



National Grid

AMENDMENT REPORT

CUSC Amendment Proposal CAP001 Frequency Response Imbalance Payments

The purpose of this report is to assist the Authority in their decision of whether to implement Amendment Proposal CAP001

Amendment Ref	CAP001
Issue	2.0
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Prepared by	National Grid

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Issue	Date	Author	Change Reference
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1.0	12/10/01	National Grid	Formal version for submission to the Authority
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DISTRIBUTION

Name	Organisation
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CUSC Parties	Various
Panel Members	Various
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1.0 SUMMARY AND RECOMMENDATIONS

Summary

- 1.1 The Balancing Service of mandatory frequency response is set out and described in Connection Condition 8.1 of the Grid Code. All licensed generators are required to provide mandatory frequency response.
- 1.2 A mechanism was introduced at NETA Go-live which was intended to compensate Generators for imbalance charges incurred under the Balancing and Settlement Code (BSC) when mandatory frequency response was provided. The mechanism (known as imbalance compensation) was discussed and agreed at a sub-group of the Transmission Users' Group (TUG), and was subsequently implemented via the NETA Implementation Scheme in the Mandatory Services Agreements (MSA).
- 1.3 Under NETA, imbalance charges arise for a number of reasons, frequency response provision being just one of them. However, a number of providers raised concerns that the level of imbalance compensation as calculated via the MSA's, did not, in certain circumstances, adequately reflect the actual imbalance charges incurred under the BSC as a result of actual provision of frequency response. As a consequence, some generators indicated their concern in continuing to provide this mandatory service when the costs of provision were not necessarily adequately compensated.
- 1.4 The mechanism for imbalance compensation, as described within the MSA, was codified into the designated CUSC documentation, which had been scheduled for implementation on 18th July 2001. It had been the intention to propose a CUSC modification to allow the imbalance compensation mechanism to be reviewed under the new Governance arrangements described in the CUSC. However, in view of the announcement to delay CUSC implementation, a CUSC Amendment Proposal could not be raised until CUSC was implemented.
- 1.5 It was thought that, assuming it was found necessary to revise the imbalance arrangements, such a delay would introduce an unnecessary hold-up before the issue regarding imbalance could be formally considered. Therefore, the proposal to set up an informal working group was suggested. The approach was discussed with Ofgem who were comfortable that an informal 'pre-CUSC' working group was established with a view to formally proposing a modification at a later date.
- 1.6 Terms of Reference were agreed for the Working Group and further to three working group meetings and associated debate and correspondence, it was the combined view of the Working Group that

the mechanism for imbalance compensation should be modified as follows:

- (i) Calculate response energy for each minute of each settlement period using minute average frequency thereby providing a more accurate calculation of a generator's response energy volume;
- (ii) Calculate assumed response energy by dual linear interpolation between frequency deviation and de-load data in the response capability matrix contained in the MSA thereby removing the need for the use of adjustment factors;
- (iii) For generating units selected to provide primary and high frequency response the mechanism should continue to use primary and high contract values to calculate response energy, but for primary, secondary and high frequency response, use the average of the primary and secondary contract values to calculate the low frequency response energy thereby improving the approximation of generators actual imbalance; and
- (iv) Replicate the BSC algebra to calculate a payment to compensate generators for their associated exposure to non-delivery costs.

1.7 There was also a fifth issue relating to Frequency Response imbalance on which the Working Group did not reach agreement. This issue was related to the reference price used in the calculation of response delivery i.e. the cost or saved cost of energy production.

1.8 The views of this Working Group formed the basis of a CUSC Amendment Proposal (CAP001) that was submitted by National Grid. This Amendment Proposal was presented to the CUSC Amendments Panel on 21 September 2001. The Amendments Panel had been recommended to endorse Amendment Proposal CAP001 and approve that it be subject to the Urgent Amendment procedure.

1.9 The Amendment Proposal had been recommended as urgent as National Grid has an obligation to reflect the costs incurred by Users in providing mandatory services in any compensation payment mechanism and the mechanism put in place at NETA go-live had been demonstrated to have inadequacies.

1.10 At the 21 September 2001 meeting, the CUSC Amendments Panel endorsed Amendment Proposal CAP001 and agreed that the proposal should be treated as urgent subject to a short period of consultation. Further to the meeting, the Authority also approved (in accordance with CUSC 8.21) that this Amendment should be treated as an Urgent Amendment and the process proposed by the Amendments Panel should be followed.

- 1.11 As a result of the above, National Grid circulated a Consultation Document to CUSC Parties and Panel Members (and other interested Parties) on 28 September 2001. Comments were requested by no later than close of business, 5 October 2001. Following the consultation, a draft of this Amendment Report was circulated for comment on the 9 October 2001. Comments were requested by close of business, 11 October 2001. Issue 1.0 of the Amendment Report was submitted to the Authority on 12 October 2001, however, in view of the need to make some minor changes to the legal text, the Authority Directed National Grid to revise the Amendment Report accordingly for resubmission. In view of this, the revised legal text was circulated to CUSC Parties and Panel Members (and other interested Parties) on 16 October 2001. Comments were requested by no later than close of business, 18 October 2001. One response was received and is attached in Annex 4.
- 1.12 This Amendment Report (Issue 2.0) was submitted to the Authority on 19 October 2001. The purpose of this document is to assist the Authority in their decision of whether to implement Amendment Proposal CAP001.

Recommendations

National Grid Recommendation

- 1.13 National Grid recommends the proposed amendment is implemented as it will better facilitate the efficient discharge of National Grid's licence obligation (at Special Condition AA4) to operate the transmission system in an efficient, economic and co-ordinated manner by aligning more accurately payments made with actual costs incurred. Furthermore, it produces greater transparency in the relative costs of service provision. 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. In addition, this amendment will help to ensure that providers are not over compensated for providing mandatory frequency response.

Working Group Recommendation

- 1.14 The informal, pre-CUSC Working Group recommended that the Amendments Panel Endorse Amendment Proposal CAP001 using the Urgent Amendment Procedure.

Amendments Panel Recommendation

- 1.15 On the basis of the consultation and assessment undertaken in respect of this Amendment Proposal, it is the general view of the Amendments Panel that CUSC Amendment Proposal CAP001 should be implemented to the time-scales as recommended.

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 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 CAP001, the endorsement of the changes by the Amendments Panel via the Urgent Amendment Procedure 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 CAP001. Such an amendment will result in changes to Section 4.1.3 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 21 September 2001. It indicates any relevant issues that arose as part of the wider-industry consultation exercise and also incorporates National Grid's and the Amendments Panel'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>.

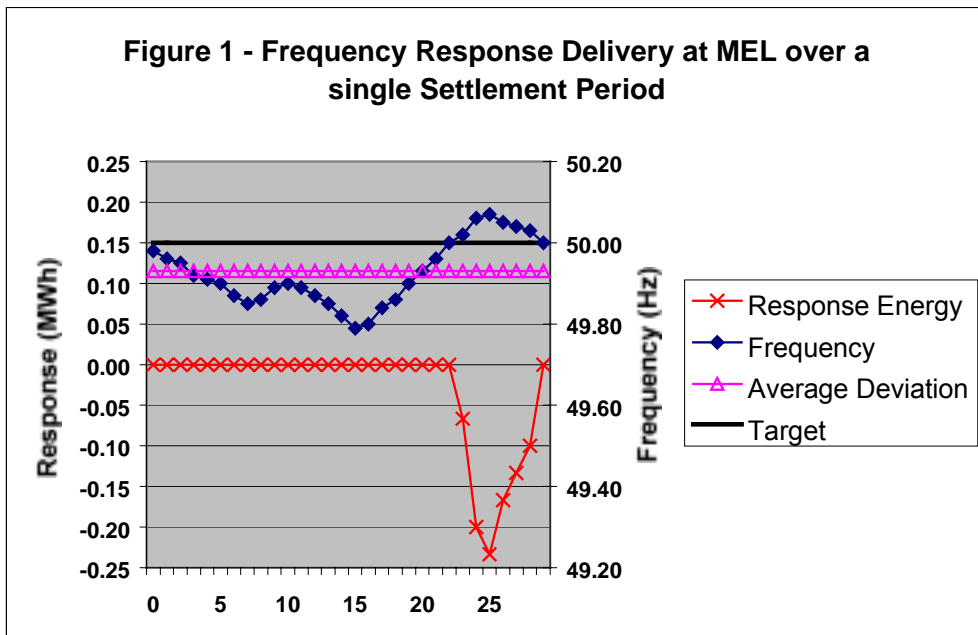
3.0 THE PROPOSED AMENDMENT

- 3.1 The CUSC Amendment Proposal CAP001 (see Annex 1) as submitted by National Grid is based on the work undertaken by the informal Frequency Response Imbalance Working Group. The Amendment proposes a better approximation of assumed energy imbalance when calculating compensation payments. These improvements to the payment mechanism are:
- Per minute average frequency calculations;
 - Detailed interpolation of the response matrix;
 - Use of Secondary response values from the matrix; and
 - Compensation for non-delivery charges.

Per-minute Response Energy Calculations

- 3.2 The mechanism introduced at NETA go-live calculates response energy within a Settlement Period based on the net frequency deviation within that period. This is satisfactory where the response capability for a given generator is broadly the same for low and high frequency response i.e. symmetrical. However, where this is not the case, this method can lead to providers being exposed to energy imbalance volumes that are not adequately reflected in the payment mechanism.

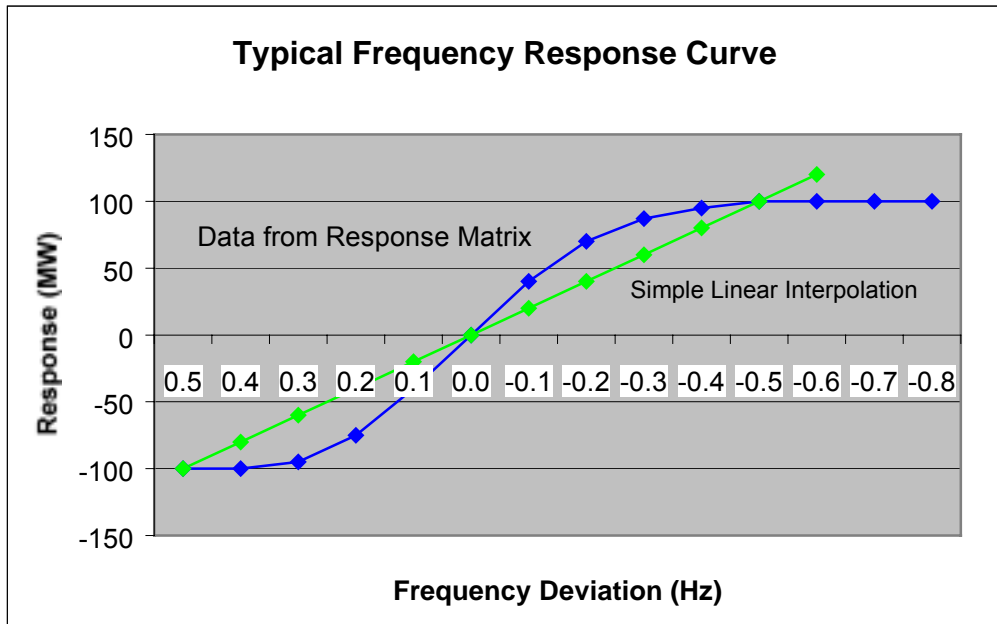
- 3.3 Figure 1 below illustrates a simple example of how this could occur within a single settlement period with a generator operating at maximum export limit (MEL). When at MEL, a generating unit can provide only high frequency response. In the example, no response energy is assumed for the settlement period because the average frequency deviation is negative i.e. a low frequency period. However, if the response delivery is considered to a finer resolution within the period, such a generator will have provided high frequency response energy (reduction in output) for several minutes within the period and will be exposed to System Buy Price (SBP) for this energy with no imbalance compensation payment.



- 3.4 Calculating response energy for each minute of each settlement period provides a more accurate calculation of a generator’s response energy volume and considerably reduces the margin for error. The assumed response energy volume would be calculated by using the average frequency deviation for each minute. Payment calculations would still be undertaken on a settlement period basis but be based on the sum of the response energy over the 30 minutes.

Dual Linear Interpolation of Response Matrix

- 3.5 The mechanism introduced at NETA go-live uses a simple linear interpolation of the matrix value at a 0.5Hz deviation. As can be seen from the graph below, this simple linear interpolation alone underestimates the assumed response energy. To compensate for this, the mechanism included the use of adjustment factors to scale up the calculated response energy.



- 3.6 Adjustment factors of 1.5 for low frequency response and 1.2 for high frequency had been calculated from a sample of 12 generating units based on the de-load data for approximately 75% of full load. Use of these adjustment factors leads to an over or under estimation of the response energy within the imbalance payment mechanism depending on the actual response characteristic of the generating unit and actual frequency deviation.
- 3.7 Calculating assumed response energy by detailed linear interpolation of the response capability matrix contained within the contract therefore removes the need for these adjustment factors. On a per minute basis (as described above) the mechanism can take the average frequency in the minute and the de-load of the generator and perform a dual linear interpolation between data points within the matrix. This method of calculating assumed response energy more closely approximates the actual response.

Use of Secondary Response Values

- 3.8 The mechanism introduced at NETA go-live uses values of Primary and High Frequency response capability contained within the response matrix. These values by definition reflect the power

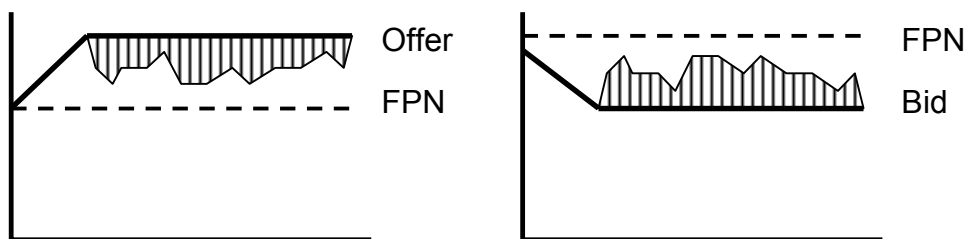
delivered in response to a change in system frequency within 10 seconds from the time of the frequency deviation.

- 3.9 When a generator is selected for Primary and High Frequency response, it was concluded that use of the Primary and High values contained within the matrix, is a fair approximation of the response delivered on a continuing basis. However, when a generating unit is selected for Primary, Secondary and High, the low frequency response energy calculated can be considerably underestimated by using the Primary value alone.
- 3.10 It is therefore considered more appropriate to reflect the additional low frequency response power that is delivered after primary response time-scales i.e. 10 seconds. By taking the average of Primary and Secondary values it is possible to more closely approximate actual imbalance arising from the provision of frequency response.

Compensation for Non-delivery Charges

- 3.11 In addition to imbalance charges, generators may also be exposed to non-delivery charges whilst providing response following acceptance of a Bid or Offer by the System Operator. No compensation is currently paid for this non-delivery exposure. The algebra for calculating non-delivery is outlined in the BSC and ensures that generators are exposed to the most onerous of SSP/SBP or their Bid/Offer price for a shortfall against a Bid-Offer acceptance. This non-delivery algebra can be simply represented as:

$$\begin{aligned}
 CNDO &= \text{Max} \{(\text{Offer} - \text{SBP}), 0\}, \text{ for non-delivery against an Offer} \\
 CNDB &= \text{Min} \{(\text{Bid} - \text{SSP}), 0\}, \text{ for non-delivery against a Bid} \\
 CND &= CNDO + CNDB, \text{ for the total non-delivery charge}
 \end{aligned}$$



- 3.12 It is proposed that the algebra for calculating non-delivery contained in the BSC is replicated to calculate a compensation payment for this exposure. The non-delivery charge (CND), can be recalculated based on an expected metered output including response power (CNDR), and a refund of that proportion of non-delivery arising from the provision of frequency response (RNDC) be calculated as follows:

$$RNDC = CND - CNDR$$

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 CAP001 is implemented to the time-scales proposed on the basis that it better facilitates achievement of the Applicable CUSC Objective (as set out in Condition C7F in paragraph 1a – the efficient discharge by NGC of the obligations imposed on it by the Act and the Transmission Licence).
- 4.3 This is on the grounds that the Transmission Licence obligates National Grid (at Special Condition AA4) to operate the transmission system in an efficient, economic and co-ordinated manner. The payment calculations outlined in the CUSC for Frequency Response are based on cost reflective charging principles i.e. based and founded upon actual or estimated costs directly incurred by the provider. The proposed amendment will better facilitate achievement of the applicable CUSC objectives by ensuring providers of mandatory frequency response are appropriately reimbursed for costs directly incurred for providing the service. 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. In addition, this amendment will help to ensure that providers are not over compensated for providing mandatory frequency response.

5.0 PROPOSED IMPLEMENTATION AND TIME-SCALES

- 5.1 It is recommended that Amendment Proposal CAP001 as detailed in this Amendment Report is implemented with effect from 21 September 2001.

6.0 IMPACT ON CUSC

- 6.1 The proposed Amendment Proposal will require the amendment of Section 4.1.3 of the CUSC (calculation of payments and payment formulae).
- 6.2 As outlined in Paragraph 1.11 above, following submission of Issue 1.0 of the Amendment Report, the Authority Directed National Grid to:
- (a) issue the final legal text that is required to implement this Proposed Amendment (marked up to show such changes) by close of business today (16th October 2001);
 - (b) circulate the final legal text to CUSC Parties and Panel Members by close of business today (16th October 2001) and allow 2 days for comments (comments to be received by close of business on 18th October 2001); and
 - (c) submit to the Authority the Amendment Report (including the final legal text and copies of comments received in respect of (b) above) in respect of CAP001 on 19th October 2001.
- 6.3 In view of the above, the proposed final legal wording was circulated as directed. Annex 2 has been revised and now contains the legal wording as included in Issue 1.0 of the Amendment Report (strikethrough text) together with the final revised legal wording. The responses received in respect of (b) above are included in Annex 4.
- 6.4 It should be noted that the version of the legal text as circulated to CUSC Parties on the 16th October has been revised as appropriate following the representations received.

7.0 IMPACT ON CORE INDUSTRY DOCUMENTS

- 7.1 It is envisaged that Amendment Proposal CAP001 will have no impact on any core industry documents.
- 7.2 Although not a core industry document, it should be noted that Amendment Proposal CAP001 does impact on National Grid's Transmission Licence. The costs associated with frequency imbalance will change as a result of this modification and therefore impact on the parameters included with the Transmission Licence which describes the National Grid System Operator (SO) Incentives for current year and future years arrangements.

Changes Required & Timescales to be followed to give effect to the Proposed Amendment

- 7.3 As it is envisaged that Amendment Proposal CAP001 will have no impact on any core industry documents no changes are required.

Changes or Developments Required to Central Computer Systems & Timescales Involved

- 7.4 It is envisaged that Amendment Proposal CAP001 will have no impact on Central Computer Systems established under core industry documentation.

Estimation of Costs

- 7.5 In relation to the impact on National Grid's Transmission Licence, it is estimated that the costs of frequency response imbalance will increase by some £4-6m per annum. Consideration is required as to how this is dealt with in the Incentive Parameters in the Transmission Licence.

8.0 IMPACT ON CUSC PARTIES

- 8.1 Amendment Proposal CAP001 will have an impact on National Grid's Balancing Services Settlement Systems. National Grid estimates that the costs of modifying its systems to reflect this proposal are approximately £100k.
- 8.2 It should be noted that such changes to settlement systems will not delay implementation of CAP001. Payments for mandatory frequency response will continue to be made on the current basis until the relevant software changes are made. Upon delivery of these software changes, payments can be reconciled in line with the payment mechanism outlined in CAP001. Following preliminary analysis, National Grid estimate that these software changes will be delivered by March 2002.
- 8.3 The proposed amendment is likely to have some impact on generators validation procedures/computer systems. Although no formal assessment of the impact on these systems has been undertaken, it is assumed that any such changes are not significant.

9.0 ALTERNATIVE AMENDMENTS

Description of Alternative Amendment

- 9.1 No alternative Amendments have been offered or considered as part of this Urgent Amendment Proposal. Nevertheless, following wider consultation, National Grid will re-issue this Amendment Report to include, inter alia, any alternative amendments that are proposed.

Assessment Against Applicable CUSC Objectives

- 9.2 Not applicable as no alternative Amendments have been offered or considered.

10.0 SUMMARY OF VIEWS AND REPRESENTATIONS

Amendments Panel Members

- 10.1 In general, CUSC Amendments Panel members agreed and supported the implementation of CUSC Amendment Proposal CAP001. This was on the grounds that the proposed changes would provide an improved approximation of the volume of actual imbalance incurred by a generator when providing mandatory frequency response and that the proposals could be implemented quickly. Furthermore, it was generally agreed that the changes as proposed would better facilitate achievement of the applicable CUSC objectives as the changes would allow National Grid to satisfy its licence obligation (at Special Condition AA4) to operate the transmission system in an efficient, economic and co-ordinated manner which in turn would better facilitate effective competition in the generation of electricity.
- 10.2 Notwithstanding the above, one CUSC Amendments Panel member noted a concern regarding the short consultation period of 5 days. Furthermore, concerns were raised over the quality processes used in the production of the detailed contractual code and algebra and suggested there should be a thorough review to ensure that the intention of the text is achieved and that the proposed changes are legally sound. In addition, two CUSC Amendment Panel members also suggested that in view of the two 'related' modifications extant in the BSC and the pricing issue in the CUSC, it could be preferable to alter the proposed methodology (as detailed in CAP001) slightly so that volumes are estimated on a per minute basis then multiplied by the reference price before being summed for the Settlement Period. Such a change would not preclude the subsequent adoption of either of the main contenders for the pricing component that is due to be discussed at the forthcoming Balancing Services Standing Group meetings. Finally, it was suggested that although the changes should improve volume calculation substantially, thereby reducing one element of generators' risk, a 'review' should be conducted and the results reported to the CUSC Panel in 3-6 months time.

Working Group Members

- 10.3 There was general agreement within the informal, pre-CUSC Working Group that CUSC Amendment Proposal CAP001 would provide a better approximation of the volume of actual imbalance incurred by a generator when providing mandatory frequency response.

Furthermore, the Working Group believed Amendment Proposal CAP001 better facilitates achievement of Applicable CUSC Objective set out in Condition C7F in paragraph 1a – the efficient discharge by NGC of the obligations imposed on it by the Act and the Transmission Licence. This was on the same grounds as detailed in paragraphs 4.2 and 4.3 above.

Core Industry Document Owners

10.4 No views have been received from Core Industry Document Owners.

Respondents

10.5 National Grid received a total of 11 responses to the consultation on CUSC Amendment CAP001, of which 9 were supportive of the proposal and made arguments in its favour. Of the remaining two responses, one thought further work should be undertaken before the amendment should be allowed and the other thought the amendment should not be implemented as it would further exacerbate discrimination within the trading arrangements against smaller generating plant.

10.6 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
CAP001-CR-01	Keadby Generation Limited, Keadby Development Limited, SSE Generation Limited, SSE Energy Supply Limited	Yes, on 3 of the 4 issues.	Supportive of per-minute response calculations, dual linear interpolation and compensation for non-delivery charges. Questions the use of an average Primary and Secondary value and asks whether primary and secondary response could be modelled separately.
CAP001-CR-02	TXU Drakelow Ltd, TXU High Marnham Ltd, TXU Ironbridge Ltd, TXU West Burton Ltd, Anglian Power Generators Ltd, Peterborough Power Ltd, TXU Europe Merchant Generation Ltd, Shotton Combined Heat & Power Ltd, Citigen (London) Ltd, TXU Europe Energy Trading B.V, TXU UK Ltd, Norweb Energi Ltd, Eastern Energy Ltd	Yes, on all 4 issues.	Supportive of the proposal as drafted.
CAP001-CR-03	Scottish Power	Yes, on all 4 issues.	Agrees with general principles of the Amendment and that it gives a better approximation of assumed energy imbalance when calculating compensation payments. Also comments that related amendments in BSC and CUSC need to be co-ordinated. Believes that calculation of

			IEP should be changed so the price is applied to the imbalance energy on a per-minute basis and then the payments summed over the Settlement Period.
CAP001-CR-04	Edison Mission Energy	No	States that the proposal although improving matters to some extent does not compensate generators for the costs involved. Believes further work is required on deriving the volume of response. Also comments that link between volume and reference price is important and CAP001 should not prevent implementation of reference price solution.
CAP001-CR-05	British Gas Trading	Yes, on all 4 issues.	In favour of the implementation of the proposal and agree the normal CUSC time-scales are reduced for the introduction of this change.
CAP001-CR-06	Entergy	Yes, on all 4 issues.	Fully supportive of the measures put forward in CAP001. Also keen to see a timely resolution to the price risk issue and would urge implementation of an interim measure. Have concern over the bid/offer market price solution. Believes it fair to apply retrospection to all measures adopted.
CAP001-CR-07	PowerGen UK plc, PowerGen Energy plc, Diamond Power Generation Limited, Cottam Development Centre Limited.	Yes, on all 4 issues.	No reason for not implementing the proposal as written. Reference price issue should be progressed ASAP. Supportive of bid/offer approach.
CAP001-CR-08	Innogy	Yes, on all 4 issues.	Supportive on all 4 issues. However, suggests the use of Primary & Secondary contract response values may not reflect delivery in different time-scales and may need to be reviewed later. Suggests calculation of IEP should be changed so the price is applied to imbalance energy on a per-minute basis and then the payments summed over the Settlement Period.
CAP001-CR-09	British Energy	Yes, on all 4 issues.	Supportive on all 4 issues. Requests National Grid publish a worked example showing how the new methodology will work in practice. Suggests calculation of IEP should be changed so the price is applied to imbalance energy on a per-minute basis and then the payments are summed over the Settlement Period. Support cost based charging approach at present. Related amendments in BSC and CUSC need to be co-ordinated to ensure the eventual solution best meets the requirements of the industry.
CAP001-CR-10	LE Group	Yes, on 2 issues. Strong reservation on remaining 2 issues.	Supportive of the amendment as the approximation for imbalance compensation calculation is improved. However, feels the proposal fails to fully resolve the problem and urge National Grid to consider and develop an approach to adequately deal with CCGT's response energy calculation. Believes there is no requirement to changes National Grid's incentive scheme target and believes consultation period of five days was short.
CAP001-CR-11	Slough Energy	No	Believes proposed amendment further

	Supplies		exacerbates discrimination within the trading arrangements against smaller generating plant.
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National Grid's Views

- 10.7 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 CAP001 and is satisfied that this proposal should be implemented as agreed by the Amendments Panel.
- 10.8 Several respondents raised the issue of the calculation of IEP_{ij} by summing per minute energy calculations over each Settlement Period and then multiplying by reference price and imbalance price. These respondents suggested that applying the reference price on a per minute basis would provide greater flexibility for any future changes to this mechanism. However, under the BSC, imbalance charges are calculated from the net imbalance energy volume in a Settlement Period. Therefore, imbalance compensation payments must continue to be calculated on a Settlement Period basis to be consistent with this treatment of imbalance exposure. Although, it is possible to separate the part of the mechanism that compensates for production costs (i.e. the Reference Price element) National Grid's view is that such a change would complicate the mechanism unnecessarily. Furthermore, National Grid believes that the proposed drafting would not cause any difficulties in implementing any other pricing option in the future should this be required as a result of other Amendment Proposals.
- 10.9 A number of respondents commented on the interaction of CAP001 with related BSC modifications (i.e. P034 and P036). National Grid reiterates its view that parties who provide balancing services are helping to balance the system and should not be exposed to imbalance prices. CAP001 and P034 (as raised by National Grid) are consistent and complimentary. CAP001 provides an interim solution to imbalance compensation for mandatory response providers and has developed a methodology for calculating a volume of expected response energy for use within CAP001 and which could be used in P034/P036. Furthermore CAP001, which can be implemented quickly, does not preclude future development or hinder the implementation of P034/P036.

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 proposed Amendment so that the CUSC Panel can determine more clearly whether the proposal should be considered further 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 sending it to the Panel. They will then write back to the Proposer, letting him know the Amendment Proposals reference number, and the date on which the Panel will consider the proposal further.

The 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)

National Grid.

Proposers Representative:

(The name of the person representing the proposer [and his alternate])

Richard Phillips [John Pettigrew]

Organisations Name:

(Organisation on whose behalf the Amendment is proposed)

National Grid are proposing this urgent amendment (CAP001), however, the proposal is based on the recommendations of the informal, pre-CUSC, Frequency Response Imbalance Working Group that was set up to consider revisions to the imbalance compensation mechanism introduced at NETA go-live.

Organisation Address:

National Grid House
Kirby Corner Road
Coventry
CV4 8JY

Capacity in which the Organisation Proposes to make an Amendment:

(CUSC Party, BSC Party, or Other. Other Parties must submit proposed Amendments via "Energy Watch")

CUSC Party

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

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

Mandatory Frequency Response is an obligation placed on generators under the Grid Code. The payment mechanism for mandatory frequency response was put in place for the commencement of NETA and was intended to be broadly cost reflective. These mechanisms were reviewed and developed for NETA by the R2P2 (Response / Reserve Procurement Principles) sub group of the Transmission Users Group (TUG).

Mandatory Frequency Response payments comprise of:

- De-load payments via bid / offer acceptance;
- Holding payment to cover the cost of a generator holding frequency response;
- Delivery or imbalance exposure payment.

During development of the payment mechanism, it was considered that the mechanism should be simple and not jeopardise the NETA project. In particular, the intention of the imbalance compensation was that on average providers were left neutral over a period of time. It was not intended to be a

“value based” principle but to compensate for energy imbalance from actual provision of frequency response. In light of experience, a number of providers have raised concerns over the imbalance exposure element of the payment. There are 5 potential shortfalls with the current payment mechanism for imbalance exposure:

- Response energy calculations are performed on a settlement period basis. This is adequate where generators are capable of providing equal volumes of energy for both positive and negative deviations of frequency within the period. However, where this is not the case, providers can be exposed to energy imbalance volumes that are not adequately reflected in the current payment mechanism;
- Response energy is calculated by linearly interpolating between zero and the capability at a 0.5Hz frequency deviation. Because this straight-line interpolation underestimates the actual response capability curve, adjustment factors are used to scale up these values. These factors were calculated for typical response providing generators and because they are not reflective of each individual generator may lead to inaccuracies;
- When selected for primary and secondary low frequency response, the energy delivered by the generator may be greater than the primary response contract value currently used in the volume calculation. This may lead to an underestimation of the low frequency response delivered by the generator;
- The payment calculation does not take into account non-delivery charges that generators may be exposed to following the acceptance of Bids and Offers by National Grid and the delivery of frequency response; and
- The payment calculation takes into account the cost or avoided cost of energy production. This is currently calculated from a monthly average of SSP/SBP data in the preceding month. This so-called reference price has proved to be an inadequate proxy for cost of production as it fails to represent with any degree of reflectivity the differences in production cost across the various plant types on the system.

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

(This should be in reasonable but not excessive detail)

The nature of the change is to move to a more accurate estimate of actual imbalance. More specifically, four main changes are proposed:

- Per-minute response energy – calculating response energy for each minute of each settlement period would provide a more accurate calculation of a generator’s response energy volume in each settlement

period. Payment calculations will still be undertaken on a settlement period basis;

- Detailed interpolation of the response matrix – by linearly interpolating between de-load points and frequency deviation data within the response matrix, a more accurate value of response capability can be ascertained. This will remove the need for adjustment factors and the associated inaccuracy of this element of the payment mechanism;
- For generating units selected to provide primary, secondary and high frequency response – calculating the low frequency response energy of a generator using the average of the primary and secondary contract values improves the approximation of a generators actual imbalance; and
- Compensation for non-delivery charges – using the BSC algebra to calculate non-delivery charges it will be possible to calculate a compensation payment based on the volume of response energy delivered.

Although the fifth shortfall highlighted above (i.e. the issue regarding the payment calculation) was discussed and debated in detail by the informal, pre-CUSC, Frequency Response Imbalance Working Group, no agreement as to a way forward regarding this matter was agreed. The CUSC Panel have therefore been invited to consider how this issue may be taken forward (possibly through further discussion/debate at the proposed Balancing Services Standing Group) as part of the recommendations of the Working Group Report.

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

(This should be given where possible)

Section 4.1.3 – calculation of payments and payment formulae. Amendment required to reflect revised payment for frequency response imbalance as outlined above.

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. The payment calculations outlined in the CUSC for Frequency Response are based on broadly cost reflective charging principles i.e. based and founded upon actual or estimated costs directly incurred by the provider.

This proposed amendment will better facilitate the efficient discharge of this licence obligation by aligning more accurately payments made with costs incurred, producing greater transparency in the relative costs of service provision. 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. In addition, this amendment will ensure that providers are not over compensated for providing mandatory frequency response.

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.

The revised formulae may require a change to National Grid's incentive scheme target and consequently the Transmission Licence.

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.

There will be no significant impact on processes used by CUSC Parties.

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 8.15.7 of the CUSC.

(A signature to this effect must be given.)

.....

Annex 2 – Proposed Text to Modify CUSC

As outlined in Section 6 above, this Annex includes the legal wording as included in Issue 1.0 of the Amendment Report (strikethrough text) together with the final legal wording.

Text Included in Issue 1 of the Amendment Report

~~DRAFT TEXT TO ACCOMPANY PROPOSED CUSC MODIFICATION~~ ~~Draft~~

~~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:-~~

$$\text{HP}_M = P_M + H_M + S_M$$

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:-

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

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:-

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

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:-

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

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:-~~

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

~~Where:~~

~~ICP_{ij} is the **Imbalance Compensation Payment** to be made to the **User** calculated in £ per **Settlement Period**;~~

~~IEP_{ij} is the Imbalance Energy Payment for Settlement Period j calculated in accordance with (b) below; and~~

~~RNDG_{ij} is the Non-Delivery Payment for Settlement Period j calculated in accordance with (c) below.~~

~~(b) The Imbalance Energy Payment IEP_{ij} for Settlement Period j shall be calculated as follows:-~~

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

~~Where:~~

~~if $IE_{ij} > 0$~~

~~then~~

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

~~$$HFIEP_{ij} = 0$$~~

~~Otherwise~~

~~$$LFIEP_{ij} = 0$$~~

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

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

~~$$IE_{ij} = \sum_{m \in j} \left(\frac{FR_{mi}}{60} \right)$$~~

~~Where:~~

~~$\sum_{m \in j}$ represents the sum over all minutes in Settlement Period j for each BM Unit i.~~

~~FR_{mi} is the expected Response power for BM Unit i (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 minute m and the mean Frequency Deviation over that minute.~~

~~For this purpose:-~~

- (i) for a positive **Frequency Deviation** in minute m , the expected change in active power output of **BM Unit** i shall be derived from the high frequency response capability table set out in the **Mandatory Services Agreement**; and
- (ii) for a negative **Frequency Deviation** in minute m , the expected change in active power output of **BM Unit** i shall be (where the **User** is instructed to provide **Primary Response** together with **Secondary Response**) the mean average value of the **Primary Response** capability and **Secondary Response** capability, or (where the **User** is instructed to provide **Primary Response** without **Secondary Response**) **Primary Response** capability, in each case derived from the low frequency response table set out in the **Mandatory Services Agreement**.

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

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** ($RNDC_j$) for **Settlement Period** j shall be calculated as follows:-

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

Where:

In respect of each **Settlement Period**, for each **BM Unit**, the **Period BM Unit Non-Delivered Offer Volume (Revised)** 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**, for each **BM Unit**, the **Period BM Unit Non-Delivered Bid Volume (Revised)** will be determined as follows:

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

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

In respect of each **Settlement Period**, for each **BM Unit**, if the **Period BM Non-Delivered Offer Volume (Revised)** is greater than zero then to determine values of **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**, 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** $\{QAO_{ij}^{n1}, QAO_{ij}^{n2}, \dots, QAO_{ij}^{nu}, \dots\}$ 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:

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

where $RQNDOR_{ij}^{u-1}$ is the **Remaining Period BM Unit Non-Delivered Offer Volume (Revised)** determined as:

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

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

$$\text{and } QNDOR_{ij}^{no} = 0.$$

In respect of each **Settlement Period**, for each **BM Unit**, if the **Period BM Non-Delivered Bid Volume (Revised)** is less than zero then to determine values of **Bid Non-Delivery Volume** ($QNDBR_{ij}^n$), 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**, 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~~ $\{QAB_{ij}^n, QAB_{ij}^{n+1}, \dots, QAB_{ij}^u, \dots\}$ 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~~ is fully apportioned.

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

$$\cdot QNDBR_{ij}^n = \min(QAB_{ij}^n, RQNDBR_{ij}^{n-1})$$

where $RQNDBR_{ij}^{n-1}$ is the ~~Remaining Period BM Unit Non-Delivered Bid Volume (Revised)~~ determined as:

$$\cdot RQNDBR_{ij}^n = RQNDBR_{ij}^{n-1} - QNDBR_{ij}^{n-1}$$

$$\text{and } \cdot RQNDBR_{ij}^0 = QNDBR_{ij}^0$$

$$\text{and } \cdot QNDBR_{ij}^{n_0} = 0.$$

In respect of each ~~Settlement Period~~, for each ~~BM Unit~~, for each accepted ~~Offer~~, the ~~Non-Delivered Offer Charge (Revised)~~ will be determined as follows:

$$\cdot CNDOR_{ij}^n = QNDOR_{ij}^n \times \max\left(\left(\frac{PO_{ij}^n}{SBP_j} - 1\right), 0\right) \times TLM_{ij}$$

In respect of each ~~Settlement Period~~, for each ~~BM Unit~~, for each accepted ~~Bid~~, the ~~Non-Delivered Bid Charge (Revised)~~ will be determined as follows:

$$\cdot CNDBR_{ij}^n = QNDBR_{ij}^n \times \min\left(\left(\frac{PB_{ij}^n}{SSP_j} - 1\right), 0\right) \times TLM_{ij}$$

In respect of each ~~Settlement Period~~, for each ~~BM Unit~~, the ~~BM Unit Period Non-Delivery Charge~~ will be determined as follows:

$$\cdot CNDR_{ij} = \sum_n (CNDOR_{ij}^n + CNDBR_{ij}^n)$$

where \sum_n represents the sum over all ~~Bid-Order 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”~~
~~“QAB^R_{ij}”~~
~~“QAO^R_{ij}”~~
~~“QM_{ij}”~~
~~“QME_{ij}”~~
~~“SSP_j”~~
~~“SBP_j”~~

~~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 made to that ~~User~~ except in relation to periods in respect of which instructions have been issued by ~~NGC~~ pursuant to this Paragraph 4.1.3.

~~Interpretation of Tables – Levels of Response~~

~~4.1.3.11~~ 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**.~~

[Paragraphs 4.1.3.13 to 4.1.3.27 remain unchanged.]

~~4.4.3~~ **Charging Principles – Frequency Response**

- ~~4.4.3.1~~ The variable cost of producing **Primary Response, Secondary Response, High Frequency Response** shall include sums in respect of the additional inefficiency costs incurred in providing these services but shall not include any sums payable in respect of any costs which are the subject of Paragraph 4.4.3.3.
- ~~4.4.3.2~~ Part loading of a **BM Unit** at a level other than that specified in a **Physical Notification** in order to provide **Frequency Response** will normally be achieved by the issue of a **Bid-Offer Acceptance**.
- ~~4.4.3.3~~ In recognition of the costs likely to be incurred under the **Balancing and Settlement Code** when providing **Frequency Response**, an additional amount based upon an expected exposure to energy imbalance and non-delivery charges when providing these services shall be payable under Paragraph 4.1.3.9A.

Related Additional Definitions for CUSC Paragraph 11.3

“Holding Payment”	that component of the payment for Mode A Frequency Response calculated in accordance with Paragraph 4.1.3.9;
“Imbalance Compensation Payment”	that component of the payment for Mode A Frequency Response referred to in Paragraph 4.1.3.9A comprising the Imbalance Energy Payment and the Non-Delivery Payment ;
“Imbalance Energy Payment”	that component of the Imbalance Compensation Payment calculated in accordance with Paragraph 4.1.3.9A(b);
“Non-Delivery Payment”	that component of the Imbalance Compensation Payment calculated in accordance with Paragraph 4.1.3.9A(c);

Final Legal Wording

LEGAL TEXT TO ACCOMPANY PROPOSED CUSC MODIFICATION

4.1.3 Frequency Response

Introduction

4.1.3.8 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

4.1.3.9 For the purposes of this Paragraph 4.1.3:

- (iv) “**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;
- (v) 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;
- (vi) 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

4.1.3.10 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**".

4.1.3.11 **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**.

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

4.1.3.13 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

4.1.3.14 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

4.1.3.10 **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

4.1.3.11 **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 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:-

- (iii) 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
- (iv) 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** $\{QAO_{ij}^{n_1}, QAO_{ij}^{n_2}, \dots, QAO_{ij}^{n_u}, \dots\}$ 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:

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

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

and $QNDOR_{ij}^{no} = 0$.

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** $\{QAB_{ij}^{n1}, QAB_{ij}^{n2}, \dots, QAB_{ij}^{nu}, \dots\}$ 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:

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

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 $QNDBR_{ij}^{no} = 0$.

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:-

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

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:-

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

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:-

$$CNDR_{ij} = \sum_n \left(CDNOR_{ij}^n + CNDBR_{ij}^n \right)$$

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 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 Paragraph 4.1.3.9, 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 Paragraph 4.1.3.9, 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.

4.4 CHARGING PRINCIPLES

4.4.1 Application

The provisions of this Paragraph 4.4 shall apply to payments made by **NGC** to a **User** pursuant to **Mandatory Services Agreements** in respect of the provision of the **Mandatory Ancillary Service of Frequency Response**, and (if agreed between **NGC** and a **User**) may also be incorporated by reference into any other **Ancillary Services Agreement** as a term thereof so as to apply in respect of payments made by **NGC** to that **User** in respect of the provision of other **Ancillary Services** (but for the avoidance of doubt not so as to thereby create any obligations on **NGC** and that **User** under the **CUSC** in respect thereof).

4.4.2 Charging Principles - General

4.4.2.1 These principles are to be used to establish the basic arrangements but are not intended to stifle innovation in the development of new services or the giving of appropriate economic signals.

4.4.2.2 The charges shall be "cost reflective" ie. based and founded upon the actual or estimated costs directly incurred or to be incurred by the **User** for the purpose of providing the service or capability concerned.

4.4.2.3 Where a capability to provide an **Ancillary Service** is required by the **Grid Code** from all **BM Units** or **CCGT Units** (as opposed to a capability made available by agreement between **NGC** and a **User** from some only of the **User's BM Units** or **CCGT Units**), no **Ancillary Service** capability payment shall be made.

4.4.2.4 The cost of "Grandfathering" **User's** Equipment (i.e. bringing equipment owned by the **User** on 30th March 1990 to a condition of compliance with the **Grid Code**) shall not be included in **Ancillary Services** payments. Where a **Derogation** is withdrawn or reduced in scope then, except in relation to **Frequency Response**, the **User** shall be entitled to take the cost of meeting the withdrawal or reduction in the scope of the **Derogation** into account in its charges.

4.4.2.5 Subject to the other provisions of this Paragraph 4.4.2, the charges shall take due account of any change in or amendments to the **Grid Code** or any other statutory or regulatory obligation coming into force after 30th March 1990 affecting the provision of **Ancillary Services**.

4.4.2.6 If as a result of any changes to the **Balancing and Settlement Code** the **User** ceases to be entitled to receive payment under the **Balancing and Settlement Code** in respect of any elements of **Ancillary Services** provided by it which are expressed in this Paragraph 4.4 to be paid for under the **Balancing and Settlement Code**, the **User** shall be entitled to charge for such elements under an **Ancillary Services Agreement**. Where, however, such change entitles the **User** to be paid for any elements of **Ancillary Services** which are expressed in this Paragraph 4.4 to be

paid for under an **Ancillary Services Agreement** the **User** shall cease to be entitled to charge for such elements under an **Ancillary Services Agreement**.

4.4.3 Charging Principles – Frequency Response

- 4.4.3.1 The variable cost of producing **Primary Response, Secondary Response, High Frequency Response** shall include sums in respect of the additional inefficiency costs incurred in providing these services but shall not include any sums payable in respect of any costs which are the subject of Paragraph 4.4.3.3.
- 4.4.3.2 Part-loading of a **BM Unit** at a level other than that specified in a **Physical Notification** in order to provide **Frequency Response** will normally be achieved by the issue of a **Bid-Offer Acceptance**.
- 4.4.3.3 In recognition of the costs likely to be incurred under the **Balancing and Settlement Code** when providing **Frequency Response**, an additional amount based upon an expected exposure to energy imbalance and non-delivery charges when providing these services shall be payable under Paragraph 4.1.3.9A.

Related Additional Definitions for CUSC Paragraph 11.3

“Holding Payment”	that component of the payment for Mode A Frequency Response calculated in accordance with Paragraph 4.1.3.9;
“Imbalance Compensation Payment”	that component of the payment for Mode A Frequency Response referred to in Paragraph 4.1.3.9A comprising the Imbalance Energy Payment and the Non-Delivery Payment ;
“Imbalance Energy Payment”	that component of the Imbalance Compensation Payment calculated in accordance with Paragraph 4.1.3.9A(b);
“Non-Delivery Payment”	that component of the Imbalance Compensation Payment calculated in accordance with Paragraph 4.1.3.9A(c);

Annex 3 – Copies of Representations Received

This Annex includes copies of any representations received following circulation of the consultation document (circulated on 28th September 2001 requesting comments by close of business 5th October 2001).

Representations were received from the following parties:

No.	Company	File Number
1	Keadby Generation Limited, Keadby Development Limited, SSE Generation Limited and SSE Energy Supply Limited.	CAP001-CR-01
2	TXU Drakelow Ltd, TXU High Marnham Ltd, TXU Ironbridge Ltd, TXU West Burton Ltd, Anglian Power Generators Ltd, Peterborough Power Ltd, TXU Europe Merchant Generation Ltd, Shotton Combined Heat and Power Ltd, Citigen (London) Ltd, TXU Europe Energy Trading B.V, TXU UK Ltd, Norweb Energi Ltd, Eastern Energy Ltd.	CAP001-CR-02
3	Scottish Power	CAP001-CR-03
4	Edison Mission Energy	CAP001-CR-04
5	British Gas Trading	CAP001-CR-05
6	Energy	CAP001-CR-06
7	PowerGen UK plc, PowerGen Energy plc, Diamond Power Generation Limited, Cottam Development Centre.	CAP001-CR-07
8	Innogy	CAP001-CR-08
9	British Energy	CAP001-CR-09
10	LE Group	CAP001-CR-10
11	Slough Energy Supplies Limited	CAP001-CR-11

Reference	CAP001-CR-01
Company	Keadby Generation Limited, Keadby Development Limited, SSE Generation Limited, SSE Energy Limited

Response to CUSC Amendment Proposal CAP001

Frequency Response Imbalance Payments

Thank you for providing the opportunity to comment on the above document outlining proposed changes for implementation with effect from 21 September 2001. Please find detailed below, comments on behalf of Keadby Generation Limited, Keadby Development Limited, SSE Generation Limited and SSE Energy Supply Limited. I understand comments will be taken into account in National Grid's Amendment Report which will be issued to the Authority for decision.

Per Minute Energy Response Calculations and Dual Liner Interpolation

We support the principle and methodology of calculating response energy for each minute of each settlement period using the average frequency in the minute and the de-load of the generator to perform a dual linear interpolation between data points. We agree that this provides a much more accurate calculation of a generator's actual response energy volume.

Delivery of Primary and Secondary Response

We question the use of an average of Primary and Secondary values to provide an improved approximation of actual response when delivering Primary and Secondary response. We question whether primary and secondary response could be modelled separately. We also question whether there are situations where Secondary response is provided on its own, and if so, how would this be modelled ?

It would be useful if you could provide copies of the presentations and details of the issues referred to in 4.2 for us to consider further, particularly proposals which suggest using a generating unit's droop parameter. It would also be helpful if you could clarify what you consider to be "large" deviations as referred to in 4.2.4.

Compensation for Non Delivery Charges and Imbalance Charges

We support the principle and methodology outlined in relation to compensation for non-delivery charges. However we still have concerns that compensation payments for energy and information imbalance and loss of Balancing Mechanism revenue have not been adequately addressed. Although information imbalance charges are currently zero, they can be amended at any time and we believe it is important that they are addressed as part of this work.

We note the focus of the proposals and consultation is very much on determining a better approximation of the frequency response volume and the Working Group were unable to reach agreement on a replacement reference price.

We believe there are 3 options available:

-Energy Imbalance payments could be paid by the participant as currently at SSP or SBP. Energy Imbalance compensation payments would be based on the average of SSP and SBP as currently. Note this would not require modification proposal P034. However we agree with concerns noted in the consultation document regarding the use of an average of SBP and SSP as a reference price. We do not believe the use of an average of SSP and SBP provides adequate compensation. As such it fails to meet the charging principles established under CUSC i.e. that they should be based upon actual or estimated costs incurred either as an energy imbalance charge or as a proxy for the cost of production.

-Energy Imbalance payments would be paid by the participant as currently at SSP or SBP. In this case however Energy Imbalance compensation payments would be based on a refund of SSP or SBP, in a similar way to the Non Delivery Charge compensation payments. The

participant could then receive a market price for the energy e.g. derived from UKPX. In our opinion this would provide a better proxy for actual costs incurred. The principle has also already been established under other Balancing and Settlement Code Modification Proposals. Alternatively for high frequency response, the energy component could be a payment from the Generator. Payment could be based on fuel costs, although we believe this is not practical and suggest a proxy should be used e.g. SSP.

-Implementation of P34 so that all energy imbalance would be transferred to the Transmission Company Energy Account, therefore no energy imbalance compensation payments would be required. Frequency response compensation payments could be based on an energy price as above e.g. derived from UKPX, or a marginal cost using SSP as a proxy. As above, this could be covered under the Ancillary Services Contract. Although this would have an impact on the Balancing and Settlement Code we believe this is probably the cleanest, most transparent and most cost reflective way of introducing compensation payments. Also imbalance volumes reported under the BSC would be reflective of genuine energy imbalances. Any imbalance related to frequency response would be stripped out.

We note recent difficulties associated with modifying central Elexon systems in relation to BSC proposed modifications. This option would have to be considered in light of information on implementation timescales and costs.

We hope you find these comments useful.

Beverley Grubb
Market Development
SSE Energy Supply Limited
3.10.01

~~~~~

|                  |                     |
|------------------|---------------------|
| <b>Reference</b> | <b>CAP001-CR-02</b> |
| <b>Company</b>   | <b>Various</b>      |

**From:** [phil.russell@txu-europe.com](mailto:phil.russell@txu-europe.com) [mailto:phil.russell@txu-europe.com]  
**Sent:** 05 October 2001 10:06  
**To:** Friend, David  
**Subject:** CAP 001

In response to the above Consultation we confirm on behalf of TXU Europe's Parties that we support the Proposal as drafted.

As far as we are concerned we should have 13 Parties, but we are still waiting for your lawyers to get round to completing the paperwork for 4 of them. (TXU Drakelow Ltd, TXU High Marnham Ltd, TXU Ironbridge Ltd and TXU West Burton Ltd)

- Anglian Power Generators Ltd
- Peterborough Power Ltd
- TXU Europe Merchant Generation Ltd
- Shotton Combined Heat and Power Ltd
- Citigen (London) Ltd
- TXU Europe Energy Trading B.V
- TXU UK Ltd
- Norweb Energi Ltd
- Eastern Energy Ltd

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<b>Reference</b>	<b>CAP001-CR-03</b>
<b>Company</b>	<b>Scottish Power</b>

**From:** NETA\_SPOC [[mailto:NETA\\_SPOC@Scottishpower.plc.uk](mailto:NETA_SPOC@Scottishpower.plc.uk)]  
**Sent:** 05 October 2001 12:11  
**To:** Friend, David  
**Cc:** Harrison, Mike  
**Subject:** CUSC Amendment Proposal CAP001 - Frequency Response Imbalance Payments - Consultation Response

With reference to the above, we agreed with the general principles of the Amendment and that it gives a better approximation of assumed energy imbalance when calculating compensation payments. However, we would like to make the following comments:-

1. There is an issue regarding the governance and thus implementation of the whole process. BSC Mods P34 and P36 relate to the same area and P36 requires the calculated volume to be submitted to settlement under the BSC. The calculation proposed in CAP001 therefore will impact on any outcome from the BSC Mods. Any outcome of the current proposals which uses a price other than a single reference price for the settlement period will require this calculation to be changed. Whether the ultimate calculation will be done by NGC or SAA therefore needs to be clarified and agreed. The process of Amendment between CUSC and BSC therefore needs to be co-ordinated.
2. We believe that the calculation of the Imbalance Energy Payment (IEP) should be changed so that the appropriate price is applied to the expected imbalance energy (IE) on a per minute basis and then the payments are summed over the settlement period.

Should you have any queries, please do not hesitate to contact me or Mike Harrison.

Regards

Man Kwong Liu  
Design Authority, Deregulated Services  
Calanais Ltd.

External phone: 0141 568 2314  
Internal phone: 700 - 2314  
Email: [mankwong.liu@calanais.com](mailto:mankwong.liu@calanais.com)

<b>Reference</b>	<b>CAP001-CR-04</b>
<b>Company</b>	<b>Edison Mission Energy</b>

**Edison Mission Energy**

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National Grid Company  
National Grid House  
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CV4 8JY

FAO David Friend

5rd October 2001

e-mail david.friend@uk.ngrid.com

### Responses to Consultation CAP001

Edison Mission Energy (EME) welcomes the opportunity to comment on the proposals made in the in the consultation document issued on 28th September 2001 on the treatment of Frequency Response Imbalance Payments.

EME has a number of concerns relating to this proposal. The objective of the mechanism is to compensate providers of mandatory services for the costs they incur in providing the services. This proposal although improving matters to some extent does not compensate generators for the costs involved in providing mandatory response.

We believe that further work is required on the volume calculation for frequency response and the derivation of reference price for the proposal. A better approach would be to use a droop based calculation to arrive at the imbalance volume and base the reference price on bid/offer prices.

We offer the following comments on the proposal:-

1) Derivation of volume of response

Pumped Storage Plant (in common with other flexible plant) offers fast acting 4% droop governors for the provision of mandatory frequency response. The output of such plant varies in relation to frequency over a period of time

between 0 - 30 seconds and under most circumstance it achieves the targeted out put in this time frame.

The Primary and High frequency response matrixes target the 10s delivery point. Pumped Storage plant is still ramping after this 10 second point. For low frequency operation the value achieved after 10 seconds (Primary response) is 0.54 times that achieved after 30 seconds, whilst for high frequency operation the value achieved after 10 seconds (High frequency response) is 0.5 times that achieved after 30 seconds, in mandatory response operation.

Any derivation of volume of response that uses the Primary and High frequency response matrices for fast acting pumped storage plant will underestimate the volume of response provided by a factor of two. This proposal uses the High frequency matrix and an average of the Primary and Secondary matrixes for calculating the delivered volume.

This methodology will not compensate fast acting pumped storage plant for the cost involved in the delivery of response. This is because the volumes calculated as being delivered are half those actually delivered, and the plant would suffer imbalance on the remainder.

## 2) Reference Price for volume

The link between volume and reference price is an important issue that cannot be ignored given the nature and extent of the proposed change. If the issue of reference price is to be subject to a further change then CAP001 should not pre-judge the outcome of this by effectively proposing rules that do not allow either the variable reference price approach or the bid/offer approach to be implemented with minimum change.

In the proposed rule change the volume that is calculated is aggregated into half hour volumes before the reference price is applied, this would make implementing a bid/offer change to reference price more difficult.

EME's view is that a bid/offer approach to reference price for mandatory services better meets the CUSC objectives than either the current method, or one based on estimated production cost, and as such this proposal should not pre-judge the outcome of that debate.

In summary we do not feel that this amendment should be allowed without further work as it would result in Pumped Storage and other similar plant (whose output is still increasing after 10 seconds) not being adequately compensated for provision of mandatory response.

Yours sincerely

Simon F Lord  
Ancillary Services Manager

Reference	CAP001-CR-05
Company	British Gas Trading



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National Grid House  
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3<sup>rd</sup> Floor North  
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Middlesex  
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Fax. 01784 645260

19 October 2001

Dear Mr Friend,

**CUSC Amendment Proposal CAP001: Frequency Response Imbalance Payments**

British Gas Trading Limited (BGT) are pleased to have the opportunity to comment on the first CUSC Amendment proposal raised as an Urgent CUSC Amendment on 28<sup>th</sup> September 2001 by NGC. BGT are supportive of the need for urgent implementation of the proposed amendment and note that the CUSC Amendments Panel recommended that it be treated as such.

We believe this Amendment better facilitates the achievement of the Applicable CUSC Objectives, in particular NGC's efficient discharge of the licence obligations imposed upon it by its Transmission Licence. Though the amendment proposed might not fulfil the requirements for a complete market solution we believe that it nonetheless improves on the existing imbalance payment arrangements.

BGT are therefore in favour of the implementation of the CUSC Amendment proposal and agree that the timescales be reduced for introduction of this change.

Yours sincerely,

**Brian Sequeira**  
**Senior Account Manager**

Reference	CAP001-CR-06
Company	Entergy



Entergy Wholesale Operations  
Equitable House  
47 King William Street  
London EC4R 9JD  
TEL. 020 7337 8200  
FAX. 020 7337 8201

5 October 2001

### **CUSC Amendment Proposal CAP001 Frequency Response Imbalance Payments**

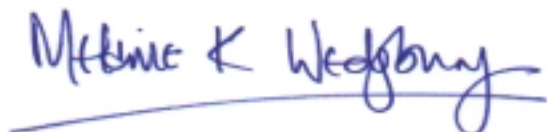
Entergy Wholesale Operations (EWO) is fully supportive of the measures put forward by amendment proposal CAP001. These measures are believed to improve the imbalance payment mechanism by providing a better approximation of assumed energy exposure and so mitigating the volume risk faced by licensed generators when providing mandatory frequency response.

EWO is also keen to see a timely resolution to the price risk issue, and would urge implementation of an interim measure with a view to minimising generators' exposure in the short term. With regard to the reference price, EWO supports the cost reflective charging principle and therefore has some concern over the 'bid/offer market price' solution that has been presented to the pre-CUSC working group.

Given the mandatory nature of the frequency response service, all licensed generators should be treated equitably; there should be no room for opportunity. Cost reflective charging would appear to be entirely consistent with the need to ensure that service providers are not exposed to charges in excess of the costs of providing those services. EWO's preference is to see the fuel type indexation methodology developed. Within-day prices for different fuel types should be relatively simple to establish, for example, from sources such as Heren. EWO would contend that the fuel indexation approach is an improvement on the existing methodology, and sees no reason why a within-day index solution could not be implemented in the short term with a view to its further development into a long term solution. EWO believes that market based prices are only appropriate for those services provided above and beyond the mandatory requirements.

Finally, EWO believes it to be fair and just to expect retrospection to be applied to all measures adopted. EWO has, in good faith, continued to provide mandatory frequency response at the risk of financial loss. It is, therefore, appropriate that solutions be applied retrospectively to ensure that EWO and other service providers are kept whole.

I hope the above comments are helpful. If you or your colleagues have any queries regarding this response please do not hesitate to contact me.



**Melanie K Wedgbury**

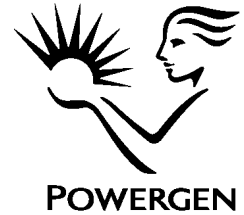
Senior Manager, Regulatory Affairs

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**E-mail: [melanie.wedgbury@entergy.co.uk](mailto:melanie.wedgbury@entergy.co.uk)**

Reference	CAP001-CR-07
Company	PowerGen



5<sup>th</sup> October 2001

Dear David,

**Powergen Comments On CUSC Amendment Proposal Frequency Response Imbalance Payments - CAP001**

Powergen UK plc ('Powergen') welcomes the opportunity to comment on the above review papers published on 8<sup>th</sup> August. Powergen provides this response on behalf of itself and the following Parties: Powergen Energy plc, Diamond Power Generation Limited and Cottam Development Centre Limited.

Powergen believes that the amendment proposal reflects the recommendations of the Pre-CUSC Working Group and we have not identified any reasons for not implementing the proposal as written.

However, it should be noted that the Working Group failed to reach consensus on the Reference Price. Powergen supports the proposal to use of Bid / Offer Acceptance (BOA) Prices to replace the Reference Price and this proposal should be progressed as soon as possible.

If you have any questions please let me know.

Yours Sincerely,

**Afroze Miah**

Strategy & Regulation Department  
Energy Trading  
Powergen  
02476 424814

Reference	CAP001-CR-08
Company	Innogy

## **Innogy's response to the Consultation Document on CUSC Amendment Proposal CAP001 Frequency Response Imbalance Payments**

### **Per-minute Response energy calculation**

We support the introduction of per-minute calculation of Response energy. This will greatly improve the accuracy of the calculation and will better facilitate the CUSC objectives. However, we believe that there may be a need to keep this under review since it does not allow for a distinction between Primary Response energy (delivered between 10 and 30 seconds after a frequency fall) and Secondary Response energy (delivered between 30 seconds and 30 minutes after a frequency fall). The issue is addressed by the use of the average of the Primary and Secondary Response to a frequency fall but, for reasons outlined below, there may be a need for a more rigorous calculation if significant discrepancies are found between the calculated expected Response and contracted values.

### **Dual Linear Interpolation of Response Matrix**

We welcome the proposal to use a more accurate method for calculating the expected Response. This will more accurately compensate imbalance exposure for all Units rather than penalising plant that is more responsive to small frequency deviations than is assumed with the current methodology.

### **Use of Secondary Response Values**

We recognise the shortcomings of using only the Primary Response values and believe that the introduction of Secondary Response values will improve the accuracy of the imbalance volume calculation. However, while the use of average numbers may be an improvement, it does not necessarily reflect instantaneous changes in contracted Response where Primary and Secondary Response are delivered independently in different time-scales. As such there may be need for review at a later date.

### **Compensation for Non-delivery Charges**

We agree that the introduction of compensation for Non-delivery is appropriate. The introduction of such a payment should help to encourage full participation in the Response market.

## Draft Text to Modify CUSC

There are a small number of points in the draft text that we believe could be improved in order to aid clarity and the possible introduction of alternative price calculations in the future. These are outlined below.

### 1. **Description of how the Primary and Secondary 'capabilities' are used to calculate the expected Response energy.**

Although '**Primary Response** capability' is not a defined term, the only other references to 'capability' are in the payment calculations where the term refers to the Primary capability at 0.5Hz, and the Secondary capability at 0.2Hz as summarised in the 'Frequency Response Capability Summary' table. Thus, the use of the word 'capability' does not seem helpful.

It is difficult to describe exactly the calculation that is required. However, it may be achieved by adding at the end of 4.1.3.9A (b) (ii) words to the effect of 'For the avoidance of doubt and for the purposes of this calculation only,  $\bar{\delta}f_p$  and  $\bar{\delta}f_s$  shall be considered equal to the mean **Frequency Deviation** over minute m.'

### 2. **Calculation of $IEP_{ij}$**

The proposed calculation derives the expected energy volume delivered in each minute of a settlement period and then sums the resulting values over the half-hour. This net volume is then multiplied by the reference price to derive the appropriate compensation payment. Such an approach presupposes that the same reference price should apply to all imbalance energy in the Settlement Period.

Whilst this is the case with use of the current Reference Price, it would not be the case if Bid and Offer prices were used to value the imbalance, or even if a single reference priced that varied with the degree of response were employed. Thus adopting this approach would severely fetter the Panel in its choice of the various pricing options.

In order to provide sufficient flexibility in the algebra such that any of the price options that have been proposed could be incorporated to derive the compensation payment, we would suggest that the appropriate price be applied to the expected energy volume in each minute.  $IEP_{ij}$  would then be expressed as the sum of these minute payments over the settlement period.

<b>Reference</b>	<b>CAP001-CR-09</b>
<b>Company</b>	<b>British Energy</b>

Mr D. Friend  
The National Grid Company plc  
National Grid House  
Kirby Corner Road  
Coventry  
CV4 8JY

Our Ref.: B/1/a/GCT/196

Date: 5th October 2001

David,

**CUSC CONSULTATION DOCUMENT  
Frequency Response Imbalance Payments  
(CAP001)**

Thank-you for the opportunity to comment formally on this paper. This letter records British Energy's response.

The Consultation Paper specifically requests comments on four key areas and I target our main response to these issues:

**Per-minute average frequency calculations**

We agree that a change from half-hourly to per-minute frequency calculations will provide a more accurate calculation of a generator's response energy volume.

**Detailed interpolation of the response matrix**

We agree that this improved interpolation, and the subsequent removal of adjustment factors, will provide a better estimate of the assumed response energy.

It is clearly difficult to succinctly describe the methodology to be employed for calculating the expected response and the associated compensation payments. NGC have clearly done a lot of work behind the scenes to demonstrate that the new proposals are an improvement on the present arrangements. It would be useful to Parties (especially those not directly represented on the working group) if NGC could publish a worked example showing how the new methodology would work in practice, using a dummy response matrix and a 'typical' response curve for a BM Unit within a settlement period. This would enable Parties to ensure that they fully understand how NGC will derive the data for their respective plant.

**Use of secondary response values from the matrix**

We agree that the inclusion of the secondary contract volumes will provide a better estimate of a generator's actual imbalance as a result of providing mandatory frequency response.

**Compensation for non-delivery charges**

We agree that generators should not be exposed to non-delivery charges as a result of providing mandatory frequency response.

We note that the pre-CUSC working group was unable to reach a decision on issue 5 (reference price) and further note that the CUSC Panel has been asked to consider how to take this issue forward.

Further to our comments on the specific views invited we would also like to record our views on the following:

**Calculation of IEPij**

We note that the methodology for calculating this factor applies the reference price to the summation of the 30 'per minute expected energy volumes'. It would provide a better degree of accuracy if the reference price could be calculated per minute (i.e. the same resolution as the expected energy volumes) and then the product of the per minute reference price and the per minute energy volumes could then be summated over the half-hour to provide the value for IEPij.

**Payment mechanism for frequency response services**

We remain to be convinced that there is an appropriate level of competition in the frequency response market at this stage of the development under NETA. In view of this we believe that a cost based charging approach would be the appropriate payment mechanism.

**Governance**

This consultation document (CAP001) is clearly intended to stand in isolation and makes no reference to similar, related reviews being carried out on this issue under the control of the BSC processes e.g. Modification Proposals P34 and P36.

CAP001 proposes the inclusion of the frequency response payment mechanisms in the CUSC. Clearly the chosen governance arrangements will have implications for the proposed treatment of, and subsequent changes to, the frequency response payment mechanisms. As such the CUSC Amendment Panel needs to take account of these competing jurisdiction issues and it should be better demonstrated that a co-ordinated approach is in place to ensure that the eventual solution best meets the requirements of the industry and is not decided on a "who gets there first" policy. Whatever decision is made regarding where the various mechanisms reside it must be ensured that the details are fully transparent, without conflict and any identified improvements to the mechanisms can be proposed and implemented by the industry.

Please do not hesitate to contact me on 01452-653070 if you would like to discuss any of these issues further.

Yours sincerely

Graham Trott  
Market Development

<b>Reference</b>	<b>CAP001-CR-010</b>
<b>Company</b>	<b>LE Group (including Sutton Bridge Power, Cottam Power, Jade Power Generation Ltd and London Power Company)</b>

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Date Our Ref Your Ref

05 OCT 01

David Friend  
National Grid  
National Grid House  
Kirby Corner Road  
Coventry  
CV4 8JY



Dear David,

### **London Electricity Group Response to the CUSC Amendment Proposal Consultation Document CAP001 (28/Sep/01)**

We welcome the opportunity to review the consultation document prepared by the NGC. We would like to make the following comments, which are made on behalf of all the CUSC parties in the London Electricity Group, including Sutton Bridge Power, Cottam Power, Jade Power Generation Ltd. and London Power Company:

#### **Overall comments on the four proposals of the Consultation Document**

We welcome the proposals of the 'per minute average frequency calculation' and for 'compensation for non delivery charges' in relation to mandatory frequency response. We consider these two proposals would help to improve the imbalance compensation treatment relating to mandatory frequency response.

The other two other proposals are 'detailed interpolation of the response matrix' and 'use of secondary response values from the matrix'. Our view is that if the conventional response matrix has to be used, then these two proposals may be helpful in improving the approximation in the imbalance compensation calculation relating to mandatory frequency response. However, these proposals are inadequate for the resolution of the outstanding issues. The underestimation problem of CCGTs response volume for both high frequency and low frequency would remain to be solved.

We would like to point out that the response matrix currently in use was defined before the introduction of wide use of large CCGTs. Whilst this type of matrix may be a useful indicator of response capability to certain extent, it is not a valid tool to calculate response energy volume, particularly for determining CCGT's response energy volume.

Therefore, we would urge the NGC, in cooperation with other CUSC parties, to consider and develop an appropriate approach to adequately deal with CCGT's response energy

calculation as a matter of urgency, regardless of whether the proposals in current Consultation Document are finally accepted or not. We would support a droop related method or other similar methods to be developed for CCGT's response energy calculation. To this extent, we do not agree with Paragraph 4.2.8 or 'general agreement' (as usually interpreted) in Paragraph 4.2.9 of the consultation document.

It should be stressed that the energy volume determination of mandatory frequency response is vital in ensuring service providers are not unduly exposed to the imbalance costs resulting from delivery of frequency response. To be workable, this will also be the essential foundation for any CUSC or BSC modification proposals, relating to imbalance compensation issue of frequency response.

Incidentally, once the 'minute by minute' calculation is introduced, other CUSC parties may have greater difficulty in reconciling any imbalance compensation payments and may have to rely on NGC entirely for the accuracy of payment calculation. Some additional data or facilities provision for necessary audit or reconciliation may prove to be desirable.

### **Comments on Annex 1**

In relation to the paragraph indicating a potential requirement to change NGC's incentive scheme target, we do not consider this logical.

The NGC's incentive scheme target was determined assuming the imbalance compensation is correct. All the proposals in the consultation document aim at improving the approximation of the calculation; therefore, unless NGC was aware of the defects of the imbalance compensation methodology long before NGC went live, the existing incentive scheme target should still be valid.

### **Comments on Annex 2**

Due to the consultation period being short, combined with holidays of some relevant members of the staff, we have not checked this annex in detail. Just two comments are listed below.

We have noted that there seems to be a minor but material error in 4.1.3.9A. Within the context, we imagine that FRmi will have a negative value for high frequency response. But this does not seem to be mentioned anywhere. Please note that the response values from all response capability tables are positive figures.

In the Para defining FRmi, the de-load level may need to be measured at the beginning of 'minute m' rather than 'the end of minute m'.

In addition, 'per minute' should be added to the end of the heading of Para 4.1.3.9 and 'per Settlement Period' should be added to the end of the heading of Para 4.1.3.9A.

### **General comment on the length of this consultation**

The Authority agreed to a five-day consultation but we think that even within an urgent time frame this period was too short. The complexity of the issues and the associated algebra changes that had not been published until very recently are such that 5 days is not a reasonable period

Yours sincerely,

Guy Buckenham  
General Manager  
Energy Purchasing and Risk Management

<b>Reference</b>	<b>CAP001-CR-011</b>
<b>Company</b>	<b>Slough Energy Supplies Limited</b>

**From:** Steve Garrett [<mailto:SteveGarrett@SloughHeatAndPower.co.uk>]  
**Sent:** 05 October 2001 18:44  
**To:** Friend, David  
**Cc:** 'nick.simpson@ofgem.gov.uk'  
**Subject:** CAP001 - Amendment Proposal Frequency Response Imbalance Payments

I refer to your proposed CUSC amendment CAP001.

This amendment, if approved, will further exacerbate discrimination within the trading arrangements against smaller generating plant.

The Frequency Response service payment calculations refer to payments to BM Units and and in respect of Mandatory Service Agreements and so to the extent that smaller generators are not a BM Unit or do not have such an agreement, they are therefore excluded from the provision of the Frequency Response service, and thus from receiving any revenue in respect of it.

Therefore, to increase the certainty of revenue payments to larger generators, and given the spread of imbalance prices, to actually increase revenue to such generators, constitutes an extension of the discrimination against smaller generators.

Steve Garrett  
Slough Energy Supplies Ltd

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**Annex 4 – Copies of Representations Received following circulation of final legal text**

As outlined in Section 6 above, this Annex includes copies of any representations received following circulation of the final legal wording (drafting was circulated on 16<sup>th</sup> October 2001 requesting comments by close of business 19<sup>th</sup> October 2001).

Representations were received from the following parties:

No.	Company	File Number
1	British Energy	CAP001-CR-012

<b>Reference</b>	<b>CAP001-CR-012</b>
<b>Company</b>	<b>British Energy</b>

**From:** Trott Graham [<mailto:graham.trott@british-energy.com>]  
**Sent:** 18 October 2001 15:58  
**To:** Friend, David  
**Cc:** Capener John; Phillips Steve  
**Subject:** CUSC Amendment Proposal CAP001 - Legal drafting

David,

Thank-you for the opportunity to comment on the above. This email records British Energy's response. Please note that as well as general comments I have requested some clarification on the logic behind some of the proposed changes.

1. The consultation process for this modification has not been good. There has been a lot of confusion over the past two weeks about what the various papers are intended to achieve and it has not always been clear that a particular document was, in fact, a consultation document e.g. to have a Consultation Document followed by an Amendment Report ... both of which are in fact consultations is not a clear and consistent approach. Furthermore the version numbers used for NGC internal review (0.1, 0.2 etc) should be kept clearly different from version numbers (1.0, 2.0 etc) used for the wider industry consultation. It was only when a colleague was recently speaking to Mike Metcalfe that we established that the report that was sent to the Authority on Friday was bounced by Ofgem and this resulted in another revised version (and subsequent consultation) issued on 16 October. The email that accompanied the revised versions referred to "... changes made for general housekeeping or clarification only ..." and, whilst I accept this is true for some of the changes, I politely question whether changes to formulae actually fall into those categories (ahem). Overall, participants must be in no doubt about what the consultation process is and where they are in the process at any one time ... this is even more important for consultations driven through with the excessive speed of CAP001.

2. There are a number of occasions where the phrase "... calculated in £ per Settlement Period ..." has been removed e.g. 4.1.3.9A(a) and 4.1.3.9A(b). Please clarify why this text has been removed.

3. Whilst the definition of LFIEPij and HFIEPij can be intuitively derived, they don't appear to be defined anywhere. Please identify where these terms are defined.

4. Clause 4.1.3.9A(b) could benefit from some minor reformatting (i.e. use of indents) to provide some clarity e.g. (subject to the editing limitation of Outlook !!!)

where:

$$\begin{aligned} & \text{if } IE_{ij} > 0, \text{ then} \\ & LFIEP_{ij} = IE_{ij} * (\text{reference price} - SSP_j) \\ & \text{and } HFIEP_{ij} = 0 \end{aligned}$$

otherwise etc etc

5. Clause 4.1.3.9A(b) contains a revised formula. Again the reason for the change appears intuitive but I would be grateful for an explanation from yourselves of why this expression has changed from a summation factor to an integral factor.

6. Clause 4.1.3.9A(b)(ii). Again as a suggested clarification point ... would this be clearer if you changed the order of the text to identify the data to be used straight away e.g.

(ii) ... shall be derived from:

A) the Primary Response Data (in the case of a BMU being instructed

to deliver Primary Response only); or

B) the mean of the Primary Response data and the Secondary Response data (in the case of a BMU being instructed to deliver both Primary Response and Secondary Response)

7. Clause 4.1.3.9A© contains a number of references to "... a sum referred to in this paragraph ...". Would it be better to replace the word 'sum' with the word 'quantity' to avoid confusion with those occurrences of the word 'sum' that genuinely refer to a mathematical summation.

8. Clause 4.1.3.9A© - the paragraph that starts with the words "Now, in ..." should finish with ":-" rather than a period to ensure consistency with the rest of the clauses. Also, to be consistent with a later clause the letters "j" and "i" should be inserted after the words

“Settlement Period” and “BM Unit” respectively. Similarly, the paragraph starting immediately after “... and QNDOR<sub>ij</sub> (with an “n” superscript)” should include the word “Unit” in between the words “BM” and “non -delivered”. Furthermore this whole section could be clarified by the introduction of sub-headings called something like “In the case of Bids” and “In the case of Offers”.

9. I haven’t gone into the maths in detail but could you confirm that the expressions for QNDOR<sub>ij</sub> (with an “n” superscript) and QNDBR<sub>ij</sub> (with an “n” superscript) are both correct i.e. is the inclusion of the “min” operator in their derivation correct for both expressions or should one refer to max ? (this is purely an intuitive question !!!)

I’d be grateful for clarification in the areas sought but in the meantime please let me know if you want to discuss any of these issues further.

Kind regards,

Graham  
Market Development  
British Energy  
01452-653070