National Grid

CONSULTATION DOCUMENT

CUSC Amendment Proposal CAP011

(Changes to frequency response
Payments to reflect potential
Changes to BSC)

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DISTRIBUTION

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

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1.0 Executive Summary

1.1 All licensed generators are required to provide the service of mandatory frequency response as set out in CC.8.1 of the Grid Code. Prior to the introduction of NETA it was recognised that generators would incur imbalance charges under the BSC when mandatory frequency response was provided. A mechanism was introduced at NETA Go-live that was intended to compensate generators for this imbalance exposure due to providing response. This mechanism was implemented via the NETA Implementation Scheme in the Mandatory Services Agreements (MSA's) and codified into the CUSC.

1.2 Various proposals have been submitted under both the CUSC and the BSC that seek to change the arrangements for imbalance compensation. CAP011 seeks to modify the CUSC should either BSC Modification Proposal MP034 (Transfer of imbalances caused by Balancing Services to the Transmission Company Energy Account) or BSC Modification Proposal MP036 (The generation of Bid-Offer Acceptances relating to energy delivered as a result of providing Applicable Balancing Services) be implemented. A description of the current process for compensation and the interaction between BSC Modifications P34/P36 and the CUSC is contained in Annex 1.

1.3 Both of the proposals (i.e. P34 or P36 or their Alternatives), if approved by the Authority, would have a consequential impact on the methodologies contained within the CUSC and would result in the need for a number of changes being made to Section 4 of the CUSC.

1.4 In view of the above requirement, CUSC Amendment Proposal CAP011 (which deals with the consequential changes required to CUSC if P34 or its Alternative is approved) was submitted by National Grid for consideration by the CUSC Amendments Panel at their 11 January 2002 meeting (see Annex 2). Following submission of the Amendment Proposal, the Amendments Panel agreed that the issue was appropriate to proceed to wider consultation by National Grid (in accordance with 8.17.12(b)). However, at the meeting, the Panel also agreed it was appropriate that an Alternative to CAP011 should be developed and included in the Consultation Document to deal with the consequential CUSC changes that would be required in the event P36 or its Alternative was approved.

1.5 This document initiates the wider consultation exercise and invites views on the consequential changes that would be required to the CUSC should the Authority approve BSC Modifications P34 or P36 (or their Alternatives). The closing date of this consultation exercise is 28 March 2002.

2.0 Introduction

2.1 This is a consultation document issued by National Grid under the rules and procedures specified in the Connection and Use of System Code (CUSC) as designated by the Secretary of State. It deals with a number of potential consequential changes to the Mandatory Frequency Response provisions set out in Section 4 of the CUSC. Such changes would be required in the event BSC Modification P34 or P36 (or their Alternatives) gain approval from the Authority.

2.2 Following submission of Amendment Proposal CAP011 (that considered the potential, consequential changes relating to BSC Modification P34, Annex 2 refers), the Amendments Panel agreed that the issue was appropriate to proceed to wider consultation by National Grid (in accordance with 8.17.12(b)). In view of the close relationship between BSC Modifications P34 and P36, the Amendments Panel also agreed it was appropriate that an Alternative to CAP011 should be developed and included in the Consultation Document to deal with the consequential CUSC changes that would be required in the event P36 or its Alternative was approved.

2.3 If BSC Modifications P34 or P36 (or their Alternatives) are approved, consequential changes to Section 4 of the CUSC (as detailed in Annex 3 and Annex 4 respectively) will be required. This document seeks views from Industry members relating to the proposed changes. Representations received in response to this consultation document will be included in National Grid's Amendment Report that will be furnished to the Authority for it's Direction.

2.4 This consultation document has been prepared in accordance with the terms of the CUSC. An electronic copy can be found on the National Grid website, at http://www.nationalgridinfo.co.uk/cusc.

3.0 Responses to Consultation

3.1 Please send your responses to this consultation document to National Grid by no later than close of business Thursday, 28 March 2002.

3.2 Please address all comments to the following e-mail address: david.friend@uk.ngrid.com. Alternatively, comments may be addressed to:

David Friend
Commercial Development
National Grid Company plc
National Grid House
Kirby Corner Road
Coventry Tel: 024 7642 3069
CV4 8JY Fax: 024 7642 3298

4.0 The Proposed Amendment Proposal

4.1 CUSC Amendment Proposal CAP011 (see Annex 2) as submitted by National Grid proposes a number of consequential changes to the CUSC that would be required, in the event that BSC Modification P34 or its Alternative was approved by the Authority. Following submission of CAP011, the Amendments Panel agreed that the scope of CAP011 should be broadened so as to include the consequential changes to the CUSC that would be required, in the event that the Authority approved BSC Modification P36 or its Alternative. In view of this, an "Alternative Amendment Proposal" is presented below that proposes a number of consequential changes to the CUSC that would be required in the event BSC Modification P36 or its Alternative receives approval by the Authority.

4.2 National Grid submitted BSC Modification P34 on 14 August 2001. The Modification Proposal recommends the transfer of imbalance charges (that are made as a result of delivering Ancillary Services and Other Services, including Mode A Frequency Response) from the Provider's Energy Account to the Transmission Company's Energy Account.

4.3 If P34 or its Alternative is implemented, the consequential changes to the Mandatory Frequency Response provisions (set out in Section 4 of the CUSC) as detailed in Annex 3 would be required.

5.0 Alternative Amendment Proposal

5.1 Innogy submitted BSC Modification P36 on 10 September 2001. The Modification Proposal recommends the use of Bid-Offer acceptances as the basis to value any energy that is delivered by a generator as a result of providing any applicable Balancing Services.

5.2 If P36 or its Alternative is implemented, the consequential changes to the Mandatory Frequency Response provisions (set out in Section 4 of the CUSC) as detailed in Annex 4 would be required.

6.0 Summary of Recommendations & Views Invited

6.1 National Grid Recommendation

6.1.1 In the event BSC Modifications P34 or P36 or their Alternatives are approved by the Authority, National Grid recommends that the consequential CUSC changes as outlined in Annex 3 or Annex 4 respectively and described in Annex 1 are also implemented. This is on the basis that the changes as proposed better facilitate achievement of the Applicable CUSC Objectives as set out in

paragraph 1 of Condition C7F to National Grid's Transmission Licence.

6.1.2 This is on the grounds that:

- in the case of P34 or its Alternative, it prevents the Transmission Company refunding payments for costs that are not incurred under the BSC, which would otherwise result in unnecessary payments being made to certain service providers.

- in the case of P36 or its Alternative, it prevents the Transmission Company refunding payments for costs that are not incurred under the BSC, which would otherwise result in unnecessary payments being made to certain service providers and prevents further payments being made which would already have been made under the BSC.

This in turn enables National Grid to discharge its obligations under the Act and the Transmission Licence and to facilitate 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.

6.2 Amendments Panel Recommendation

6.2.1 The CUSC Amendments Panel agreed with National Grid's views outlined above and proposed that the matter be subjected to wider industry consultation. This is to seek views on the proposed, consequential changes that would be required should BSC Modifications P34 or P36 (or their Alternatives) be implemented.

6.3 Views Invited

6.3.1 National Grid seeks the views of interested Parties relating to this Amendment Proposal. Views are invited on whether the consequential changes to Section 4 of the CUSC that are required should BSC Modifications P34 or P36 (or their Alternatives) as detailed in Annex 3 and Annex 4 respectively, better facilitates the applicable CUSC objectives on the grounds outlined above in paragraph 6.1.

Annex 1 – Interaction between BSC Modifications P34/P36 and CUSC Paragraph 4.1.3.9A

1) When a BM participant provides certain balancing services (e.g. mandatory frequency response) its output will move away from its expected position.

2) This change in output will contribute to the imbalance charge that the BM participant incurs under the BSC. In general, if output increases, the participant will receive System Sell Price (SSP), and if output decreases the participant will pay System Buy Price (SBP).

3) Provisions were put in place at NETA Go-live to compensate generators for this imbalance exposure when they are providing the balancing service of mandatory frequency response. This compensation mechanism is contained within the CUSC (paragraph 4.1.3.9A refers).

4) Under CUSC the volume of frequency response that is expected to be delivered from each service provider for each settlement period is calculated (currently using the CAP001 methodology which could be replaced by the CAP009 methodology):

   - When low frequency response is provided (i.e. output increases and the provider receives SSP under the BSC), the CUSC provides that the generator pays back an amount to National Grid equal to the expected volume multiplied by the relevant SSP; or

   - When high frequency response is provided (i.e. output decreases and the provider incurs SBP under the BSC), the CUSC provides that the generator receives an amount from National Grid equal to the expected volume multiplied by the relevant SBP.

5) These payments under 4 are intended to remove the imbalance exposure that the participant incurs for the volume of frequency response delivered (as described in 2 above).

6) A further payment is then calculated and paid under the CUSC for this volume of frequency response energy delivered:

   - When low frequency response is provided (i.e. the output has increased), the increase in energy volume receives a reference price intended to cover the costs of production (this could be replaced by the appropriate offer price if CAP010 is implemented); or

   - When high frequency response is provided (i.e. the output has decreased), the decrease in energy volume pays back a reference price intended to reflect the avoided costs of production (this could be replaced by the appropriate bid price if CAP010 is implemented)

P34

7) P34 or its Alternative proposes a mechanism whereby imbalance charges are not incurred when certain balancing services are delivered (including mandatory frequency response) by transferring the imbalance volume to the energy account of the Transmission Company. Thus the imbalance exposure arising from the provision of these services (as described in 2 above) does not occur. Therefore the compensation payments under CUSC (described in 4 above) are no longer required. Note the payment for cost or avoided cost of production (described in 6 above) is still required.

8) CAP011 proposes that the equations in CUSC which calculate the payments due under 4 above, are removed i.e. the consequential changes to CUSC arising from the implementation of P34 or its Alternative.

9) Therefore, National Grid is of the view that if P34 or its Alternative is implemented, then CAP011 needs to be implemented at the same time.

P36

10) P36 proposes a mechanism whereby imbalance charges are not incurred when certain balancing services are delivered (including mandatory frequency response) by treating the delivery of the balancing service as a bid or offer acceptance. Thus, the imbalance exposure arising from the provision of these services (as described in 2 above) does not occur. Therefore the compensation payments under CUSC (described in 4 above) are no longer required.

11) Furthermore, the bid or offer acceptance will attract the relevant bid or offer price for the volume of balancing service delivered and the payments under CUSC (described in 6 above) are no longer required.

12) P36 Alternative proposes that the P34 approach is used for balancing services other than mandatory frequency response and the P36 approach is used for mandatory frequency response.

13) CAP011 Alternative proposes that the equations in CUSC that calculate the payments due under 4 and 6 above, are removed i.e. the consequential changes to CUSC arising from the implementation of P36 or its Alternative.

14) Therefore, National Grid is of the view that if P36 or its Alternative is implemented, then CAP011 Alternative needs to be implemented at the same time.

Annex 2 – CUSC Amendment Proposal

CUSC Amendment Proposal Form	CAP011

Title of Amendment Proposal: Changes to frequency response payments to reflect a potential change to the BSC.

Description of the Proposed Amendment *(mandatory by proposer)*:

National Grid has proposed a change to the BSC (BSC Mod P34) to remove certain charges made as a result of delivering Ancillary Services and Other Services, including Mode A Frequency Response. If this proposal, or a similar proposal with the same effect, was adopted, we believe that CUSC would need to be amended such that the refund of these payments (which is described in CUSC) is also removed. Specifically, we propose the removal of the following payments (currently made under paragraph 4.1.3.9A):

i. Refund of BSC imbalance charges; and
ii. Refund of BSC non-delivery charges.

The effective date to be consistent with the effective date of the BSC modification.

For the avoidance of doubt, the payment for energy delivered or avoided as a result of delivering Mode A Frequency Response will continue to be made under CUSC.

Description of Issue or Defect that Proposed Amendment seeks to Address *(mandatory by proposer)*:

The Transmission Company, in accordance with CUSC, currently refunds the following charges made under the BSC resulting from the delivery (along with certain other balancing services) of Mode A Frequency Response:

i. BSC energy imbalance charges; and
ii. BSC none delivery charges.

National Grid has proposed a modification to the BSC to remove these charges at source. If this or a similar modification were adopted it would be necessary to modify CUSC to reflect the change to the BSC.

Impact on the CUSC *(this should be given where possible)*:

Modifications to section 4 of the CUSC, in particular (but not necessarily exclusively) paragraph 4.1.3.9A.

Impact on Core Industry Documentation *(this should be given where possible)*:

None identified (This amendment is in anticipation of a potential change to the BSC)

Impact on Computer Systems and Processes used by CUSC Parties *(this should be given where possible)*:

Changes to the Transmission Company's Balancing Services Settlement System. Revisions to users' systems which verify these payments.

Details of any Related Modifications to Other Industry Codes *(where known)*:

BSC modification proposal P34.

Justification for Proposed Amendment with Reference to Applicable CUSC Objectives *(mandatory by proposer)*:

Assuming the BSC is modified as described, this modification is justified since it prevents the Transmission Company refunding payments for costs that are not incurred, which would result in unnecessary payments being made to certain service providers. The cost of these payments would be borne by BSUoS customers.

This is compatible with CUSC objective (a), the efficient discharge by National Grid of its obligations under the Transmission Licence; and objective (b), facilitating competition.

Details of Proposer: Organisation's Name:	National Grid
Capacity in which the Amendment is being proposed: (i.e. CUSC Party, BSC Party or "energywatch")	BSC Party
Details of Proposer's Representative: Name: Organisation: Telephone Number: Email Address:	 Richard Phillips National Grid 024 7642 3184 richard.phillips@uk.ngrid.com
Details of Representative's Alternate: Name: Organisation: Telephone Number: Email Address:	 Nick Sillito National Grid 024 7642 3082 nick.sillito@uk.ngrid.com
Attachments (Yes/No): No If Yes, Title and No. of pages of each Attachment:	

Notes:

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

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

The completed form should be returned to:

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

Or via e-mail to: CUSC.Team@uk.ngrid.com

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

Annex 3 – Consequential changes to CUSC text should BSC Modification P34 or P34A be approved

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**~~**Response Energy Payments** and shall be determined in accordance with the formulae in, respectively, Paragraphs 4.1.3.9 and 4.1.3.9A and in accordance with Paragraphs 4.1.3.10 to 4.1.3.12 inclusive.

*Payment Formulae - **Holding Payments***

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

$$HP_M = P_M + H_M + S_M$$

Where:

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

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

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

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

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

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

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

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

P_{PR} = the appropriate payment rate for **Primary Response** set out in the **Mandatory Services Agreement**;

P_{MW} = the **Primary Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;

H_{PR} = the appropriate payment rate for **High Frequency Response** set out in the **Mandatory Services Agreement**;

H_{MW} = the **High Frequency Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;

S_{PR} = the appropriate payment rate for **Secondary Response** set out in the **Mandatory Services Agreement**;

S_{MW} = the **Secondary Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;

K_T = the ambient temperature adjustment factor. **NGC** and each **User** acknowledge and agree, as between **NGC** and that **User**, that K_T shall be deemed to be 1 for the purposes of calculating payments until such time as they agree upon an appropriate formula and a suitable method of measuring the ambient temperature on a minute by minute basis which shall be set out in the **Mandatory Services Agreement**. In the event that any agreed method of measuring the ambient temperature on a minute by minute basis should fail following its implementation, then **NGC** and each **User** acknowledge and agree, as between **NGC** and that **User**, that K_T shall be deemed to be 1 until the method of measuring the ambient temperature on a minute by minute basis is restored;

K_{GRC} = where the **BM Unit** is a **CCGT Module**, the plant configuration adjustment factor set out in the relevant table in the **Mandatory Services Agreement** for the configuration of the **BM Unit** concerned at the time at which the capability to provide the service is carried, otherwise 1;

SF_P = 0, subject to Paragraph 4.1.3.25 (e);

SF_S = 0, subject to Paragraph 4.1.3.25 (e);

SF_H = 0, subject to Paragraph 4.1.3.25 (e).

Payment Formulae - ~~Imbalance Compensation~~Response Energy Payment

4.1.3.9A (a) The ~~Imbalance Compensation~~Response Energy **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:-

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

$$REP_{ij} = RE_{ij} \times \text{Reference Price}$$

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

Where:

~~I~~CREP_{ij} is the ~~**Imbalance Compensation**~~**Response Energy Payment** to be made to or, as the case may be, by the **User**; and

~~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~~

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

~~and~~

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

~~otherwise~~

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

~~and~~

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

~~Where~~

~~I~~RE$_{ij}$ is the expected ~~imbalance~~response energy for **BM Unit** i in **Settlement Period** j calculated as follows:-

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

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:-

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the high frequency response table set out in the **Mandatory Services Agreement** and shall be signed negative; and

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

A) the **Primary Response** data in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the mean of the **Primary Response** and **Secondary Response** data in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

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

$$\text{reference price} = \frac{\left(\overline{SBP_{month}} + \overline{SSP_{month}}\right)}{2}$$

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.

(b) (not used)

(c) (not used)

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

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

~~Where:~~

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

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

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

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

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

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

~~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)** ($QNDOR^*_{ij}$), 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** $\left\{QAO_{ij}^{n_1}, QAO_{ij}^{n_2}, \ldots, QAO_{ij}^{n_u}, \ldots\right\}$ 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:~~

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

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

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

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

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

~~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:~~

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

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

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

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

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

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)** ($CNDR_{ij}$) 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"
"QAB^{n}_{ij}"
"QAO^{n}_{ij}"
"QM_{ij}"
"QME_{ij}"
"SSP_j"
"SBP_j"
"SPD"

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 or any costs which are incurred under the **Balancing and Settlement Code** in providing these services.

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 energy production costs likely to be incurred or saved ~~under the **Balancing and Settlement Code**~~ when providing **Frequency Response**, an additional amount based upon an expected delivery of **Frequency Response** energy~~exposure to energy imbalance and non-delivery charges when providing these services~~ shall be payable under Paragraph 4.1.3.9A.

Annex 4 – Consequential changes to CUSC text should BSC Modification P36 or P36A be approved

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,~~ Paragraph~~s~~ 4.1.3.9 ~~and 4.1.3.9A~~ and in accordance with Paragraphs 4.1.3.10 to 4.1.3.12 inclusive.

*Payment Formulae - **Holding Payments***

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

$$HP_M = P_M + H_M + S_M$$

Where:

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

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

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

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

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

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

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

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

P_{PR} = the appropriate payment rate for **Primary Response** set out in the **Mandatory Services Agreement**;

P_{MW} = the **Primary Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;

H_{PR} = the appropriate payment rate for **High Frequency Response** set out in the **Mandatory Services Agreement**;

H_{MW} = the **High Frequency Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;

S_{PR} = the appropriate payment rate for **Secondary Response** set out in the **Mandatory Services Agreement**;

S_{MW} = the **Secondary Response** capability (expressed in MW) for the level of **De-Load** of the **BM Unit** concerned at the end of the minute in which the service is provided;

K_T = the ambient temperature adjustment factor. **NGC** and each **User** acknowledge and agree, as between **NGC** and that **User**, that K_T shall be deemed to be 1 for the purposes of calculating payments until such time as they agree upon an appropriate formula and a suitable method of measuring the ambient temperature on a minute by minute basis which shall be set out in the **Mandatory Services Agreement**. In the event that any agreed method of measuring the ambient temperature on a minute by minute basis should fail following its implementation, then **NGC** and each **User** acknowledge and agree, as between **NGC** and that **User**, that K_T shall be deemed to be 1 until the method of measuring the ambient temperature on a minute by minute basis is restored;

K_{GRC} = where the **BM Unit** is a **CCGT Module**, the plant configuration adjustment factor set out in the relevant table in the **Mandatory Services Agreement** for the configuration of the **BM Unit** concerned at the time at which the capability to provide the service is carried, otherwise 1;

SF_P = 0, subject to Paragraph 4.1.3.25 (e);

SF_S = 0, subject to Paragraph 4.1.3.25 (e);

SF_H = 0, subject to Paragraph 4.1.3.25 (e).

~~*Payment Formulae - **Imbalance Compensation Payment***~~

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

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

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

~~Where:~~

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

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

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

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

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

~~Where:~~

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

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

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

~~and~~

$$HFIEP_{ij} = 0$$

~~otherwise~~

$$LFIEP_{ij} = 0$$

~~and~~

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

~~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:

(i) for a positive **Frequency Deviation** the expected change in **Active Power** output of **BM Unit** i shall be derived from the high frequency response table set out in the **Mandatory Services Agreement** and shall be signed negative; and

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

A) the **Primary Response** data in the case of a **BM Unit** being instructed to deliver **Primary Response** without **Secondary Response**; or

B) the mean of the **Primary Response** and **Secondary Response** data in the case of a **BM Unit** being instructed to deliver **Primary Response** and **Secondary Response**,

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

$$\text{reference price} = \frac{\left(\overline{SBP_{month}} + \overline{SSP_{month}}\right)}{2}$$

Where:

$\overline{SBP_{month}}$ and $\overline{SSP_{month}}$ are the calculated time weighted average of SBP_t and SSP_t respectively (each as defined in the **Balancing and Settlement Code**) for the preceding calendar month in which the service is provided.

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

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

Where:

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

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

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

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

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

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

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)** ($QNDOR^n_{ij}$), 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** $\{QAO_{ij}^{n_1}, QAO_{ij}^{n_2}, \ldots, QAO_{ij}^{n_u}, \ldots\}$ 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:

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

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

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

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

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

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

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

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

where $RQNDBR^{u-1}_{ij}$ 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:

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

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

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

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

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

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)** ($CNDR_{ij}$) 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"**~~
~~**"QAB^{n}_{ij}"**~~
~~**"QAO^{n}_{ij}"**~~
~~**"QM_{ij}"**~~
~~**"QME_{ij}"**~~
~~**"SSP_{j}"**~~
~~**"SBP_{j}"**~~
~~**"SPD"**~~

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 the energy delivered in providing these services or any costs which are incurred under the **Balancing and Settlement Code**, ~~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.~~