CONSULTATION DOCUMENT

CUSC Amendment Proposal CAP047
Introduction of a competitive process for the provision of Mandatory Frequency Response

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Prepared by	National Grid

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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 SUMMARY

The Amendment Proposal

1.1 CUSC Amendment Proposal CAP047, Introduction of a competitive process for the provision of Mandatory Frequency Response, seeks to facilitate competition in the provision of Frequency Response services by increasing transparency and provider's ability to vary prices. In particular, the Amendment Proposal has three elements;

(i) The right to amend payment rates such that Users can submit "holding" prices to be applied in each calendar month for Mandatory Frequency Response service.
(ii) A requirement upon National Grid to publish market data describing prices and volumes of Mandatory Frequency Response services procured in previous months, and submitted prices for each BMU.
(iii) Lifting of the cost reflective charging principles as currently applied to "holding" payments.

1.2 CAP047 was proposed by Innogy and submitted to the Amendments Panel on 21st March 2003. The Amendments Panel subsequently actioned the BSSG to act as a Working Group to consider CAP047 and report back to the June CUSC Panel meeting.

1.3 The BSSG submitted the CAP047 Working Group Report to the June Panel meeting where the Panel determined that the Terms of Reference had been met and that National Grid should carry out wider industry consultation on CAP047 in accordance with the CUSC.

1.4 This document initiates the wider industry consultation exercise and invites views on CUSC Amendment Proposal CAP047. The consultation closing date is **20th August 2003**.

2.0 INTRODUCTION

2.1 This is a consultation document issued by National Grid under the rules and procedures specified in the Connection and Use of System Code (CUSC) as designated by the Secretary of State. It addresses issues associated with implementing a revised payment mechanism for Mandatory Frequency response.

2.2 Further to the submission of Amendment Proposal CAP047 (see Annex 1), this document seeks views from Industry members relating to the Amendment Proposal. Such an amendment would result in changes to Section 4 of the CUSC.

2.3 This document outlines the nature of the CUSC changes that are proposed and also incorporates National Grid's and the Amendments Panel's initial views on the way forward concerning the Proposed Amendment. Representations received in response to this consultation document will be included in National Grid's Amendment Report that will be furnished to the Authority for its 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 BACKGROUND

3.1 All licensed generators are required to provide the service of mandatory Frequency Response as set out in CC.8.1 of the Grid Code. The provisions for payment of the service are contained within section 4 of the CUSC, and are currently based on a number of cost reflective charging principles that are also set out in the CUSC.

3.2 A generator receives two payments under the CUSC when providing mandatory Frequency Response:

- Holding Payment – this is a £/MW/hr payment paid during the period where a generator receives an instruction to provide the service; and
- Response Energy Payment – this is a £/MW/hr payment paid for the volume of the service that is expected to be delivered.

3.3 The present payment arrangements associated with mandatory response provision are paid in accordance with the prices and power delivery tables detailed within the Mandatory Service Agreement (MSA). Under the current arrangements, Users have the right to request that prices relating to "holding" response are amended on a bi-monthly basis. This request takes the form of a bilateral agreement with National Grid with reference to the Cost Reflective Charging Principles. Irrespective of the bi-monthly arrangement, the payments rates are also reviewed on a triennial basis, with the rates being adjusted by such an amount that is consistent with charging principles.

4.0 DESCRIPTION OF THE AMENDMENT PROPOSAL

4.1 The amendment proposal seeks to facilitate competition in the provision of Frequency Response services by increasing a provider's ability to vary prices along with associated improvements in transparency. The Proposer stated that it would also facilitate the eventual development of a frequency response market along the lines contemplated in the Balancing Services Standing Group (BSSG) in their capacity as a standing group in accordance with their terms of reference as set out by the CUSC panel.

4.2 The CAP047 Amendment Proposal has three elements:

- Revision of the provisions regarding the right to amend payment rates such that the User can submit "holding" prices to be applied in each calendar month for each mandatory frequency response service (Primary, secondary, High). Such submissions to be made by the 15th business day of the month prior to the month in which prices shall apply.
- A requirement for National Grid to publish market data describing prices and volumes of frequency response services procured in previous months, submitted prices for each service by BMU, and their future requirements.
- Lifting of cost reflective charging principle as currently applied to the "holding" payments.

4.3 Where a provider chooses not to submit prices for a BMU in any month, the previous month's prices shall apply. In the case that no price has previously been submitted, the prices for each service shall be deemed to be nil. The SO

shall only instruct the provision of Frequency Response from such a BMU where no other source of Frequency Response is available to meet the total system requirement at the time of instruction.

5.0 WORKING GROUP DISCUSSIONS

5.1 In acting as a Working Group in relation to CAP047, the BSSG considered each of the elements of the Amendment Proposal. These are considered below, along with the view of the BSSG.

Discussion of CAP047 issues

5.2 The BSSG **agreed** that evolution of the current arrangements for the procurement of mandatory frequency response would better facilitate the Applicable CUSC Objectives.

Information publication and transparency

5.2 The BSSG **agreed** that an appropriate information publication and submission process was required to support CAP047. The BSSG discussed the original proposal and concluded that refinements would be desirable. These are discussed in further detail in relation to the Alternative Amendment in Annex 5.

Volume of service available

5.4 The BSSG discussed whether CAP047 would affect the volume of frequency response available to the System Operator. The BSSG **agreed** that the volume of frequency response available would not be affected, and that CAP047 only had the ability to impact the price associated with this volume.

Market liquidity /competition issues

5.5 The BSSG discussed liquidity associated with frequency response provision. National Grid provided some analysis about the number of market participants and their market share (based on actual payments made during 2002/03). National Grid stated that this analysis resulted in a Hirschmann-Herfindal Index (HHI)[1] of approximately 1400. Furthermore the National Grid representative stated that a HHI of 1800 was commonly accepted as a level where concerns about a particular market's liquidity would be raised.

5.6 National Grid provided a paper 'Depth of Mandatory Response Market & Associated Cost Issues' (attached at Annex 3). The analysis provided contends that at a simplistic level there is sufficient contracted capability to meet the demand for response services at any one time. However other issues need to be taken into account which have the potential to erode levels of response that is available for delivery (e.g. a generators PN level, technical derogations). Additionally, at times of summer minimum demand when much of the derogated plant may be running, a significant increase in BM activity would be required to ensure that there is sufficient responsive plant available

[1] The Hirschmann-Herfindal Index is a measure of market concentration and is calculated by summing the percentage market shares of each participant. Thus HHI = 10000 is a monopolistic market, and HHI = 0 is an infinitely liquid market

on the system. This view was countered[2] by another member of the group who felt that the proposal would increase the likelihood of more useful response being made available at these times by flexible plant if there was a mechanism for satisfactory remuneration. However in order for the more flexible plant to be bought forward, response prices would need to be high enough to make this economically efficient.

5.7 In terms of the interaction with the BM, the National Grid analysis noted that the proposal would lead to a 'market within a market'. This is because the availability of response depends upon a generator's operating level within the BM, and on occasion, response will only be available once a bid or an offer has been accepted. Specifically at times of low system demand, gensets tend to run at lower load levels meaning that in order to ensure sufficient high frequency capability significant BM bid/offer activity is required. This is also true for the reverse scenario for periods of high system demand as the costs involved in changing a Unit's load may outweigh the costs of provision of the service. The counter view to this was put that providers would seek to maximise BM activity by maintaining competitive prices for response and that the two markets would interact in order to achieve a more efficient solution to the scheduling of response.

5.8 In support of the Amendment Proposal, it was argued that the increase in competition, coupled with a degree of freedom in pricing for the service and interaction with the BM would ensure an efficient outcome. The BSSG questioned whether energy prices or frequency response prices were more important to generators i.e. pricing high in the BM to avoid being called for Frequency Response. For example, would a generator place a low BM price and a high response price so as to avoid being called for response services? If CAP047 was implemented then generators in these circumstances could submit a higher price for the service, thereby making themselves less attractive to the SO to provide the service. One member noted that if prices were high then the SO could look elsewhere for the service and the market would respond by submitting lower holding prices in the next month. A minority of members noted that if the requirement is dictated by system dynamics then the SO must purchase the service whatever the cost. Another member believed that the incentive to provide Frequency Response could only get better following implementation of CAP047.

5.9 In summary, the majority of the BSSG **agreed** that there was sufficient liquidity in the provision of frequency response to ensure that the revised market arrangements would lead to overall more efficient costs of providing response. A minority of the BSSG disagreed with this view.

Cost impact of CAP047

5.10 The National Grid analysis (Annex 3) stated that the overall cost of frequency response could increase by £45m over a two-year period. This increase is based on the following assumptions:

- Almost all mandatory response providers have increased their prices by 50-100%. This assumption has been based on previous experience of instances where market arrangements have been introduced for the

[2] A paper was provided by the Innogy representative (the proposer of CAP047) countering many of the views in the National Grid paper – this paper is provided in Annex 4

procurement of Balancing Services. There are no particular assumptions on times of year etc.

- NGC has managed a fairly limited re-allocation of response holding.
- There is a modest increase in both the BM volumes on response actions as plant is re-loaded to avoid the higher prices, complete with subsequent price rises as Generators pay more attention to the BM prices of responsive plant.
- Consequently BM costs of response also rise but by less than those associated with Ancillary contracts.

5.11 The view among BSSG members was split as to the cost impact of the Amendment Proposal. Several members believed that the proposed market would result in a decrease in the overall costs associated with the provision of the service (i.e. the frequency response costs and the costs incurred in the Balancing Mechanism). This was based on the view that there was sufficient competition in the provision of the service and that CAP047 would provide generators with as extra degree of freedom to optimise the balance between the response holding price and the BM price. However no quantifiable analysis was provided to support this view. An additional view was given that it was difficult to envisage costs reducing from the current levels when the current levels are cost reflective and the BSSG agreed that the costs of frequency response (when considered in isolation) would probably increase.

5.12 The BSSG members who were concerned about potential cost increases associated with CAP047 considered that CAP047 represented too much of a 'leap of faith' in market principles and that no hard evidence had been provided to offer any assurance that CAP047 would result in more efficient costs when the overall costs of provision of the service were considered.

5.13 The BSSG discussed the demand/supply elasticity of Frequency Response. Two members felt that it was arguable as to whether provision of the service can ever be truly competitive as whilst there is sufficient capability and hence competition can exist, this is not true of demand for the service. In a normal market an increase in prices to an unacceptable level would lead to a decrease in demand for the product. However in the case of Frequency Response the level of service is dictated by system dynamics and level of the system rather than price.

5.14 The BSSG agreed that the full benefits of CAP047 would only be realised if the dispatch algorithm in the control room were able to optimise energy balancing and frequency response holding costs at the same time. The National Grid representative informed the BSSG that the current optimisation technique had been designed with the current relative levels of BM prices and response holding prices in mind (i.e. the BM prices dominating the response holding prices). The National Grid representative indicated that, whilst the current optimisation tool could cope with the CAP047 process (in terms of monthly price changes), if the relative balance between the BM prices and response holding prices were to shift then it may not result in the optimum solution. It was suggested that significant work would be required to develop the current algorithm to ensure that it fully optimised costs in a CAP047 world. The BSSG noted this issue.

5.15 In summary, the majority of the BSSG **agreed** that the overall costs of the provision of frequency response would decrease with CAP047. The remaining minority contended that no evidence had been provided to support this assertion.

Other Features

5.16 The National Grid paper contained a discussion relating to other features that could be introduced with CAP047.

5.17 Price caps – it was suggested that as a way of easing concerns over potential cost increases, a price cap should be introduced. The BSSG **agreed** that a price cap associated with CAP047 would not be appropriate.

5.18 Monitoring and incentivisation arrangements – it was suggested that a value based service should be supported by robust monitoring to ensure that the service was delivered and the appropriate payments were withheld if non-delivery occurred. The BSSG **agreed** with the concept of monitoring and agreed that further consideration should be given as to how it could be implemented, although it was not seen as a pre-requisite for CAP047.

6.0 PROPOSED IMPLEMENTATION AND TIMESCALES

6.1 Should the Authority be minded to approve the Amendment Proposal, it is proposed that it should become effective from 1 April 2004. A specific implementation date was not discussed in detail at the BSSG.

7.0 ALTERNATIVE AMENDMENTS

7.1 During analysis and consideration of the Amendment Proposal the BSSG identified an Alternative Amendment which would better facilitate achievement of the Applicable CUSC Objectives over the original Amendment Proposal. The Alternative Amendment is broadly similar to the original Amendment Proposal, but has the following changes:

- Removal of the requirement in the Amendment Proposal for National Grid to publish future requirements from the service. The BSSG noted that this information is already available to providers in the form of the Weekly Operational Planning (WOP) Report and Demand forecasts published by National Grid. The BSSG noted that it would be useful if National Grid could consolidate the data in one location on the National Grid Industry Information website. National Grid agreed to look into this further.
- Where a provider does not submit prices for a BMU in any month, the previous month's prices shall apply. Where no prices were submitted previously, the deemed price for each service should be those that applied prior to any implementation of CAP047 Alternative Amendment (figure in MSA). The BSSG unanimously believed that using the figure in a User's MSA was preferable to a default position of zero as put forward by the original Amendment Proposal.
- If there is no price available for the previous month or prior to any implementation of CAP047 Alternative Amendment (i.e. a newly commissioned generator) then if no prices are submitted, the prices shall

default to zero. The BSSG agreed that in such cases the price should default to zero, as this places the correct incentives on the new provider to offer a price

7.2 The BSSG **agreed** that an Alternative Amendment Proposal should be raised to capture the above points. This is attached at Annex 5. The proposer of CAP047 developed a 'process' strawman to describe the process of data publication and submission envisaged by the alternative. This is attached at Annex 6. The BSSG **agreed** that this process was appropriate.

8.0 SUMMARY OF VIEWS

Initial View of National Grid

8.1 National Grid remains supportive of moves to introduce market principles into areas such as Balancing Services. However, National Grid does not believe that CAP047 as described by the Proposer better facilitates the relevant CUSC objectives.

8.2 National Grid remains concerned that the Amendment Proposal as submitted will lead to increasing costs with respect to the provision of Frequency Response services, without the appearance of any associated benefits such as a more reliable service.

8.3 Due to the mandatory nature of frequency response services from dynamic sources, the current payments terms for this service are based on the costs incurred in providing the service. National Grid finds it difficult to see how the removal of these cost reflective principles could result in anything other than a significant rise in overall costs associated with the provision of response, unless in certain circumstances providers are willing to make a loss. To date no interested party has submitted evidence to the contrary except to say that there is an expectation that whilst the cost of response per se may rise, holistically costs across the energy market may decrease.

8.4 National Grid's own forecast of cost changes as a result of the introduction of CAP047 suggest that costs could increase by circa £45m over a two year period. This cost includes not only an increase in the cost of the mandatory service, but also associated BM actions to get a BMU into a position where it is able to be "responsive". In addition, cost increases are also expected across our range of Commercial response services that are currently negotiated on a bilateral basis due to increased visibility of those costs associated with the mandatory service. It is not possible to consider changes to the mandatory service without also considering any associated impact on the Commercial services.

8.5 With respect to the assumptions underpinning this analysis, these are further detailed in Annex 3 of this Consultation Document. These assumptions were previously presented to the BSSG, and have been expanded where possible to provide the additional clarity requested by the CUSC panel. However, it should be noted that many of our assumptions are underpinned by previous experience. National Grid has seen similar exploratory pricing strategies, typically over a two-year duration, undertaken in other Balancing Services

where market arrangements have been introduced for the procurement of Balancing Services.

8.6 While the Proposer asserts that the Amendment Proposal does not seek to alter the mandatory nature of this service, National Grid believes that providers will, under this proposal, be able to commercially exclude their capability as a result of more extreme pricing structures. Industry participants have suggested that commercial exclusion would not occur due to the introduction of market and therefore competitive forces. However, it is truly arguable as to whether the provision of responsive services can ever exhibit proper market forces. Unlike other products/commodities, the provision of response is very much "demand inelastic". Irrespective of price, National Grid has to meet its requirement for responsive services in any given half-hour to ensure the secure and stable operation of the transmission system. Unlike other markets, the System Operator cannot chose to forego the procurement of that last MW of response on the basis that its provision is too costly. Indeed, one might consider that in the shorter term, the System Operator is deemed to be a "distressed" buyer and therefore open to possible price manipulation. Certainly at times of system stress, the potential for high response costs will be magnified.

8.9 In addition, while it has been argued that CAP047 could result in an increase in the number of participants willing to provide "responsive" services and therefore competition, National Grid does not believe this to be the case. Instead, National Grid believes that CAP047 could in fact prove to be a barrier to entry with respect to new independent players. Under the current arrangements, providers can be guaranteed that the cost of the service will be recovered as a result of the Cost Reflective Charging Principles contained within the CUSC. If these charging principles are removed, there will be no guarantee that costs will be recovered, particularly since new entrants will potentially be at a price and market share disadvantage, and will therefore choose not to participate in the market.

Alternative Features

8.10 As mentioned above, we continue to believe that the evolution of the Frequency Response service is desirable, however we believe that additional safeguards are also required as follows:

- The introduction of a phased price cap, which would be subject to review at the end of the period; and

- The introduction of appropriate monitoring and clawback arrangements. If services are to be recompensed on a value basis, it seems appropriate that payment is withheld for non delivery. At the same time, such an arrangement would also allow superior providers to be recognised more easily.

Industry Views

8.11 As part of this Consultation Document, a variety of issues associated with CAP047 have been raised. National Grid would like to take this opportunity to

seek views on any of the aspects discussed in this Consultation Document. In particular, views are sought on the following aspects;

- Does CAP047 better meet the Applicable CUSC objectives?
- Does Alternative Amendment better meet the Applicable CUSC objectives?
- Do you believe that the implementation of CAP047 would affect the volume of service offered to the System Operator?
- What do you believe the impact on costs to be as a result of the implementation of CAP047?
- What benefits do you believe could be derived from CAP047?
- Do you agree with the removal of the Cost Reflective Charging Principles?
- Given the potential issues with Despatch Optimisation, do you believe this to be an issue that requires a solution prior to the implementation of CAP047?
- Do you believe that CAP047 will introduce more competition into Frequency Response, and in particular, do you believe that it will encourage new providers of the service to come forward?
- Do you believe monitoring and "clawback" to be a pre-requisite to any introduction of market forces into Frequency Response?
- Should safeguards such as price caps also be implemented?
- Do you believe that CAP047 will introduce more competition into Frequency Response, and in particular, do you believe that it will encourage new providers of the service to come forward?

8.12 Responses should be sent to National Grid by no later than close of business on **Wednesday 20th August 2003**.

8.13 Please address all comments to the email address below entitled "CAP047 Consultation Response".

John.Greasley@uk.ngrid.com

Alternatively, comments may be addressed to:

Diane Ritchie
Commercial Frameworks
National Grid Company plc
National Grid Transco House
Warwick Technology Park
Gallows Hill
Warwick
CV34 6DA

Fax: 01926 656604

Please note that during the course of this Consultation, we will be moving offices and therefore changing contact details. Please ensure that you confirm receipt of your response.

ANNEX 1 – CAP047 Amendment Proposal Form

CUSC Amendment Proposal Form	CAP: 047

Title of Amendment Proposal:
Introduction of a competitive process for the provision of Mandatory Frequency Response

Description of the Proposed Amendment *(mandatory by proposer)*:
This amendment seeks to facilitate competition in the provision of Frequency Response services by increasing transparency and providers' ability to vary prices. It will also facilitate the eventual development of a frequency response market along the lines contemplated by the BSSG.

The proposed amendment has three elements:

- Revision of the provisions regarding the right to amend payment rates such that the User can submit 'holding' prices to be applied in each calendar month for each mandatory frequency response service (Primary, Secondary and High). Such submissions to be made by the 15th business day of the month prior to month in which the prices shall apply.
- A requirement for National Grid to publish market data describing prices and volumes of frequency response services procured in previous months, submitted prices for each service by BMU, and their future requirements for the service.
- Lifting of the cost reflective charging principle as currently applied to the 'holding' payments.

Where a provider chooses not to submit prices for a BMU in any month, the previous month's prices shall apply. In the case that no price has previously been submitted, the prices for each service shall be deemed to be nil but the SO shall only instruct the provision of Frequency Response from such BMU where no other source of Frequency Response is available to meet the total system requirement at the time of instruction.

Description of Issue or Defect that Proposed Amendment seeks to Address *(mandatory by proposer)*:
The current arrangements in CUSC for the provision of mandatory Frequency Response services do not enable parties to actively compete in the provision of those services. Furthermore, circumstances can emerge whereby service providers cannot fully recover their costs. Adoption of this amendment will not only provide a framework for competition in the provision of the service, but also give confidence that costs can be fully recovered under changing market conditions thus enhancing the security of the system.

Impact on the CUSC *(this should be given where possible)*:
Likely changes would include:

Change to 4.1.3.13 to separate the amendment of levels of response from payment rates. This might be achieved by limiting 4.1.3.13 to payment rates and making 4.1.3.14 reciprocal.

Drafting of 4.1.3.13 to permit the monthly submission by users of "holding" prices to apply in each calendar month.

Changes to 4.4 (Charging Principles)

Consequential changes to 4.1.3.15 / 16 / 18 (dispute resolution for changes to payment rates).

Consequential changes to 4.1.3.20 / 21 / 22 (Triennial Review of prices). Consequential changes to 4.5 (indexation) Introduction of a requirement on National Grid to publish market data. This may require review of confidentiality clause 6.15.
Impact on Core Industry Documentation *(this should be given where possible)*: Changes to MSAs to remove payment rates. Possible changes to Procurement Guidelines in relation to information to be published.
Impact on Computer Systems and Processes used by CUSC Parties *(this should be given where possible)*: National Grid would be required to update 'holding' prices for the purposes of economic despatch monthly rather than annually or when changes are agreed.
Details of any Related Modifications to Other Industry Codes *(where known)*:
Justification for Proposed Amendment with Reference to Applicable CUSC Objectives** *(mandatory by proposer)*: By introducing market forces into the provision of Frequency Response, the modification would facilitate effective competition in the generation of electricity.

Details of Proposer: Organisation's Name:	Innogy plc
Capacity in which the Amendment is being proposed: (i.e. CUSC Party, BSC Party or "energywatch")	CUSC Party
Details of Proposer's Representative: Name: Organisation: Telephone Number: Email Address:	**Raoul Thulin** **Innogy plc** **01793 892634** raoul.thulin@innogy.com
Details of Representative's Alternate: Name: Organisation: Telephone Number: Email Address:	**David Tolley** Innogy plc 01793 892650 david.tolley@innogy.com
Attachments (~~Yes~~/No): **If Yes, Title and No. of pages of each Attachment:**	

Notes:

1. *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.

2. *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:

   Richard Dunn
   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).

3. Applicable CUSC Objectives** - These are defined within the National Grid Company Transmission Licence under Section C7F, paragraph 15. Reference should be made to this section when considering a proposed amendment.

ANNEX 2 – CAP047 Working Group Terms of Reference

CAP047: Introduction of a competitive process for the provision of Mandatory Frequency Response

Introduction

1. CUSC Amendment Proposal CAP047 seeks to facilitate competition in the provision of Frequency Response services by increasing transparency and providers' ability to vary prices. It will also facilitate the eventual development of a frequency response market along the lines contemplated by the BSSG.

   CAP047 has three elements:
   - Revision of the provisions regarding the right to amend payment rates such that the User can submit 'holding' prices to be applied in each calendar month for each mandatory frequency response service (Primary, Secondary and High). Such submissions to be made by the 15th business day of the month prior to month in which the prices shall apply.
   - A requirement for National Grid to publish market data describing prices and volumes of frequency response services procured in previous months, submitted prices for each service by BMU, and their future requirements for the service.
   - Lifting of the cost reflective charging principle as currently applied to the 'holding' payments.

   Where a provider chooses not to submit prices for a BMU in any month, the previous month's prices shall apply. In the case that no price has previously been submitted, the prices for each service shall be deemed to be nil. The SO shall only instruct the provision of Frequency Response from such BMU where no other source of Frequency Response is available to meet the total system requirement at the time of instruction.

2. This paper outlines the terms of reference that the BSSG should work to regarding CAP047.

Relationship with Amendments Panel

3. The CAP047 Working Group shall seek the views of the Amendments Panel before taking on any significant amount of work. Where the group requires instruction, clarification or guidance from the Amendments Panel, particularly in relation to their Scope of Work, the Chairman should contact the CUSC Panel Secretary.

Meetings

4. The CAP047 Working Group shall develop and adopt its own internal working procedures as necessary and provide a copy to the Panel Secretary.

Terms of Reference

5. The BSSG has been actioned to act as a Working Group for the purposes of consideration of CAP047 in line with the Amendment Procedures described in Section 8 of the CUSC.

6. The BSSG will undertake the appropriate analysis to demonstrate the likely impact on the volume and cost of frequency response that is available to the System Operator should CAP047 be implemented.

7. During the analysis of CAP047 the BSSG shall also consider whether any Alternative Amendment to CAP047 would better facilitate achievement of the Applicable CUSC Objectives in respect of the subject matter of CAP047.

8. The BSSG will develop draft legal text to support the Proposed Amendment and any Alternative Amendment developed.

9. The Chairman of the BSSG is responsible for producing a Working Group Report setting out the recommendations and any Alternative Amendment developed by the Working Group. The Report shall be written with reference to Clause 8.17 of the CUSC. The Working Group Report (including draft legal text) should be submitted to the Panel Secretary by 12th June 2003 for circulation to Panel Members. In accordance with the CUSC the Chairman, or another member nominated by him, shall present such report to the Amendments Panel at their scheduled meeting on 20th June 2003.

ANNEX 3 – National Grid Analysis

Depth of Mandatory Response Market & Associated Cost Issues

Paper by National Grid

1. As part of the BSSG's consideration of CAP47, National Grid undertook an action to provide analysis on the depth and competitiveness of the frequency response market, and the subsequent impact on cost. This note fulfils that action.

Contracted volumes

2. Response capability will alter depending on the loading level of each genset. For the purposes of this analysis, the overall volume of mandatory service contracted has been based upon the Optimum Load Point (typically the third deload point).

	Primary Volume	Secondary Volume	High Volume
Fuel	**MW**	**MW**	**MW**
Coal	2730	1862	2767
Gas	1684	1165	1880
Oil	287	142	411
Hydro	216	139	162
Nuclear	82	82	88
Totals	**4999**	**3390**	**5308**

(note that these are mandatory volumes only, and do not include any commercial (for example demand side) providers.

3. These figures already reflect the loss of service provision at Grain, Killingholme PG, High Marnham and Drakelow and reduced availability on hydro.

4. Any requirement for frequency holding is dependent upon the level of demand at the time and the largest potential generation or demand loss. Typical requirements are shown in the table below. It should be noted however that the deterministic requirement has a floor of 550MW of response required irrespective of demand level. This is known as the minimum dynamic level.

	Demand	Primary Response	Secondary Response	High Response
Summer Minimum	20GW	1259MW	1265MW	1086MW
Winter Peak	55GW	550MW*	822MW	731MW

N.B. Both scenarios assume 1320MW as the largest generation loss, and 1120MW demand loss.
* - Minimum dynamic level.

At a simplistic level, this analysis shows that there is sufficient contracted capability to meet the demand for response services at any one time.

5. However, the above simplistic analysis looks at all the Response capability of plant currently registered on the system. Much of this capability will be unusable at any point in time – the genset may be unavailable, it may not be generating, it may be on bars but it may not be possible to re-load the genset to a loading level at which useful response may be held. We define "accessible response" as the response that is available at any time on the system given the loading level of all gensets on bars. Initial indications are that "accessible" response capability totals less than 150% of our requirement for more than half the year. Clearly, at certain times across the year, securing sufficient "responsive" services will be more difficult that at others.

6. Additionally, based on 2002/03 payments for mandatory frequency response, 4 market players receive nearly 70% of the total contracted income associated with this service.

Derogations

7. At any one time, there is a certain amount of plant that is deemed to be non-responsive, either through explicit derogations or short to medium term technical issues. At present, 9.5GW of plant is derogated against the Grid Code requirements. An additional 5GW of plant is experiencing longer term technical difficulties in relation to the provision of this service, and 5GW on a short-term basis. It is reasonable to assume that this same level of short to medium term non-responsive plant will occur at any one time throughout the year. This equates to approximately 30% of the current installed capacity upon the system. Response services are therefore only provided on 70% of plant currently on the system. It is likely that at times of summer minimum, the derogated plant will be running, leading to the likelihood of significant BM activity in order to ensure sufficient responsive plant is available on the system.

BM Interaction

8. On top of the erosion of contract capability through the existence of derogated or short to medium term non-responsive plant, capability can be decreased even further by the position taken by any particular genset at gate closure.

9. Typically gensets loaded to their full rating are unable to provide Primary or Secondary response. Conversely, gensets loaded to their Stable Export Limit (SEL) are unable to provide High frequency response. The relationship between the total system demand and typical genset load levels poses potential problems. At times of low system demand, gensets tend to run at lower load levels meaning that in order to ensure sufficient high frequency capability significant BM bid/offer activity is required. Conversely the reverse is true for periods of high system demand. Similarly, instances may exist where particular units are equivalent to FPN 0, and therefore need to be brought on through either some form of pre gate contract or within the BM before they can provide the response service.

10. Under the current CUSC arrangements, the costs incurred in loading gensets to a suitable level in order to access the service may be many times that of the AS contract cost for the service. This means that the delivery of all

mandatory services is intrinsically linked (both technically and commercially) to the wholesale and Balancing market, and that the provision of frequency response services can only be considered as a "market within a market".

Demand / Supply elasticity

11. It is arguable as to whether the provision of Frequency response services can ever be truly competitive. While the market for the provision of services is competitive in the sense that sufficient capability exists, the same cannot be said of demand. In any normal market, if prices rose to an unacceptable level, demand for the product should eventually fall in response. This is quite clearly not the case for frequency response where the level of service held is dictated by system dynamics and the level of system demand rather than by the price. With system demand being very much an exogenous variable, the level of response required is therefore also exogenous.

Implications of CAP47

Effect on Costs of Frequency Provision

12. At present, costs associated with the provision of frequency response services are circa £80m per annum. Last year, the cost of holding response alone amounted to circa £26m irrespective of additional balancing services also required. Associated BM actions taken amounted to £30m, with £24m spent on acquiring Commercial Response services.

13. Under CAP47, National Grid believes that there is a strong likelihood that prices associated with the provision of response will rise going forward. Given the freedom to vary price as opposed to the current cost reflective methodology, a price rise of some magnitude seems inevitable. A view that is further supported by the fact that no price/volume elasticity exists within this particular market and market share analysis. Irrespective of the magnitude of price increase, the System Operator will be required to purchase a deterministic volume of response in accordance with system demand and the associated largest single loss, at any one time.

14. As part of the CAP47 process, National Grid has considered the subsequent effect on prices, and therefore total costs. While there are scenarios in which the costs to the industry could reduce, as generators are able to re-allocate response provision within their portfolios, it is National Grid's belief that these savings would not materialise within the Balancing costs of response. Instead, the analysis undertaken suggests that costs associated with frequency response, including balancing actions, could increase by £45m over a two-year period. Typically price exploration strategies tend to settle down after this point. This increase is based on the following assumptions:

- Almost all mandatory response providers have increased their prices by 50-100%. There are no particular assumptions on times of year etc. Previous experience in other Balancing Services suggests this to be the case.
- NGC has managed a fairly limited re-allocation of response holding.
- There is a modest increase in both the BM volumes on response actions as plant is re-loaded to avoid the higher prices, complete with

subsequent price rises as Generators pay more attention to the BM prices of responsive plant.

- Consequently BM costs of response also rise but by less than those associated with Ancillary contracts.

Additional Features Required

15. Given the magnitude of cost increases predicted above, if CAP47 were to proceed in its current format in relation to holding payments, additional features would also be a necessary requirement in order to derive any associated benefit.

Price Caps

16. As previously mentioned, the provision of response services is viewed as a price inelastic market. The ability to freely vary the price of response services could cause prices to rise to a level that is in theory only curtailed by limitations of the despatch software. With this in mind, National Grid would want to see a price cap introduced in order to prevent services either curtailing capability in a commercial manner, or introducing significant price increases.

Monitoring and Incentivisation Arrangements

17. At present, while the provision of response is monitored against pre-agreed levels, incentivisation to meet these levels is more of an implicit nature, which has been deemed appropriate given the cost reflective nature of the service.

18. By moving to a situation that allows response services to be charged according to their perceived value as opposed to the costs incurred, the issue of delivery according to contract becomes even more pertinent. National Grid believes that any move towards a more value based charging mechanism should be accompanied by the appropriate mechanisms for monitoring and incentivising delivery of the service as pre agreed. Indeed, there may also be instances where a superior service may be rewarded further.

19. Should such complimentary arrangements not be implemented as part, or alongside CAP47, there is a strong likelihood that situations could occur where commercial rates are being paid for a service which is not being delivered in part or in full.

21 May 2003.

ANNEX 4 – Proposer's response to National Grid Analysis

CAP047 Cost Issues – Discussion Note for BSSG

Introduction

1. This note refers to some of the points made in National Grid's paper 'Depth of Mandatory Response Market & Associated Cost Issues' circulated to the BSSG in May 2003 for the purposes of promoting discussion of these points in the BSSG. The National Grid paper concludes that cost increases of up to £45m over two years could occur following implementation of CAP047. This note questions some of the assumptions behind this conclusion and suggests that such increases are unlikely and that overall cost reductions are a likely outcome.

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Availability of Response

2. Paragraph 5 of National Grid's paper states that much of the system's response capability may be unavailable at any point in time for a variety of reasons. These include Units not being synchronised or being synchronised at operating levels that cannot be changed to levels where 'useful response' may be held. It would seem to be a likely outcome of CAP047 that at times where response is currently in shortest supply, more will be made available to the System Operator (SO). This can be by providers changing the despatch of plant in order to be able to offer more response or by offering Balancing Mechanism prices that enable the SO to change loads on Units in order to access 'useful response'. In this way, CAP047 would contribute to increasing competition in the generation of electricity and thus, meet one of the objectives of the CUSC.

3. Paragraph 7 in National Grid's paper also refers to potential shortages of available response, in this case during times of minimum system demand. However, CAP047 increases the likelihood of more useful response being made available at these times. If flexible plant is remunerated during summer nights, then more is likely to be made available. This could then avoid the need for the SO to take costly BM actions. Although prices for frequency response would have to be high by current norms in order to change scheduling patterns, this is unlikely to materialise for Units not synchronised since this would make them very un-competitive and unlikely to receive income for either their energy in the BM or for response provision.

Interaction with BM

4. The interaction with the BM that is described in paragraphs 8 to 10 of the National Grid paper is where much of the benefit of CAP047 may materialise. As is pointed out, the costs involved in changing Units' load may far outweigh the cost of providing response. It is therefore unlikely that providers would put this income at risk by making the price of response un-competitive. It is more likely that providers would seek to maximise BM activity by maintaining competitive prices for response. It is by the interaction of the two 'markets' that a more efficient solution to the scheduling of response should be achieved.

5. Paragraph 11 refers to the need for certain levels of response to be carried in order to ensure system security irrespective of price changes. This is also the case in other parts of the electricity industry. For example, in order to balance the system in real time, the SO is required to procure certain volumes of energy in the Balancing Mechanism and in forward markets. The volume of actions that

are required are exogenous and depend on the difference between expected demand and generation. Where the SO has seen high prices for 'premium products' in the BM, they have sought to introduce innovative products and processes in order to increase competition. There is no reason to suppose that such an approach would not work in the provision of frequency response.

6. The assertion that price rises seem inevitable made in paragraph 13 may at first sight appear sensible. However, the increase in competition that CAP047 would introduce and the interaction with BM actions should ensure an efficient outcome. Since, as is pointed out in the National Grid paper, frequency response is in effect a 'market within a market', potential providers could currently, if they wished, price BM actions at such a level as to extract a premium for responsive plant. In other words, since the only way to access the current cost-reflective response 'market' is through a value based balancing 'market', then any intention by providers to force the SO into costly actions would already be apparent. By introducing another degree of freedom in pricing, an overall more efficient outcome should develop.

7. To give an example, if a provider is reluctant to provide frequency response, then they may currently make their Bids and Offers unattractive so as to reduce the likelihood of being loaded to a level where useful response is available. Were CAP047 to be introduced, then a provider's reluctance to provide response would be reflected in the prices for the response services, which would allow the Unit to offer energy competitively in the BM whilst pricing response at a level where they are prepared to provide the service.

Cost Implications of CAP047

8. The assumptions behind the proposition that costs may rise by £45m over 2 years do not appear to be backed up by evidence. 50-100% price rises seem extremely unlikely due to the amount of competition. In a world where generators are paying half of BSUoS charges, in proportion to their share of generation, maintaining market share in response is an important consideration for providers. A rise in BSUoS costs may not be desirable to many participants and these may seek to gain market share in response by maintaining competitive prices.

9. Another of the assumptions is that NGC have managed a fairly limited re-allocation of response holding. It is not clear why this assumption is made. If a suitable despatch algorithm is employed, then the degree of re-allocation will be driven by the availability of response at any point in time and the interaction with the BM. CAP047, should maximise the response available and hence lead to increased opportunities for re-allocation of response.

10. The increase in BM actions predicted to avoid higher prices only makes sense if this leads to a more cost-effective solution. If it is better to take the high response prices than to take additional BM actions, then the efficiency has been achieved by market forces. If the high response prices are not cost-effective, then the same BM actions would be taken as are currently required and no additional cost would have been incurred. The suggestion that prices would rise as generators pay more attention to BM prices of responsive plant does not seem reasonable. As has been pointed out, the freedom to vary both response and BM prices should result in more, not less, competition in both the BM and in the provision of response.

Additional Features

11. The National Grid paper suggests a number of additional features that would be necessary due to the predicted levels of increase in costs. Since the actual levels of cost changes are at best uncertain and may well reduce overall, the requirement for the 'additional features' is also questionable.

12. The potential benefit of price caps would require such caps to be set at higher levels than the prices that need to be achieved in order for beneficial interactions with the energy market to appear. The need for them presupposes that market forces will not deliver benefits in either the provision of response or in the BM.

13. The paper asserts that incentivisation to meet agreed levels of response is of an implicit nature. This may have been the case prior to the introduction of P71. However, one of the expected outcomes of P71 was that 'Failure to deliver firm Balancing Services (notably response and reserve) will expose providers (or their suppliers) to imbalance charges. This will correctly reflect onto the provider the cost of the failure to deliver the energy element of the service'[3]. Given the introduction of P71 in March this year, energy delivery shortfalls are valued at system prices and this incentivises providers to deliver the expected volumes of response energy. Whilst the CUSC recognises the intention to implement a continuous monitoring system with the ability to affect holding payments, we do not believe that this is a prerequisite for the implementation of CAP047.

Conclusions

14. The conclusions reached by National Grid's paper seem to imply that a competitive market for the provision of frequency response is impossible. The evidence for this appears to be the lack of responsive plant at time of greatest system need and the interaction with the Balancing Mechanism. In contrast to National Grid, we conclude that the implementation of CAP047 would encourage participation in the provision of response and thus ensure greater availability when most needed by the system and providing long-term security of supply of frequency response through the correct price signals being achieved. Also, the interaction with the BM is one mechanism where the freedom to vary response prices independently of BM prices can result in a more efficient provision of the balancing services required to maintain system security.

[3] From National Grid paper attached to P34 and P71.

ANNEX 5 – Alternative Amendment Proposal

CUSC Amendment Proposal Form	CAP:###

Title of Amendment Proposal:
Introduction of a competitive process for the provision of Mandatory Frequency Response

Description of the Proposed Amendment *(mandatory by proposer)*:
This amendment seeks to facilitate competition in the provision of Frequency Response services by increasing transparency and providers' ability to vary prices. It will also facilitate the eventual development of a frequency response market along the lines contemplated by the BSSG.

The proposed amendment has three elements:

- Revision of the provisions regarding the right to amend payment rates such that the User can submit 'holding' prices to be applied in each calendar month for each mandatory frequency response service (Primary, Secondary and High). Such submissions to be made by the 15th business day of the month prior to month in which the prices shall apply.
- A requirement for National Grid to publish market data describing prices and volumes of frequency response services procured in previous months and submitted prices for each service by BMU.
- Lifting of the cost reflective charging principle as currently applied to the 'holding' payments.

Where a provider chooses not to submit prices for a BMU in any month, the previous month's prices shall apply. In the case that no price has previously been submitted, the prices for each service shall be deemed to be those that applied immediately prior to the implementation of this modification proposal. In the case that there has been no applicable price available for the previous month or prior to the implementation of this modification, for example in the case of a new User, then, if no prices are submitted, the prices shall default to nil.

Description of Issue or Defect that Proposed Amendment seeks to Address *(mandatory by proposer)*:
The current arrangements in CUSC for the provision of mandatory Frequency Response services do not enable parties to actively compete in the provision of those services. Furthermore, circumstances can emerge whereby service providers cannot fully recover their costs. Adoption of this amendment will not only provide a framework for competition in the provision of the service, but also give confidence that costs can be fully recovered under changing market conditions thus enhancing the security of the system.

Impact on the CUSC *(this should be given where possible)*:
Likely changes would include:

Change to 4.1.3.13 to separate the amendment of levels of response from payment rates. This might be achieved by limiting 4.1.3.13 to payment rates and making 4.1.3.14 reciprocal.

Drafting of 4.1.3.13 to permit the monthly submission by users of "holding" prices to apply in each calendar month.

Changes to 4.4 (Charging Principles)

Consequential changes to 4.1.3.15 / 16 / 18 (dispute resolution for changes to payment rates).

Consequential changes to 4.1.3.20 / 21 / 22 (Triennial Review of prices).

Consequential changes to 4.5 (indexation)

Introduction of a requirement on National Grid to publish market data. This may require review of confidentiality clause 6.15.

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

Changes to MSAs to remove payment rates.

Possible changes to Procurement Guidelines in relation to information to be published.

Impact on Computer Systems and Processes used by CUSC Parties *(this should be given where possible)*:
National Grid would be required to update 'holding' prices for the purposes of economic despatch monthly rather than annually or when changes are agreed.

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

Justification for Proposed Amendment with Reference to Applicable CUSC Objectives** *(mandatory by proposer)*:
By introducing market forces into the provision of Frequency Response, the modification would facilitate effective competition in the generation of electricity.

Details of Proposer: Organisation's Name:	Innogy plc
Capacity in which the Amendment is being proposed: (i.e. CUSC Party, BSC Party or "energywatch")	CUSC Party
Details of Proposer's Representative: Name: Organisation: Telephone Number: Email Address:	Raoul Thulin Innogy plc 01793 892634 raoul.thulin@innogy.com
Details of Representative's Alternate: Name: Organisation: Telephone Number: Email Address:	**David Tolley** Innogy plc 01793 892650 david.tolley@innogy.com

Attachments (~~Yes~~/No):
If Yes, Title and No. of pages of each Attachment:

ANNEX 6 – CAP047 Alternative Amendment – Process Strawman

Draft Methodology for Frequency Response Price Submissions and Data Publishing - revised following discussion at BSSG 29/05/03

- Because of the link between System Demand and the requirement for Frequency Response, published demand forecasts and the Weekly Operational Policy will provide service providers with market information.

- Providers to submit prices for each BMU giving prices per MW for Primary, Secondary and High Response by 15th business day of the month. The submission of prices will be in an agreed format (probably using spreadsheet files). The intention will be to minimise manual intervention - perhaps by highlighting prices that are to be changed.

- Where no price has been submitted, prices will default to the prices in place during the previous month. These may be the pre CAP047 prices where no prices have been submitted under CAP047 provisions. (This is different from the proposal as submitted following discussion at BSSG)

- National Grid publishes submitted prices and volumes available at Optimum Load Point by BMU.

- Following the publication by National Grid of submitted prices, providers shall be entitled to dispute any differences between data submitted and that which has been published. Such dispute must be raised within three working days of the publication of the data by National Grid. Where the parties agree that the published data differs from the data submitted, National Grid shall correct the data and re-publish.

- At start of following month, by 9th working day, National Grid publishes holding volumes instructed by BMU for each service.

ANNEX 7: Draft Legal text to give effect to CAP047 Amendment Proposal

For the avoidance of doubt, the proposed changes are indicated with coloured text only. Coloured underlined text will be inserted, and coloured strikethrough text will be deleted.

Proposed Changes to Section 4 of the CUSC (Balancing Services) and Section 11 (Interpretation and Definitions)

Section A - Proposed Changes to Paragraph 4.1.3 of the CUSC (Frequency Response)

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 Subject to Paragraph 4.1.3.4A, **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**.

4.1.3.4A Where in respect of any calendar month Paragraph 4.1.3.13(f)(i) applies in respect of a **BM Unit**, **NGC** shall not instruct the **User** in accordance with Paragraph 4.1.3.4 to operate that **BM Unit** in the next following calendar month so as to provide any of the components of **Mode A Frequency Response** unless **NGC** is unable to meet its requirement for **Mode A Frequency Response** from alternative **BM Unit(s)**.

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**.

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User's** Obligation to Provide **Response

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

4.1.3.7A For the avoidance of doubt a **User** shall ensure that the **Transmission Entry Capacity** for the relevant **Connection Site** shall be sufficient to enable it to comply with its obligations under Paragraph 4.1.3.7 above at all times and in respect of all relevant **BM Units**.

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** 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** determined in accordance with Paragraph 4.1.3.13~~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** determined in accordance with Paragraph 4.1.3.13~~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** determined in accordance with Paragraph 4.1.3.13~~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~~ 21 (e);

SF_S = 0, subject to Paragraph 4.1.3.~~25~~ 21 (e);

SF_H = 0, subject to Paragraph 4.1.3.~~25~~ 21 (e).

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **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 calculated in accordance with the following formulae:-

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

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

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

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

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

Where:

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

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

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

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant Frequency Response Power Delivery Data table 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 table entitled "High Frequency Response Power Delivery – Mode A" set out in the **Mandatory Services Agreement** and shall be signed negative; and

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

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

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

in each case 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 for the preceding calendar month in which the service is provided.

(b) (not used)

(c) (not used)

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

"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 **Response Energy 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.

*Interpretation of Tables – Levels of **Response***

4.1.3.11 The figures for **Response** set out in the Frequency Response Capability Data tables and Frequency Response Power Delivery Data tables in the **Mandatory Services Agreements** shall be given in relation to specific **Frequency Deviations** and to specific levels of **De-Load** for a **BM Unit**. Such tables shall, for the purposes of Paragraphs 4.1.3.7 and 4.1.3.9A(a), 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 a table, the level of **Response** shall be calculated by linear interpolation from the figures specified in the table in respect of **Frequency Deviations**;

(b) for a level of **De-Load** at a given time differing from the figures given in a table, the level of **Response** shall be calculated by linear interpolation from the figures specified in the table in respect of levels of **De-Load**. For the avoidance of doubt, **Frequency Sensitive Mode** shall not be instructed for any **De-Load** greater than the maximum level of **De-Load** given in the relevant Frequency Response Capability Data table;

(c) in respect of any time in relation to which both Paragraphs 4.1.3.11(a) and (b) apply, the level of **Response** shall be calculated by dual linear interpolation from the figures specified in the table in respect of **Frequency Deviations** and in respect of levels of **De-Load**;

and

(d) for any **Frequency Deviation** greater than the greatest **Frequency Deviation** given in a table (whether positive or negative), the level of **Response** shall be calculated by reference to the greatest **Frequency Deviation** (positive or negative, as the case may be) given in that table; and

(e) for the purposes of calculating levels of **Response** in respect of **Frequency Deviations** lower than those specified in a table, the relevant table(s) shall be deemed to specify a level of zero **Response** for a **Frequency Deviation** of zero.

Interpretation of Tables – Levels of Holding Payment

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

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

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

***User**'s submission of **Holding Payment** Rates*

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4.1.3.13 The following terms shall apply to determine the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** used in the calculation of **Holding Payments** in accordance with Paragraph 4.1.3.9 which shall apply in respect of the provision of **Mode A Frequency Response** by the **User** to **NGC** from one or more **BM Units** in a calendar month (and, for the purposes thereof, all dates specified in this Paragraph 4.1.3.13 unless stated otherwise refer to the immediately preceding calendar month):-

(a) By the fifth **Business Day** of the calendar month, **NGC** shall publish on its web-site information relating to **NGC**'s requirement for **Mode A Frequency Response** (in MW) in the next following calendar month.

(b) By the fifteenth **Business Day** of the calendar month, the **User** may in relation to any of its **BM Units** identified in a **Mandatory Services Agreement** to which the **User** is a party submit a single notification to **NGC** (in a form and by such method as shall be prescribed by **NGC** from time to time) specifying in respect of that **BM Unit** the payment rates to apply in determining the **Holding Payments** for the provision of **Mode A Frequency Response** during the next following calendar month, each such notification to specify:-

(i) the **BM Unit** in question;

(ii) the payment rate for **Primary Response**;

(iii) the payment rate for **High Frequency Response**; and

(iv) the payment rate for **Secondary Response**.

(c) Payment rates submitted by the **User** in accordance with Paragraph 4.1.3.13(b) must be:-

(i) quoted in pounds sterling to the nearest penny;

(iii) quoted in units of £/MW/h; and

(ii) no greater than £[9999.99].

(d) Upon receipt of a notification from the **User** made in accordance with Paragraph 4.1.3.13(b), **NGC** shall publish details of such notification in a report issued in accordance with Paragraph

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4.1.3.13(A)(a) and, subject always to rectification (if any) of payment rates pursuant to Paragraph 4.1.3.13(e), **NGC** shall apply published payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** in calculating the **Holding Payments** for the relevant **BM Unit** in the next following calendar month.

(e) The **User** shall have the right, to be exercised within one **Business Day** of the publication of payment rates in respect of a **BM Unit** in accordance with Paragraph 4.1.3.13(d), to notify **NGC** (in a form and by such method as shall be prescribed by **NGC** from time to time) of any discrepancy between those payment rates and the actual payment rates submitted by the **User** in respect of that **BM Unit** in accordance with Paragraph 4.1.3.13(b). Upon receipt of any such notification, **NGC** shall rectify the report issued in accordance with Paragraph 4.1.3.13A(a) and shall publish the rectified report in accordance with Paragraph 4.1.3.13A(b).

(f) In the absence of a notification from a **User** in accordance with Paragraph 4.1.3.13(b) in respect of the provision by a **BM Unit** of **Mode A Frequency Response** in the next following calendar month, then the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** to apply in determining the **Holding Payments** for that **BM Unit** in respect of that calendar month shall be determined as follows:-

(i) where the **User** has never in respect of any previous calendar month submitted a notification in accordance with Paragraph 4.1.3.13(b) in respect of the provision by that **BM Unit** of **Mode A Frequency Response**, the payment rate to apply to the provision of each of **Primary Response**, **High Frequency Response** and **Secondary Response** from that **BM Unit** in that calendar month shall be deemed to be £00.00/MW/h.

(ii) in all other cases, the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** which shall apply in respect of the provision by that **BM Unit** of **Mode A Frequency Response** in that calendar month shall be the payment rates most recently published in accordance with Paragraph 4.1.3.13A(a)

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or (b) (as the case may be) for that **BM Unit** in respect of a previous calendar month;

(g) Paragraph 4.4.2.2 shall not apply to the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** determined in accordance with this Paragraph 4.1.3.13.

*Publication of **Holding Payment** Rates and other information*

4.1.3.13A (a) **NGC** shall use reasonable endeavours to publish on its web-site by the 16th **Business Day** of each calendar month, a report containing the following information in respect of each applicable **User**'s **BM Unit(s)** which shall apply in respect of the next following calendar month:-

(i) the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** to apply in determining the **Holding Payments** for the next following calendar month as determined in accordance with Paragraph 4.1.3.13;

(ii) the available **Response** volume (in such form and manner as shall be prescribed by **NGC** from time to time).

(b) Where any payment rates published in a report issued in accordance with Paragraph 4.1.3.13A(a) are rectified by **NGC** in accordance with Paragraph 4.1.3.13(e), **NGC** shall as soon as reasonably practicable thereafter publish the rectified report on its web-site.

(c) In respect of each **Operational Day** in a calendar month, **NGC** shall, by the ninth **Business Day** of the calendar month following that calendar month, publish on its web-site in respect of all **BM Units** details of instructions issued by **NGC** in accordance with Paragraph 4.1.3.4 for each of **Primary Response**, **High Frequency Response** and **Secondary Response** (in such form and manner as shall be prescribed by **NGC** from time to time).

(d) Each **User** consents to the disclosure by **NGC** of the information referred to in Paragraphs 4.1.3.13A(a) and (b) in so far as it relates the provision of **Mode A Frequency Response** from its **BM Unit(s)**, provided always that **NGC** shall not be bound to comply with the provisions of

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Paragraphs 4.1.3.13A(a) and (b) with regard to the provision of information to the extent that to do so would be likely to restrict, distort or prevent competition in the provision of **Mode A Frequency Response**.

*~~NGC's~~ Requests to Amend Levels of **Response***

4.1.3.14 Where either the **User** or **NGC**~~**NGC**~~ reasonably considers in light of operating experience that the levels of **Response** set out in the Frequency Response Capability Data tables and/or the Frequency Response Power Delivery Data tables in the **Mandatory Services Agreement** do not represent the true operating capabilities of a **BM Unit(s)**, the **User** or **NGC** (as the case may be) ~~**NGC**~~ shall have the right not more than once every two months (or otherwise at any time with the specific agreement of the other party to the **Mandatory Services Agreement**~~relevant **User**~~) to request (provided always that such request be accompanied by a reasonable justification therefor) that the levels of **Response** set out in the relevant response table(s) in the **Mandatory Services Agreement** be reviewed and, if appropriate, amended by agreement with such other party, ~~**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 Paragraph~~s 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 4.1.3.1~~9~~8.

Failure to Agree Amendments

4.1.3.16 If **NGC** and a **User** are unable to agree any amendments requested pursuant to Paragraph~~s 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**.~~

4.1.3.1~~9~~8 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~~19 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~~ 21 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~~20 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~~21. Neither **NGC** nor the **User** shall unreasonably withhold or delay such agreement and/or implementation.

Genset Response Monitoring

Introduction

4.1.3.~~25~~21 (a) This Paragraph 4.1.3.~~25~~ 21 sets out the principles relating to:

(i) the proposed continuous monitoring system to be implemented pursuant to Paragraph 4.1.3.~~23~~19; and

(ii) the incident based monitoring system to apply until such time as implementation of the continuous monitoring system takes place.

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

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

Aims of Project

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

Incident Based Monitoring Scheme

(c) Details of the incident based monitoring scheme (including without limitation the definitions of Shortfall Period and Incident, the calculation of service delivery and the determination of Incident start and end times) will be more

particularly set out in a document entitled "Procedure for Incident Based Response Monitoring" ("the PIRM Document") to be produced by **NGC** and agreed by all relevant **Users** (such agreement not to be unreasonably withheld or delayed).

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

Continuous Based Monitoring Scheme – Confirmation of Response Delivery

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

Determination of Response Shortfall

(e) For the purposes of the continuous monitoring system, the **Response** shortfall may take three forms:-

(i) average **Primary Response** under-delivery;

(ii) average **Secondary Response** under-delivery;

(iii) average **High Frequency Response** under-delivery,

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

Upon the implementation of the continuous monitoring system, for the purposes of determining any such average under-delivery, SF_P, SF_S and SF_H shall be the average under-delivery of **Primary Response**, **Secondary Response** and **High Frequency Response** respectively during the Shortfall Period in which the **Ancillary Service** was, or should have been, provided. For the purposes of the formulae in Paragraphs 4.1.3.9 and 4.1.3.9A, such average under-delivery will be determined using a continuous plant response assessment algorithm which is under development and which will be agreed with the **User** prior to its implementation and expressed in terms of $0 \leq SF \leq 1$.

Measurement of System Variables

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

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

FMS Interface Unit

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

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

Direct Measurement

(h) Where for the reasons detailed in Paragraph 4.1.3.~~25~~21(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~~

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~~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.~~

4.1.3.2722 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.

Section B - Proposed Changes to Paragraphs 4.4 and 4.5 of the CUSC (Charging Principles and Indexation)

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 Save where otherwise expressly provided in this Paragraph 4.4, ~~T~~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.~~ **Holding Payments** shall be determined in accordance with Paragraph 4.1.3.13 and, as specified in Paragraph 4.1.3.13(g), therefore need not be cost reflective.

4.4.3.~~2~~1 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~~2 In recognition of the energy production costs likely to be incurred or avoided when providing **Frequency Response**, an additional amount based upon an expected delivery of **Frequency Response** energy shall be payable under Paragraph 4.1.3.9A.

4.5 INDEXATION

4.5.1 Application

The provisions of this Paragraph 4.5 ~~shall~~may ~~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~~ **Balancing Services Agreement** (other than a **Mandatory 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~~ **Balancing Services** (other than **Mandatory 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).

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4.5.2 Indexation provisions

4.5.2.1 The rates and/or prices to be indexed shall be specified in the **Balancing Services Agreement** as applicable for a 12 month period commencing 1st April ("the base year"), and these rates and/or prices will be adjusted annually to take account of general price inflation. The index used will be the Retail Prices Index (RPI) with 1987 = 100 base.

4.5.2.2 The source of the RPI index is to be the monthly Office for National Statistics "Business Monitor MM23."

4.5.2.3 The rates and/or prices to be indexed shall be increased (or reduced as appropriate) for the subsequent 12 month period commencing 1st April by the following factor:-

$$\frac{RPI_2}{RPI_1}$$

Where

RPI_2 is the RPI for March immediately prior to commencement of that 12 month period

RPI_1 is the RPI for March immediately prior to commencement of the base year.

4.5.2.4 The rates and/or prices to be indexed shall be increased (or reduced as appropriate) for the subsequent 12 month period commencing 1st April by the following factor:-

$$\frac{RPI_3}{RPI_1}$$

Where

RPI_3 is the RPI for March immediately prior to commencement of that 12 month period

RPI_1 is the RPI for March immediately prior to commencement of the base year.

4.5.2.5 In subsequent years indexation will continue in accordance with the above, with always the numerator of the factor representing the RPI of the 12 month period in question and the denominator of the factor being the RPI for March immediately prior to the base year.

4.5.2.6 In the event that RPI ceases to be published or is not published in respect of any relevant month or it is not practicable to use RPI because of a change in the method of compilation or some other reason, indexation for the purposes of this Paragraph 4.5 shall be calculated by **NGC** using an index agreed between **NGC** and the relevant **User** with a view to determining the relevant price after indexation that would be closest to the relevant price after indexation if RPI had continued to be available. If **NGC** and a relevant **User** are unable to agree a suitable index, either of them may initiate the **Dispute Resolution Procedure** for resolution of the issue as an **Other Dispute** in accordance with Paragraph 7.4.

4.5.2.7 For the avoidance of doubt, the provisions of Paragraph 11.3 with regard to determination of an alternative index should the **Retail Prices Index** not be published or there is a material change to the basis of such index shall not apply with respect to the rates and/or prices the subject of this Paragraph 4.5.

Section C - Proposed Changes to Paragraph 11.3 of the CUSC (Definitions)

~~**"Triennial Review Date"** as defined in Paragraph 4.1.3.20;~~

"**Operational Day**" as defined in the **Grid Code**;

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

For the avoidance of doubt, the proposed changes are indicated with coloured text only. Coloured underlined text will be inserted, and coloured strikethrough text will be deleted.

4. FREQUENCY RESPONSE

4.1 Paragraph 4.1.3 of CUSC

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

4.2 Term

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

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

4.3 Provision of Frequency Response

4.3.1 The **Parties** agree that:-

(a) [subject always to Sub-Clause 4.~~6~~4,] for the purposes of Paragraph 4.1.3.7 of the **CUSC**, the figures set out in the response tables in Appendix 1, Section B, Part I represent the amount of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein;

(b) [subject always to Sub-Clause 4.~~6~~4,] for the purposes of Paragraph 4.1.3.9 of the **CUSC**, the figures set out in the summary response table in Appendix 1, Section B, Part II represent the capabilities in respect of **Primary Response**, **Secondary Response** and **High Frequency Response** at given levels of **De-Load** referred to therein;

(c) for the purposes of Paragraph 4.1.3.4 of the **CUSC**, the table in Appendix 1, Section B, Part III shows the permissible combinations of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein;

(d) for the purposes of Paragraph 4.1.3.9 of the **CUSC**, the figures (if any) set out in the plant configuration table in Appendix 1, Section B, Part II represent the plant configuration adjustment factors referred to therein to be applied where the **BM Unit** is a **CCGT Module**;

~~(e) for the purposes of Paragraph 4.1.3.9 of the **CUSC**, the payment rates in Appendix 2, Section B constitute the payment rates in respect of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein; and~~

(~~f~~e) [subject always to Sub-Clause 4.~~6~~4,] for the purposes of Paragraph 4.1.3.9A(a) of the **CUSC** in respect of calculation of the **Response Energy Payment**, the response values in Appendix 1, Section B, Part IV represent the Frequency Response Power that is deemed to be delivered in respect of **Primary Response**, **Secondary Response** and **High Frequency Response**.

~~**4.4 Indexation**~~

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

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~~**4.5 Triennial Review**~~

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

4.~~6~~4 [Commissioning and Provisional Response Levels

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

APPENDIX 2

SECTION B (FREQUENCY RESPONSE)

~~PAYMENT RATES~~

~~Table 1~~	~~Payment Rates~~	
~~Response Type~~	~~Payment Code~~	~~Payment Rate (£/MW/h)~~
~~Primary Response~~	~~P_{PR}~~	
~~Secondary Response~~	~~S_{PR}~~	
~~High Frequency Response~~	~~H_{PR}~~	

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ANNEX 8: Draft Legal text to give effect to the Alternative Amendment

For the avoidance of doubt, the proposed changes are indicated with coloured text only. Coloured underlined text will be inserted, and coloured strikethrough text will be deleted.

Proposed Changes to Section 4 of the CUSC (Balancing Services) and Section 11 (Interpretation and Definitions)

Section A - Proposed Changes to Paragraph 4.1.3 of the CUSC (Frequency Response)

4.1.3 Frequency Response

Introduction

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

Definitions

4.1.3.2 For the purposes of this Paragraph 4.1.3:

(i) **"Frequency Response Service"** means the **Mandatory Ancillary Service** of **Frequency Response** and any **Commercial Ancillary Service** of **Frequency Response** as may be agreed to be provided by a **User** from time to time;

(ii) the **Mandatory Ancillary Service** of **Frequency Response** shall constitute operation of a **BM Unit** in accordance with **Grid Code CC** 6.3.7 and **BC** 3.5 (with the exception of **BC** 3.5.2), including, without limitation, under normal operating conditions with the speed governor set so that it operates with an overall speed droop of between 3% and 5% so as to provide the applicable levels of **Response** referred to in Paragraph 4.1.3.7;

(iii) the term "instruction" means a communication whether by telephone or automatic logging device or facsimile from **NGC** to the **User** instructing a **User** in accordance with **Grid Code BC** 2.8 and this Paragraph 4.1.3 to provide any **Frequency Response Service**, and derivations of the term shall be construed accordingly;

(iv) the amendment of an existing instruction shall be deemed to be a new instruction;

(v) an instruction will prevail until either it is countermanded by **NGC** or until the **BM Unit** to which the instruction relates is **De-synchronised** (whichever is first to occur).

NGC's *Instructions to provide* ***Mode A Frequency Response***

4.1.3.3 For the purposes of instructions and calculation of payments, the **Mandatory Ancillary Service** of **Frequency Response** as described in this Paragraph 4.1.3 shall be referred to as "**Mode A Frequency Response**".

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

(a) **Primary Response**;

(b) **Secondary Response**;

(c) **High Frequency Response**,

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

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

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

User's *Obligation to Provide* ***Response***

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

4.1.3.7A For the avoidance of doubt a **User** shall ensure that the **Transmission Entry Capacity** for the relevant **Connection Site** shall be sufficient to enable it to comply with its obligations under Paragraph 4.1.3.7 above at all times and in respect of all relevant **BM Units**.

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 **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** determined in accordance with Paragraph 4.1.3.13~~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** determined in accordance with Paragraph 4.1.3.13~~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** determined in accordance with Paragraph 4.1.3.13~~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~~ 21 (e);

SF_S = 0, subject to Paragraph 4.1.3.~~25~~ 21 (e);

SF_H = 0, subject to Paragraph 4.1.3.~~25~~ 21 (e).

*Payment Formulae – **Response Energy Payment***

4.1.3.9A (a) The **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 calculated in accordance with the following formulae:-

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

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

Where:

REP_{ij} is the **Response Energy Payment** to be made to or, as the case may be, by the User; and

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

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

Where:

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

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

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

$FR_{ij}(t)$ is the expected change in **Active Power** output for **BM Unit** i, at time t (resolved to the nearest integer minute), expressed in MW derived from the relevant Frequency Response Power Delivery Data table 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 table entitled "High Frequency Response Power Delivery – Mode A" set out in the **Mandatory Services Agreement** and shall be signed negative; and

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

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

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

in each case 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 for the preceding calendar month in which the service is provided.

(b) (not used)

(c) (not used)

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

"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 **Response Energy 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.

*Interpretation of Tables – Levels of **Response***

4.1.3.11 The figures for **Response** set out in the Frequency Response Capability Data tables and Frequency Response Power Delivery Data tables in the **Mandatory Services Agreements** shall be given in relation to specific **Frequency Deviations** and to specific levels of **De-Load** for a **BM Unit**. Such tables shall, for the purposes of Paragraphs 4.1.3.7 and 4.1.3.9A(a), 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 a table, the level of **Response** shall be calculated by linear interpolation from the figures specified in the table in respect of **Frequency Deviations**;

(b) for a level of **De-Load** at a given time differing from the figures given in a table, the level of **Response** shall be calculated by linear interpolation from the figures specified in the table in respect of levels of **De-Load**. For the avoidance of doubt, **Frequency Sensitive Mode** shall not be instructed for any **De-Load** greater than the maximum level of **De-Load** given in the relevant Frequency Response Capability Data table;

(c) in respect of any time in relation to which both Paragraphs 4.1.3.11(a) and (b) apply, the level of **Response** shall be calculated by dual linear interpolation from the figures specified in the table in respect of **Frequency Deviations** and in respect of levels of **De-Load**;

and

(d) for any **Frequency Deviation** greater than the greatest **Frequency Deviation** given in a table (whether positive or negative), the level of **Response** shall be calculated by reference to the greatest **Frequency Deviation** (positive or negative, as the case may be) given in that table; and

(e) for the purposes of calculating levels of **Response** in respect of **Frequency Deviations** lower than those specified in a table, the relevant table(s) shall be deemed to specify a level of zero **Response** for a **Frequency Deviation** of zero.

Interpretation of Tables – Levels of Holding Payment

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

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

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

***User**'s submission of **Holding Payment** Rates*

4.1.3.13 The following terms shall apply to determine the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** used in the calculation of **Holding Payments** in accordance with Paragraph 4.1.3.9 which shall apply in respect of the provision of **Mode A Frequency Response** by the **User** to **NGC** from one or more **BM Units** in a calendar month (and, for the purposes thereof, all dates specified in this Paragraph 4.1.3.13 unless stated otherwise refer to the immediately preceding calendar month):-

(a) By the fifth **Business Day** of the calendar month, **NGC** shall publish on its web-site information relating to **NGC**'s requirement for **Mode A Frequency Response** (in MW) in the next following calendar month.

(b) By the fifteenth **Business Day** of the calendar month, the **User** may in relation to any of its **BM Units** identified in a **Mandatory Services Agreement** to which the **User** is a party submit a single notification to **NGC** (in a form and by such method as shall be prescribed by **NGC** from time to time) specifying in respect of that **BM Unit** the payment rates to apply in determining the **Holding Payments** for the provision of **Mode A Frequency Response** during the next following

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calendar month, each such notification to specify:-

(i) the **BM Unit** in question;

(ii) the payment rate for **Primary Response**;

(iii) the payment rate for **High Frequency Response**; and

(iv) the payment rate for **Secondary Response**.

(c) Payment rates submitted by the **User** in accordance with Paragraph 4.1.3.13(b) must be:-

(i) quoted in pounds sterling to the nearest penny;

(ii) quoted in units of £/MW/h; and

(iii) no greater than £[9999.99].

(d) Upon receipt of a notification from the **User** made in accordance with Paragraph 4.1.3.13(b), **NGC** shall publish details of such notification in a report issued in accordance with Paragraph 4.1.3.13(A)(a) and, subject always to rectification (if any) of payment rates pursuant to Paragraph 4.1.3.13(e), **NGC** shall apply published payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** in calculating the **Holding Payments** for the relevant **BM Unit** in the next following calendar month.

(e) The **User** shall have the right, to be exercised within one **Business Day** of the publication of payment rates in respect of a **BM Unit** in accordance with Paragraph 4.1.3.13(d), to notify **NGC** (in a form and by such method as shall be prescribed by **NGC** from time to time) of any discrepancy between those payment rates and the actual payment rates submitted by the **User** in respect of that **BM Unit** in accordance with Paragraph 4.1.3.13(b). Upon receipt of any such notification, **NGC** shall rectify the report issued in accordance with Paragraph 4.1.3.13A(a) and shall publish the rectified report in accordance with Paragraph 4.1.3.13A(b).

(f) In the absence of a notification from a **User** in accordance with Paragraph 4.1.3.13(b) in respect of the provision by a **BM Unit** of **Mode A Frequency Response** in the next following calendar month, then the payment rates for

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Primary Response, **High Frequency Response** and **Secondary Response** to apply in determining the **Holding Payments** for that **BM Unit** in respect of that calendar month shall be determined as follows:-

(i) where the **User** has never in respect of any previous calendar month submitted a notification in accordance with Paragraph 4.1.3.13(b) in respect of the provision by that **BM Unit** of **Mode A Frequency Response**, the payment rate to apply to the provision of each of **Primary Response**, **High Frequency Response** and **Secondary Response** from that **BM Unit** in that calendar month shall be deemed to be either:-

(aa) the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** prevailing immediately prior to the date of implementation of **Amendment Proposal** CAP047; or

(bb) where no payment rates as referred to in paragraph (aa) above subsisted at the date of implementation of **Amendment Proposal** CAP047, £00.00/MW/h; or

(ii) in all other cases, the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** which shall apply in respect of the provision by that **BM Unit** of **Mode A Frequency Response** in that calendar month shall be the payment rates most recently published in accordance with Paragraph 4.1.3.13A(a) or (b) (as the case may be) for that **BM Unit** in respect of a previous calendar month;

(g) Paragraph 4.4.2.2 shall not apply to the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** determined in accordance with this Paragraph 4.1.3.13.

*Publication of **Holding Payment** Rates and other information*

4.1.3.13A (a) **NGC** shall use reasonable endeavours to publish on its web-site by the 16th **Business Day** of each calendar month, a report containing the

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following information in respect of each applicable **User**'s **BM Unit(s)** to apply in respect of the next following calendar month:-

(i) the payment rates for **Primary Response**, **High Frequency Response** and **Secondary Response** to apply in determining the **Holding Payments** for the next following calendar month as determined in accordance with Paragraph 4.1.3.13;

(ii) the available **Response** volume (in such form and manner as shall be prescribed by **NGC** from time to time).

(b) Where any payment rates published in a report issued in accordance with Paragraph 4.1.3.13A(a) are rectified by **NGC** in accordance with Paragraph 4.1.3.13(e), **NGC** shall as soon as reasonably practicable thereafter publish the rectified report on its web-site.

(c) In respect of each **Operational Day** in a calendar month, **NGC** shall, by the ninth **Business Day** of the calendar month following that calendar month, publish on its web-site in respect of all **BM Units** details of instructions issued by **NGC** in accordance with Paragraph 4.1.3.4 for each of **Primary Response**, **High Frequency Response** and **Secondary Response** (in such form and manner as shall be prescribed by **NGC** from time to time).

(d) Each **User** consents to the disclosure by **NGC** of the information referred to in Paragraphs 4.1.3.13A(a) and (b) in so far as it relates the provision of **Mode A Frequency Response** from its **BM Unit(s)**, provided always that **NGC** shall not be bound to comply with the provisions of Paragraphs 4.1.3.13A(a) and (b) with regard to the provision of information to the extent that to do so would be likely to restrict, distort or prevent competition in the provision of **Mode A Frequency Response**.

~~***NGC's***~~ *Requests to Amend Levels of* ***Response***

4.1.3.14 Where either the **User** or **NGC**~~**NGC**~~ reasonably considers in light of operating experience that the levels of **Response** set out in the Frequency Response Capability Data tables and/or the Frequency Response Power Delivery Data tables in the **Mandatory Services Agreement** do not represent the true operating capabilities of a **BM Unit(s)**, the **User** or **NGC** (as the case may be) ~~**NGC**~~ shall have the right not more than once every two months (or otherwise at any time with

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the specific agreement of the other party to the **Mandatory Services Agreement** ~~relevant **User**~~) to request (provided always that such request be accompanied by a reasonable justification therefor) that the levels of **Response** set out in the relevant response table(s) in the **Mandatory Services Agreement** be reviewed and, if appropriate, amended by agreement with such other party, ~~**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 Paragraph~~s 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 4.1.3.1~~9~~8.

Failure to Agree Amendments

4.1.3.16 If **NGC** and a **User** are unable to agree any amendments requested pursuant to Paragraph~~s 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~~8~~ 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~~19 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~~21 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~~20 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~~21. Neither **NGC** nor the **User** shall unreasonably withhold or delay such agreement and/or implementation.

Genset Response Monitoring

Introduction

4.1.3.~~25~~21 (a) This Paragraph 4.1.3.~~25~~21 sets out the principles relating to:

(i) the proposed continuous monitoring system to be implemented pursuant to Paragraph 4.1.3.19; and

(ii) the incident based monitoring system to apply until such time as implementation of the continuous monitoring system

takes place.

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

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

Aims of Project

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

Incident Based Monitoring Scheme

(c) Details of the incident based monitoring scheme (including without limitation the definitions of Shortfall Period and Incident, the calculation of service delivery and the determination of Incident start and end times) will be more particularly set out in a document entitled "Procedure for Incident Based Response Monitoring" ("the PIRM Document") to be produced by **NGC** and agreed by all relevant **Users** (such agreement not to be unreasonably withheld or delayed).

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

Continuous Based Monitoring Scheme – Confirmation of Response Delivery

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

Determination of Response Shortfall

(e) For the purposes of the continuous monitoring system, the **Response** shortfall may take three forms:-

(i) average **Primary Response** under-delivery;

(ii) average **Secondary Response** under-delivery;

(iii) average **High Frequency Response** under-delivery,

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

Upon the implementation of the continuous monitoring system, for the purposes of determining any such average under-delivery, SF_P, SF_S and SF_H shall be the average under-delivery of **Primary Response**, **Secondary Response** and **High Frequency Response** respectively during the Shortfall Period in which the **Ancillary Service** was, or should have been, provided. For the purposes of the formulae in Paragraphs 4.1.3.9 and 4.1.3.9A, such average under-delivery will be determined using a continuous plant response assessment algorithm which is under development and which will be agreed with the **User** prior to its implementation and expressed in terms of $0 \leq SF \leq 1$.

Measurement of System Variables

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

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

FMS Interface Unit

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

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

Direct Measurement

(h) Where for the reasons detailed in Paragraph 4.1.3.~~25~~21(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~~22 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

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for resolution of the issue as an **Other Dispute** in accordance with Paragraph 7.4.

Section B - Proposed Changes to Paragraphs 4.4 and 4.5 of the CUSC (Charging Principles and Indexation)

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 Save where otherwise expressly provided in this Paragraph 4.4, ~~T~~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.~~**Holding Payments** shall be determined in accordance with Paragraph 4.1.3.13 and, as specified in Paragraph 4.1.3.13(g), therefore need not be cost reflective.

4.4.3.~~2~~1 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~~2 In recognition of the energy production costs likely to be incurred or avoided when providing **Frequency Response**, an additional amount based upon an expected delivery of **Frequency Response** energy shall be payable under Paragraph 4.1.3.9A.

4.5 INDEXATION

4.5.1 Application

The provisions of this Paragraph 4.5 ~~shall~~ may~~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~~ **Balancing Services Agreement** (other than a **Mandatory 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~~ **Balancing Services** (other than **Mandatory 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).

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4.5.2 Indexation provisions

4.5.2.1 The rates and/or prices to be indexed shall be specified in the **Balancing Services Agreement** as applicable for a 12 month period commencing 1st April ("the base year"), and these rates and/or prices will be adjusted annually to take account of general price inflation. The index used will be the Retail Prices Index (RPI) with 1987 = 100 base.

4.5.2.2 The source of the RPI index is to be the monthly Office for National Statistics "Business Monitor MM23."

4.5.2.3 The rates and/or prices to be indexed shall be increased (or reduced as appropriate) for the subsequent 12 month period commencing 1st April by the following factor:-

$$\frac{RPI_2}{RPI_1}$$

Where

RPI_2 is the RPI for March immediately prior to commencement of that 12 month period

RPI_1 is the RPI for March immediately prior to commencement of the base year.

4.5.2.4 The rates and/or prices to be indexed shall be increased (or reduced as appropriate) for the subsequent 12 month period commencing 1st April by the following factor:-

$$\frac{RPI_3}{RPI_1}$$

Where

RPI_3 is the RPI for March immediately prior to commencement of that 12 month period

RPI_1 is the RPI for March immediately prior to commencement of the base year.

4.5.2.5 In subsequent years indexation will continue in accordance with the above, with always the numerator of the factor representing the RPI of the 12 month period in question and the denominator of the factor being the RPI for March immediately prior to the base year.

4.5.2.6 In the event that RPI ceases to be published or is not published in respect of any relevant month or it is not practicable to use RPI because of a change in the

method of compilation or some other reason, indexation for the purposes of this Paragraph 4.5 shall be calculated by **NGC** using an index agreed between **NGC** and the relevant **User** with a view to determining the relevant price after indexation that would be closest to the relevant price after indexation if RPI had continued to be available. If **NGC** and a relevant **User** are unable to agree a suitable index, either of them may initiate the **Dispute Resolution Procedure** for resolution of the issue as an **Other Dispute** in accordance with Paragraph 7.4.

4.5.2.7 For the avoidance of doubt, the provisions of Paragraph 11.3 with regard to determination of an alternative index should the **Retail Prices Index** not be published or there is a material change to the basis of such index shall not apply with respect to the rates and/or prices the subject of this Paragraph 4.5.

Section C - Proposed Changes to Paragraph 11.3 of the CUSC (Definitions)

~~**"Triennial Review Date"** as defined in Paragraph 4.1.3.20;~~

"**Operational Day**" as defined in the **Grid Code**;

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

For the avoidance of doubt, the proposed changes are indicated with coloured text only. Coloured underlined text will be inserted, and coloured strikethrough text will be deleted.

4. FREQUENCY RESPONSE

4.1 Paragraph 4.1.3 of CUSC

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

4.2 Term

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

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

4.3 Provision of Frequency Response

4.3.1 The **Parties** agree that:-

(a) [subject always to Sub-Clause 4.~~6~~4,] for the purposes of Paragraph 4.1.3.7 of the **CUSC**, the figures set out in the response tables in Appendix 1, Section B, Part I represent the amount of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein;

(b) [subject always to Sub-Clause 4.~~6~~4,] for the purposes of Paragraph 4.1.3.9 of the **CUSC**, the figures set out in the summary response table in Appendix 1, Section B, Part II represent the capabilities in respect of **Primary Response**, **Secondary Response** and **High Frequency Response** at given levels of **De-Load** referred to therein;

(c) for the purposes of Paragraph 4.1.3.4 of the **CUSC**, the table in Appendix 1, Section B, Part III shows the permissible combinations of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein;

(d) for the purposes of Paragraph 4.1.3.9 of the **CUSC**, the figures (if any) set out in the plant configuration table in

Appendix 1, Section B, Part II represent the plant configuration adjustment factors referred to therein to be applied where the **BM Unit** is a **CCGT Module**;

~~(e) for the purposes of Paragraph 4.1.3.9 of the **CUSC**, the payment rates in Appendix 2, Section B constitute the payment rates in respect of **Primary Response**, **Secondary Response** and **High Frequency Response** referred to therein; and~~

(~~f~~e) [subject always to Sub-Clause 4.~~6~~4,] for the purposes of Paragraph 4.1.3.9A(a) of the **CUSC** in respect of calculation of the **Response Energy Payment**, the response values in Appendix 1, Section B, Part IV represent the Frequency Response Power that is deemed to be delivered in respect of **Primary Response**, **Secondary Response** and **High Frequency Response**.

~~**4.4 Indexation**~~

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

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~~**4.5 Triennial Review**~~

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

4.~~6~~4 [Commissioning and Provisional Response Levels

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

APPENDIX 2

SECTION B (FREQUENCY RESPONSE)

~~**PAYMENT RATES**~~

~~Table 1~~	~~Payment Rates~~	
~~Response Type~~	~~Payment Code~~	~~Payment Rate (£/MW/h)~~
~~Primary Response~~	~~P_{PR}~~	
~~Secondary Response~~	~~S_{PR}~~	
~~High Frequency Response~~	~~H_{PR}~~	

Not Used

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