable CUSC Objectives (mandatory by proposer):</b> The justification for the Amendment Proposal is the same as for CAP001, i.e. by more closely aligning	

Ancillary Services payments to the costs incurred by providers, National Grid can purchase such services from the most economic sources. Furthermore, improving clarity and removing uncertainty from the CUSC documentation enables National Grid to more easily and efficiently discharge its obligations under the Act and the Transmission Licence and fulfil its obligations to facilitate competition in the generation and supply of electricity.

Details of Proposer: Organisation's Name:	National Grid
Capacity in which the Amendment is being proposed: (i.e. CUSC Party, BSC Party or "energywatch")	CUSC Party
Details of Proposer's Representative:  Name: Organisation: Telephone Number: Email Address:	John Greasley National Grid 024 7642 3170 <a href="mailto:john.greasley@uk.ngrid.com">john.greasley@uk.ngrid.com</a>
Details of Representative's Alternate:  Name: Organisation: Telephone Number: Email Address:	Richard Phillips National Grid 024 7642 3184 <a href="mailto:richard.phillips@uk.ngrid.com">richard.phillips@uk.ngrid.com</a>
Attachments (Yes/No): Yes	
If Yes, Title and No. of pages of each Attachment:	
Legal Text to Accompany Proposed Amendment (15 Pages).	

## Notes:

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 Amendments 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 Panel Secretary will inform the Proposer.

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](mailto: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 that is a CUSC Party shall be deemed to have granted this Licence).

## Annex 2 – Proposed Text to Modify CUSC

### LEGAL TEXT TO ACCOMPANY CAP016

#### 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 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<sub>ij</sub> is the low frequency response imbalance energy payment for **BM Unit** i, in **Settlement Period** j, and HFIEP<sub>ij</sub> 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

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

and

$$HFIEP_{ij} = 0$$

otherwise

$$LFIEP_{ij} = 0$$

and

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

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

$$IE_{ij} = \int_0^{SPD} \left[ \max(FR_{ij}(t), 0) \times (1 - SF_{LF}) + \min(FR_{ij}(t), 0) \times (1 - SF_H) \right] \times K_T \times K_{GRC} dt$$

Where:

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

$SF_{LF}$  is equal to  $SF_P$  in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response** or the mean of  $SF_P$  and  $SF_S$  in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**.

$SF_P$ ,  $SF_S$ ,  $SF_H$ ,  $K_T$  and  $K_{GRC}$  have the meanings ascribed to them in Paragraph 4.1.3.9.

$FR_{ij}(t)$  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 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 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 **Primary Response** data 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 **Secondary Response** data 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:-

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

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**  $\{QAO_{ij}^n, QAO_{ij}^{n_2}, \dots, QAO_{ij}^{n_u}, \dots\}$  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:

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

where  $RQNDOR_{ij}^{n_u-1}$  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:

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

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

and  $QNDOR_{ij}^{n_0} = 0$ .

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:

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

where  $RQNDBR_{ij}^{u-1}$  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:

$$RQNDBR_{ij}^u = RQNDBR_{ij}^{u-1} - QNDBR_{ij}^{u-1}$$

and  $RQNDBR_{ij}^0 = QNDBR_{ij}$

and  $QNDBR_{ij}^{n_0} = 0$ .

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<sub>ij</sub>) 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<sub>ij</sub>”  
 “Non-Delivery Order No.1”  
 “Non-Delivery Order No.2”  
 “Offer”  
 “QAB<sup>n</sup><sub>ij</sub>”  
 “QAO<sup>n</sup><sub>ij</sub>”  
 “QM<sub>ij</sub>”  
 “QME<sub>ij</sub>”  
 “SSP<sub>j</sub>”  
 “SBP<sub>j</sub>”  
 “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 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, 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**, 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**, the level of

**Response** required shall be calculated by linear interpolation from the figures in the relevant table(s) 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;

- (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) 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** (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); and
- (e) for the purposes of calculating levels of **Response** to be provided in response to **Frequency Deviations** lower than those specified in the response tables in the **Mandatory Services Agreement**, the relevant table(s) shall be deemed to specify that 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 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 response 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 table(s) in the **Mandatory Services Agreement**. **NGC's** agreement to such a request shall not be unreasonably withheld or delayed.

*NGC's Requests to Amend Levels of Response*



- 4.1.3.14 Where **NGC** reasonably considers in light of operating experience that the levels of **Response** set out in the response 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 response tables 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.

*Procedure for Amendments to Levels of and/or Payment Rates for **Response***

- 4.1.3.15 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.

*Failure to Agree Amendments*

- 4.1.3.16 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.

*Dispute Resolution Procedure*

- 4.1.3.17 **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.

*Implementation of Continuous Monitoring System*

- 4.1.3.23 To the extent the same shall be acceptable to **NGC** and a **User** on the basis of a cost benefit analysis, **NGC** and a **User** agree, as between **NGC** and that **User**, to the implementation of a continuous monitoring system as soon as is reasonably practicable. The continuous monitoring system shall be in accordance with the relevant principles set out in Paragraph 4.1.3.25 for the purposes of confirming performance of the **BM Units** and adjusting payments pursuant to this Paragraph 4.1.3.

*Incident Based Monitoring System*

- 4.1.3.24 Pending implementation of the continuous monitoring system, **NGC** and each **User** agree, as between **NGC** and that **User**, to implement an incident based monitoring scheme for the purpose of confirming the performance of the **BM Units** pursuant to this Paragraph 4.1.3. Such incident based monitoring scheme shall be in accordance with the relevant principles set out in Paragraph 4.1.3.25. Neither **NGC** nor the **User** shall unreasonably withhold or delay such agreement and/or implementation.

*Genset Response Monitoring**Introduction*

- 4.1.3.25 (a) This Paragraph 4.1.3.25 sets out the principles relating to:
- (i) the proposed continuous monitoring system to be implemented pursuant to Paragraph 4.1.3.23; and
  - (ii) the incident based monitoring system to apply until such time as implementation of the continuous monitoring system takes place.

Some elements of the continuous monitoring system are currently undergoing testing and development and it is accepted that if final testing of these elements proves unsatisfactory alternatives will need to be developed. Further, implementation of the continuous monitoring system shall be subject to its acceptability to **NGC** and **Users** on the basis of a cost benefit analysis.

Wherever possible the technical specification of both the incident based monitoring system and the continuous monitoring system will be designed so as to enable future development or enhancement.

*Aims of Project*

- (b) The aim of the monitoring project (which includes, without limitation, the development of the incident based monitoring system and the continuous monitoring system) is to develop a response monitoring system which will measure the response performance of generators against the levels of **Frequency Response** required to be provided under **Mandatory Services Agreements**.

*Incident Based Monitoring Scheme*

- (c) Details of the incident based monitoring scheme (including without limitation the definitions of Shortfall

Period and Incident, the calculation of service delivery and the determination of Incident start and end times) will be more particularly set out in a document entitled "Procedure for Incident Based Response Monitoring" ("the PIRM Document") to be produced by **NGC** and agreed by all relevant **Users** (such agreement not to be unreasonably withheld or delayed).

For the avoidance of doubt during the period during which the incident based monitoring scheme applies, and prior to the implementation of the continuous monitoring system, for the purposes of the formulae in Paragraphs 4.1.3.9 and 4.1.3.9A, the values of  $SF_P$ ,  $SF_S$  and  $SF_H$  shall be zero, such that no payment reduction shall apply during such period in respect of shortfall.

*Continuous Based Monitoring Scheme – Confirmation of Response Delivery*

- (d) The main objective of the continuous monitoring scheme is to provide a quantitative measure of **Frequency Response** delivery against which payment can be justifiably made and to reduce payments if delivery does not comply with the **CUSC** and the **Mandatory Services Agreement**. As the capability of a **BM Unit** to provide the level of **Response** required pursuant to this Paragraph 4.1.3 for any change in **System Frequency** occurring during the period of delivery of Response pursuant to a prior change in **System Frequency** will be affected by the level of **Response** then being delivered, relevant fluctuations in **System Frequency** should to this extent be taken into account by the continuous monitoring scheme for the purpose of calculating payment levels.

*Determination of Response Shortfall*

- (e) For the purposes of the continuous monitoring system, the **Response** shortfall may take three forms:-
- (i) average **Primary Response** under-delivery;
  - (ii) average **Secondary Response** under-delivery;
  - (iii) average **High Frequency Response** under-delivery,

in each case over a Shortfall Period (such term to be defined prior to implementation of the continuous monitoring system).

Upon the implementation of the continuous monitoring system, for the purposes of determining any such average under-delivery,  $SF_P$ ,  $SF_S$  and  $SF_H$  shall be the average under-delivery of **Primary Response**, **Secondary Response** and **High Frequency Response** respectively during the Shortfall Period in which the **Ancillary Service** was,

or should have been, provided. For the purposes of the formulae in Paragraphs 4.1.3.9 and 4.1.3.9A, such average under-delivery will be determined using a continuous plant response assessment algorithm which is under development and which will be agreed with the **User** prior to its implementation and expressed in terms of  $0 \leq SF \leq 1$ .

*Measurement of System Variables*

- (f) In relation to the continuous monitoring system measurement of **System Frequency** and generator output power will be required local to the **BM Unit**. **Synchronised** time tagging of both power and **Frequency** will be required.

**Frequency** is required as the fundamental driving variable of the contract model software. Access to a voltage source to enable **Frequency** to be measured is not expected to cause any difficulty. The measurement of generator output power will also be required every second. Cost effective access to this measurement is, however, less straight forward. Covered below are two options describing how this will be achieved. It is expected that normally the FMS interface unit will be the method used; however, where the **BM Unit** concerned has derogations from FMS, method two may be used.

*FMS Interface Unit*

- (g) The use of the Final Metering System (FMS) represents a logical method of measurement since it eliminates the high cost associated with running cables to access CTs and VTs.

The high accuracy integrated data from FMS will be used to re-generate a power profile and curve fitting techniques will be applied to improve accuracy. This instantaneous power curve will then be sampled every second to obtain the required values.

*Direct Measurement*

- (h) Where for the reasons detailed in Paragraph 4.1.3.25(f) it is not possible to use the FMS interface unit, the use of 'ISAT' type transducers will be employed to interface between the monitoring equipment and the measurement transformers' secondary circuit.

It is envisaged that generators seeking derogations from FMS will be supportive in establishing convenient VT and CT secondary connections for this purpose.

*Contract Model*

- (i) The contract model is the heart of the continuous monitoring system and it is crucial to the philosophy behind the system, namely that of modelling the **Mandatory Services Agreement** and not the **BM Unit** itself.

Given the difficulty in measuring **Frequency Response** directly on loaded plant, the need to compare changes in power delivery against expectation is evident. Comparison against this model output, which in turn is based on agreed and legally binding contracts, permits an identifiable quantity of non conformity to be measured and payments to be suitably reduced.

Therefore, since the **Mandatory Services Agreement** itself is the quantifying factor, there can be no redress due to assumptions regarding the technical attributes of the **BM Unit** other than those taken into account in setting the levels of **Response**.

*Functional Objective*

- (j) In relation to the continuous monitoring system, the model will comprise software which uses system and instructed variables to access the contract look-up tables. The look-up tables used will precisely mimic the response tables set out in **Mandatory Services Agreements**. These variables in turn will be processed using an algorithm to determine the levels of **Response** expected at any instant in time.

It is intended that this process will be effective during both small and large **Frequency Deviations**. Indeed with regard to reduction in payment and estimated **Response** capability, response to small **Frequency Deviations** is extremely important.

*Input Data*

- (k) In relation to the continuous monitoring system, inputs to the contract model will include **Frequency**, all contract table data, target load, **Target Frequency**, the latest genset availability, the response instruction, LF setting (if electronically despatched) and any other information required which may be specified in the **Mandatory Services Agreement**.

*Comparator*

- (l) In relation to the continuous monitoring system, the comparator will determine the difference between the measured change in the level of **Output** from the **BM Unit** by way of **Frequency Response** and the change in **Output** level that is specified in the **Mandatory Services Agreement**.

*Additional Costs*

4.1.3.26 Save where expressly provided otherwise in the **CUSC** or any **Mandatory Services Agreement** if:-

- (a) a **User** is of the opinion that in order to comply with any change in or amendment to the **Grid Code** (other than the withdrawal of or reduction in the scope of a **Derogation**) or any statutory or regulatory obligation coming into force after the **Commencement Date** of the relevant **Mandatory Services Agreement** that **User** is obliged to incur costs and expenses for the purpose of carrying out modifications to any **BM Unit** or **CCGT Unit** or otherwise for the purposes of changing the manner of operation of a **BM Unit** or **CCGT Unit** in relation to the provision of the **Mandatory Ancillary Service of Frequency Response**; or
- (b) **NGC** is of the opinion that by reason of any change in or amendment to the **Grid Code** or any statutory or regulatory obligation coming into force after the **Commencement Date** of the relevant **Mandatory Services Agreement** a **User** is able to make savings in the cost and expense of providing the **Mandatory Ancillary Service of Frequency Response** from any **BM Unit** or **CCGT Unit**,

then either the **User** or **NGC** as the case may be may by notice in writing require the other to agree any adjustment in the rates and prices for the **Mandatory Ancillary Service of Frequency Response** and the **BM Unit** or **CCGT Unit** concerned as set out in the relevant **Mandatory Services Agreement** having regard to the charging principles set out in Paragraph 4.4. If **NGC** and that **User** cannot agree to an adjustment in such rates and prices within a month of receipt by either of them of the other's written notice, either of them may initiate the procedure for resolution of the issue as an **Other Dispute** in accordance with Paragraph 7.4.

4.1.3.27 If, at any time during the term of a **Mandatory Services Agreement**, there is a variation in the security standards with which **NGC** is obliged to comply and such variation would, in a **User's** reasonable opinion, materially affect the operation of the services to be provided under that **Mandatory Services Agreement**, **NGC** and that **User** shall negotiate in good faith with a view to agreeing and implementing appropriate amendments to any relevant **Mandatory Services Agreement**. If they are unable to reach agreement within 28 days of either of them serving on the other notice of its intention to invoke the **Dispute Resolution Procedure**, either of them may initiate the procedure for resolution of the issue as an **Other Dispute** in accordance with Paragraph 7.4.

**Annex 3 – Copies of Representations Received (Consultation Document)**

This Annex includes copies of any representations received following circulation of the consultation document (circulated on 17<sup>th</sup> April 2002 requesting comments by close of business 3<sup>rd</sup> May 2002).

Representations were received from the following parties:

No.	Company	File Number
1	All 21 TXU Companies which are CUSC Signatories	CAP016-CR-01
2	London Electricity Group	CAP016-CR-02
3	Elexon	CAP016-CR-03
4	British Energy Generation Ltd, Eggborough Power Ltd and British Energy Power and Energy Trading Ltd.	CAP016-CR-04
5	Innogy plc	CAP016-CR-05
6	British Gas	CAP016-CR-06



Reference	CAP016-CR-01
Company	All 21 TXU Companies which are CUSC Signatories

TXU Europe Energy Trading Ltd  
Wherstead Park  
Wherstead  
Ipswich  
Suffolk  
IP9 2AQ

David Friend  
National Grid Company plc  
Kirby Corner Road  
Coventry  
CV4 8JY

29<sup>th</sup> April 2002

### **CAP016 Consultation Response**

Dear David

We confirm that we support the views of the BSSG and NGC that the Amendment Proposal does better facilitate the relevant objectives and should be made.

Yours sincerely

Philip Russell  
Market Development Manager  
For and on behalf of the 21 TXU CUSC Parties

<b>Reference</b>	<b>CAP016-CR-02</b>
<b>Company</b>	<b>London Electricity Group</b>

-----Original Message-----

**From:** Cecil Dick [mailto:Dick.Cecil@le-group.co.uk]  
**Sent:** 01 May 2002 15:24  
**To:** Friend, David  
**Subject:** Consultation Response -CAP016 Reintroduction of adjustment factors into Imbalance Calculations  
**Importance:** High

### **Consultation Response -CAP016 Reintroduction of adjustment factors into Imbalance calculations**

This response from London Electricity Group is on behalf of all the groups CUSC Parties.

We are in favour of CAP016, however we consider it can be improved and we propose an alternative. We consider the CUSC Objectives would be better met with the addition of CAP009 and further enhanced by the Alternative we propose below.

Alternative proposal.

CAP001 was implemented retrospectively on 21/Sep/01. CAP016 is to correct an error of CAP001 and should be implemented retrospectively on the same date (21/Sep/01). We do not consider it logical to have a different implementation date that addresses the correction of an error.

We therefore propose an Amendment Alternative to CAP016 adding retrospection to 21<sup>st</sup> September 2001. Other than the effective implementation date of the Amendment, the Alternative proposed is the same as the substantive Amendment that will be taken forward within the report to the Authority.

This alternative is brought forward on the principle that 'what should have been included from day one is corrected from day one'. But we also wish to see a pragmatic resolution of the Amendment. We therefore request that information is available to the next CUSC Amendment Panel meeting on whether retrospection creates the need for any further change and if it does, what the cost of this is likely to be against the estimated materiality of retrospection.

Comments on the original CAP016 Amendment.

Regarding Para 4.1.1: Impact of the error, we consider the Consultation Report may underestimate the significance of the issue by stating that the error that CAP016 is designed to correct 'has no real material impact at this stage'. This is because Kgrc can be less than 1 fairly often, rather than on 'very rare' occasions. For example, if a CCGT module consists of 3 GTs and one ST, with the one GT out of service, Kgrc will be down to 0.667. Omission of Kgrc does have impact on the response volume calculation, unless by coincidence all those CCGTs were not instructed to go to frequency sensitive mode when the Kgrc was less than 1. We are not aware of any studies that have been undertaken on these issues.

Regarding Legal Text: Calculation of IEij (page 16)

We consider the legal text of CUSC should be correct. In theory, it is not correct to multiply a mean response by (1- mean shortfall factor) when both primary and secondary response are delivered. The difference between this method and a method first calculating response x (1- shortfall factor) then averaging them should not be neglected.

For example, assuming primary/secondary response is 10MW and 20MW respectively and SFr=0.1 and SFs=0, the difference between the two methods is up to 1.8%.

We acknowledge that all SFr, SFs and SFh are currently inactive, however, we would like to flag up the above point. We suggest revision to the calculation of IEij to make it more accurate within the CUSC text.

#### Conclusion

We consider the CUSC Objectives would be better met with the addition of CAP009 and further enhanced by the Amendment Alternative we have proposed, although further information is required to ensure the alternative is efficient. We have also suggested a little legal text tidying for accuracy.

Dick Cecil  
London Electricity Group

<b>Reference</b>	<b>CAP016-CR-03</b>
<b>Company</b>	<b>Elexon</b>

Our ref. Comments on CAP016  
Your ref. CAP016



David Friend  
Commercial Development  
National Grid Company plc  
National Grid House  
Kirby Corner Road  
Coventry CV4 8JY

(By email to: david.friend@uk.ngrid.com)

Dear David,

**Comments on Consultation Paper CAP016 'Re-introduction of adjustment factors into imbalance calculations'**

ELEXON acting as the Balancing and Settlement Code Company has reviewed the Consultation Paper CAP016 'Re-introduction of adjustment factors into imbalance calculations'. ELEXON would like to make the following observations regarding the 'Proposed Amendment' which seeks to amend a minor error in the legal drafting of Section 4 that occurred due to the implementation of Urgent CAP001 'Frequency Response Imbalance Payments'.

ELEXON notes that a number of factors have been omitted from the imbalance volume calculations for frequency response payments, and supports CAP016 which seeks to re-introduce these factors into the imbalance calculations.

Yours sincerely

Justin Andrews  
ELEXON Change Delivery

<b>Reference</b>	<b>CAP016-CR-04</b>
<b>Company</b>	<b>British Energy Generation Ltd, Eggborough Power Ltd, British Energy Power and Energy Trading Ltd</b>

-----Original Message-----

**From:** Trott Graham [<mailto:graham.trott@british-energy.com>]  
**Sent:** 03 May 2002 11:31  
**To:** Friend, David  
**Cc:** Phillips Steve; Capener John  
**Subject:** CAP016 - Consultation Response

David,

Thank-you for the opportunity to comment on the above consultation paper.

British Energy supports the implementation of CAP016 as proposed.

We agree that the omission of the identified adjustment factors were simply the result of a drafting error following the implementation of changes associated with CAP001. We acknowledge that, since the values presently allocated to these factors result in their materiality being insignificant, their re-introduction will not have any significant consequences. We agree that the re-introduction of these adjustment factors will better support the applicable CUSC objectives.

Regards,

Graham

For British Energy Generation Ltd  
Eggborough Power Ltd  
British Energy Power and Energy Trading Ltd

<b>Reference</b>	<b>CAP016-CR-05</b>
<b>Company</b>	<b>Innogy plc</b>

-----Original Message-----

**From:** Raoul Thulin [<mailto:RAOUL.THULIN@innogy.com>]

**Sent:** 03 May 2002 14:37

**To:** Friend, David

**Cc:** Commercial Services

**Subject:** CAP016 Consultation Response

Response from Innogy plc

David,

Innogy supports CAP016 in order to correct the drafting errors implemented with CAP001. The requirement to correct these errors suggest that it may be appropriate to review the way in which legal drafting is prepared in order to allow more rigorous industry review prior to implementation. This could improve the efficiency of the change process and may avoid such errors in the future.

Regards,

Raoul Thulin  
Innogy plc  
Networks and Ancillary Services  
Tel: (01793) 892634, Fax: (01793) 893051

Reference	CAP016-CR-06
Company	British Gas

word/cusc



National Grid Company plc  
National Grid House  
Kirby Corner Road  
Coventry  
CV4 8JY

For the Attention of Mr D Friend  
- Commercial Development

energy management group

Charter Court  
50 Windsor Road  
Slough  
Berkshire  
SL1 2HA

Tel. (01753) 758051  
Fax (01753) 758170  
Our Ref. Cap016  
Your Ref.  
3<sup>rd</sup> May 2002

Dear David,

**Re: CUSC Amendment CAP016 – Re-introduction of adjustment factors into imbalance calculations - Consultation Document**

Thank you for the opportunity to comment on the Consultation Document in respect of the above Amendment Proposal (AP).

British Gas Trading (BGT) acknowledge the fact that the AP is intended to correct an anomaly introduced when AP CAP001 was implemented. However, since NGC identify in Paragraph 4.1.1 of the Consultation Paper that there has been “no real material impact at this stage (as the factors are either inactive or are very rarely used)”, we are unclear as to whether this change does better meet the relevant objectives as stated in 5.1. We would welcome clarification on this point and some additional details on how and when these factors may have an impact.

Should you have any queries regarding this response, please do not hesitate to contact me.

Yours sincerely,

**Simon Goldring**  
Transportation Manager

**Annex 4 – Copies of Representations Received (Draft Amendment Report)**

This Annex includes copies of any representations received following circulation of the Draft Amendment Report (circulated on 10<sup>th</sup> May 2002 requesting comments by 12 noon on 17<sup>th</sup> May 2002).

Representations were received from the following parties:

No.	Company	File Number
1	London Electricity Group	CAP016-AR-01



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<b>Reference</b>	<b>CAP016-AR-01</b>
<b>Company</b>	<b>London Electricity Group</b>

Second comment on CAP016

Subsequent to LEG's first comments on this Amendment, where we requested information be brought to the next CUSC Panel Meeting in respect of the practicality and materiality of our Alternative Amendment (AA), that CUSC Panel Meeting was cancelled.

As a result we requested the information and have been informed that the AA is practical, but the materiality is zero.

In these particular circumstances we would now give preference to the original Amendment.

Dick Cecil  
LEG  
17/5/02