



For Working Group Consultation only

This report is a draft of the Working Group report and shall be used for the purposes of the Working Group Consultation.

The Working Group is seeking the views of CUSC and interested parties in relation to the issues raised by this document.

Parties are requested to respond by 1st June 2009 cust.team@uk.ngrid.com using the Working Group Consultation Responses proforma.

CUSC Parties have the ability in accordance with CUSC 8.17.13 to raise a WG Consultation Request for the Working Group to consider a proposal.

A copy of the proformas are available on National Grid's website, see link below

http://www.nationalgrid.com/uk/Electricity/Codes/systemcode/amendments/forms_guidance/

WORKING GROUP REPORT VOLUME 1

CUSC Amendment Proposal CAP169

Provision of Reactive Power from Power Park Modules, Large Power Stations and Embedded Power Stations

**Prepared by the CAP169 Working Group
for submission to the Amendments Panel**

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I DOCUMENT CONTROL

a National Grid Document Control

Version	Date	Author	Change Reference
V1.0	18 th May 2009	CAP169 WG	Formal version for release

b Distribution

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

1.0 SUMMARY AND RECOMMENDATIONS

Executive Summary

- 1.1 CAP 169 Provision of Reactive Power from Power Park Modules, Large Power Stations and Embedded Generators was raised by National Grid and submitted to the CUSC Amendments Panel for consideration at their meeting on the 27th of February 2009. CAP169 proposes to amend the CUSC based on three discreet areas relating to Reactive Power.
- 1.2 Part 1 of CAP169 seeks to align the CUSC requirements with those of the Connection Conditions of the Grid Code in relation to Power Park Modules. The Grid Code was recently amended¹ to mandate the reactive capability requirement from Power Park Modules. Part 1 of CAP169 proposes the corresponding changes be made to the CUSC to ensure that Reactive Power from Power Park Modules can be despatched and providers can be paid accordingly.
- 1.3 Part 2 of CAP169 seeks to extend the obligation on National Grid to conclude/amend Mandatory Services Agreements (MSAs) with all Large Power Stations, with a reactive capability below 15 Mvar, upon request from the Large Power Station. This reconciles the fact that all Large Power Stations are obliged to have the necessary capability, but the CUSC does not currently oblige National Grid to conclude MSAs with those with a range below 15 Mvar.
- 1.4 Part 3 of CAP169 seeks to introduce amended payment terms for the provision of Reactive Power from embedded generators, recognising that some embedded generators are under connection restrictions which prevent National Grid from despatching to them 0 Mvar. Where such restrictions are in place CAP169 proposes a payment of 20% (in line with current default payment terms when restrictions are in place).
- 1.5 CAP169 was raised by National Grid, and a Working Group was established to review the implications of the Amendment Proposal. Consequential Grid Code changes are required to facilitate the proposal, therefore the Working Group established is a joint CUSC and Grid Code Working Group, to allow the relevant changes for both codes to be considered and developed in parallel.
- 1.6 Draft Working Group Alternative Amendment 1 was raised by National Grid and looks to extend part 3 of CAP169 to cover long term Reactive Power despatch restrictions, in place for 12 months or more, not known at the time of connection.
- 1.7 Draft Working Group Alternative Amendment 2 was prepared by National Grid on behalf of the CAP169 Working Group. The draft alternative proposes CAP169 parts 1 and 2, with part 3 removed. This draft alternative was raised following agreement on parts 1 and 2 by the Working Group. It was recognised by the Working Group that there were differing views on part 3 and this alternative would ensure that should the Authority be minded to implement parts 1 and 2, this would not be inhibited by any concerns that may exist with regards to part 3.

¹ Grid Code amendment G/06 Power Park Modules and Synchronous Generating Units
<http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/consultationpapers/2006/>

Working Group Consultation

- 1.8 This is a draft of the Working Group report, used for the purpose of the Working Group Consultation. The Working Group is seeking the views of the CUSC and interested parties in relation to the issues raised in this document. **Please note that whilst the CAP169 Working Group is joint between the CUSC and the Grid Code, this Working Group Consultation is a CUSC Working Group Consultation.** A further paper is being prepared or discussion at the Grid Code Review Panel on May 21st 2009.
- 1.9 Responses are requested by 1st June 2009 to cusc.team@uk.ngrid.com using the Working Group Consultation response proforma included as Annex 6 of this document. In accordance with CUSC 8.17.13 CUSC parties also have the ability to raise a Working Group Consultation Request.

Working Group Recommendation

- 1.10 *To be completed prior to submission to the CUSC Panel*

Summary of Working Group Consultation Responses

- 1.11 *To be completed prior to submission to the CUSC Panel*

2.0 PURPOSE AND INTRODUCTION

- 2.1 This Report summarises the deliberations of the Working Group, describing the original CAP169 Amendment Proposal as well as the Working Group Alternatives.
- 2.2 CAP169 was proposed by National Grid and submitted to the Amendments Panel for their consideration on February 27th 2009. The Amendments Panel determined that the proposal should be considered by a Working Group and that the group should report back to the Amendments Panel meeting within four months following two weeks for Working Group Consultation.
- 2.3 A copy of the Terms of Reference for CAP169 is provided in Annex 2.
- 2.4 This Working Group Report has been prepared in accordance with the terms of the CUSC. An electronic copy can be found on the National Grid Website, www.nationalgrid.com/uk/Electricity/Codes/, along with the Amendment Proposal Form.

3.0 PROPOSED AMENDMENT

- 3.1 CAP169 contains three parts relating to Reactive Power with the intention of improving the Reactive Power provisions within the CUSC. It was raised by National Grid as one Amendment Proposal to allow consideration of the complete suite of Reactive Power proposals that National Grid propose for amendment at this time.
- 3.2 **Part 1 – Provision of Reactive Power from Power Park Modules**
- 3.2.1 Part 1 of CAP169 looks to amend various sections of CUSC to accommodate the provision of Reactive Power from Power Park Modules. Currently, the vehicle to enable National Grid to despatch and pay providers for Reactive Power, the Mandatory Services Agreement (MSA), does not reflect the

capability requirement as per Grid Code CC6.3.2 for Power Park Modules i.e. within the capability data tables. It is therefore proposed that additional tables be added to the MSA pro forma in the CUSC (Schedule 2, Exhibit 4). CAP169 also looks to update the Reactive Power Definitions and Interpretations section in line with the Grid Code CC8.1 to reflect that Reactive Power from Power Park Modules is a Mandatory (not Enhanced) Ancillary Service.

3.2.2 Sections of CUSC associated with Reactive Power also require amendment in order to accommodate the additional referencing of Power Park Modules as an alternative category to Generating Units and CCGT Modules.

3.2.3 The proposal looks to make similar changes to include the further category of DC Converters for which the Reactive Power requirement has also been previously added to Grid Code CC6.3.2.

3.3 **Part 2 - Provision of Reactive Power from Large Power Stations**

3.3.1 Current provisions in the CUSC oblige National Grid to conclude or amend MSAs if the Reactive Power capability of the Generating Unit is 15Mvar or more. However, all Large Power Stations are obliged to be signatory to the CUSC, and therefore through the Grid Code have the obligation to provide a Reactive Power Service. Part 3 of CAP169 seeks to extend the obligation whereby, upon request from a Large Power Station with a reactive capability below 15Mvar, National Grid is obliged to conclude a MSA.

3.4 **Part 3 – Recognition of Distribution Network Imposed Restriction on Reactive Power**

3.4.1 Generators directly connected to a Distribution Network produce Reactive Power which is of benefit to the distribution network operators (DNOs) and National Grid and assists in managing voltage on the networks. DNOs can impose restrictions which prevent instruction(s) from National Grid to the embedded generator to reduce output to 0 Mvar. These restrictions result in National Grid being unable to instruct the relevant generator to achieve economic and efficient use of the Reactive Power across the Transmission system, despite the imposed requirement and capability being in place.

3.4.2 Part 3 of CAP169 seeks to facilitate partial payment to those embedded generators under such connection restrictions by DNOs. This partial payment reflects the Grid Code requirement and dynamic benefit from generators under restriction, whilst acknowledging that it is not possible for National Grid to despatch Reactive Power from such generators to 0 Mvar in line with Transmission system operation requirements.

3.4.3 Payment proposed under such restriction would be in line with current arrangements in CUSC Schedule 3, Appendix I (2) whereby a 20% payment is made as a result of certain conditions (including failure to have the Mvar range which includes the ability to provide 0 Mvar at the Commercial Boundary).

3.5 **Consequential Grid Code Changes**

3.5.1 A revision to the Grid Code is required with regards part 1 of CAP169 whereby the appropriate capability data table for submission of revised Mvar capability by Power Park Modules is required within BC2 Appendix 3.

- 3.5.2 Part 3 of CAP169 also requires the Grid Code to be amended to facilitate communication of the specified restriction from both the DNO and the embedded generator.

4.0 SUMMARY OF WORKING GROUP DISCUSSIONS

- 4.1 Within the Working Group National Grid provided a detailed overview of the Amendment Proposal, the changes envisaged and the defect the proposal seeks to address. National Grid explained that CAP169 was written in three parts, and the Working Group discussed each of the parts in turn.

Part 1 – Provision of Reactive Power from Power Park Modules

- 4.2 National Grid explained that this part of the proposal seeks to amend various sections of the CUSC to accommodate the provision of Reactive Power from Power Park Modules. This part of the proposal was raised to align the CUSC provisions with the already updated provisions within the Grid Code.
- 4.3 The main changes required for this part of the proposal are the introduction of additional referencing to Reactive Power from Power Park Modules, and an alternative set of capability data tables within the MSAs to accommodate the requirements for Reactive Power from Power Park Modules. Moreover, an additional section (CUSC Schedule 3, appendix 8 part 3) has been included to enable the conversion of Reactive Power capability from the LV to the HV side of the generator step up transformer for Power Park Modules where required.
- 4.4 Currently, for conventional generators, the MSA records Reactive Power capability at the Generator Stator Terminal (LV side of generator step up transformer) and at the Commercial Boundary (HV side of the generator step up transformer). Payments are made for utilisation of the Reactive Power service at the Commercial Boundary to account for losses across the generator step up transformer. Applying these same principles to Power Park Modules, using current definitions, was not suitable because it would have resulted in completing a MSA per wind turbine rather than the whole Module and would not account for the losses across the Power Park Module step up transformer.
- 4.5 In order to resolve these issues it was proposed that, where applicable, the CUSC definition of 'Commercial Boundary' could be adapted within the individual MSA. The current CUSC Section 11 definition of 'Commercial Boundary' already allows this flexibility and means that the CUSC definition does not need to be changed.
- 4.6 The Working Group queried whether defining the Commercial Boundary within the MSA in this way had any impact upon any other technical or ownership boundaries but National Grid confirmed that this boundary was only applicable to the relevant MSA and the payment for Reactive Power. It was also queried whether defining the Commercial Boundary in each case was necessary given that the Grid Code requirement and metering requirements were clearly set out in the other codes. National Grid confirmed that this was necessary given the various categories, and therefore Grid Code requirements for wind farms, and the differing asset ownership arrangements in Scotland (where the relevant Transmission Owner may own the Power Park Module step up transformer).
- 4.7 In addition, the CUSC text associated with the MSA and the Reactive Power service referred in the main to 'Generating Units' which would again have led

to a solution at the wind turbine level rather than at the Power Park level. It was therefore proposed that any such CUSC text which referred to 'Generating Unit' be changed to 'Generating Unit or Power Park Module'. Similar amendment to referencing is required to accommodate DC Converters to correspond to an additional change previously made within the Grid Code (CC6.3.2).

- 4.8 It was recognised by the Working Group that due to the aforementioned variations in asset ownership that the location of Reactive Power metering at Power Park Modules could also vary (metering could be located at the LV or HV side of the Power Park Module step up transformer). National Grid originally proposed that this be accounted for via an additional definition within the CUSC but the Working Group highlighted that this could be dealt with by the Aggregation of Reactive Power Metering Methodology (referred to in CUSC Schedule 3, appendix 4). The consequential changes proposed to this document are discussed in more detail in Section 9 of this document.
- 4.9 The Working Group questioned, in relation to Reactive Power meters, whether the meters themselves could compensate for the difference between LV and HV Reactive Power readings i.e. internal compensation, and whether this would have an impact on the proposed changes. National Grid confirmed that there could be meters which internally compensate but that this would be considered and catered for on a case by case basis. This case by case assessment of meter type is current practice by National Grid (and by ELEXON in the case of Active Power).
- 4.10 The original CUSC Amendment Proposal stated that there may be changes required to the communication systems which feed to and from the National Grid Electricity Control Centre, namely Electronic Data Transfer (EDT) and Electronic Despatch Logging (EDL), to despatch Reactive Power from Power Park Modules. The Working Group queried what these changes would be given that any developments would involve significant resource and affect a number of industry parties. Following review of requirements, National Grid confirmed that the current systems could be used to facilitate Reactive Power despatch instructions to Power Park Modules and that no changes were required.
- 4.11 Following the discussion and clarification of the proposal as outlined above, the Working Group agreed that part 1 of the proposal should proceed to the Working Group Consultation with no alternatives to this part of the proposal.

Part 2 - Provision of Reactive Power from Large Power Stations

- 4.12 National Grid explained that the current provisions in the CUSC only oblige National Grid to conclude MSAs with Generating Units with a reactive capability of 15 Mvar or above. Part 2 of CAP169 looks to extend this obligation to include all Large Power Stations upon request from the Large Power Station with a reactive capability below 15 Mvar.
- 4.13 This change was proposed on the basis that all Large Power Stations have the obligation to have the necessary Reactive Power capability, however National Grid only currently has an obligation to conclude MSAs (and therefore facilitate appropriate remuneration) with those with a capability of 15 Mvar or above.
- 4.14 The Working Group discussed part 2 of the proposal and agreed that it offers a proportionate solution regarding MSAs. It was felt to be a more appropriate solution than obliging National Grid to conclude MSAs with all Large Power

Stations with a reactive capability below 15 Mvar as the relevant generator may not actively wish an MSA to be in place, due to the level of remuneration likely to be received and additional administrative requirements introduced. This proposed solution, more appropriately, allows Large Power Stations with a capability below 15 Mvar to request MSAs if they so wish.

- 4.15 The Working Group questioned the implications of a MSA relating to Reactive Power on Frequency Response obligations, and National Grid clarified that the relevant Grid Code requirements for each of these services would not change. The group also questioned if there were additional Grid Code obligations introduced through signature to a MSA, National Grid explained that there were no additional obligations introduced as the obligations were applied through the Grid Code.
- 4.16 Following the discussion outlined above, the Working Group agreed that part 2 of the proposal should proceed to the Working Group Consultation with no alternatives to this part of the proposal.

Part 3 – Recognition of Distribution Network Imposed Restriction on Reactive Power

- 4.17 Part 3 of CAP169 seeks to facilitate partial payment (20%) to embedded generators subject to connection restrictions imposed by their DNO which prevent receipt of Reactive Power instruction(s) from National Grid to 0 Mvar.
- 4.18 National Grid explained that such restrictions prevent National Grid from being able to instruct the relevant generator with regards use of Reactive Power across the Transmission system. Moreover they remove the ability for payment to be turned off to such generators through instruction to 0 Mvar.

Payment Level

- 4.19 National Grid clarified for the Working Group that there are no existing generators which will see a reduction in Reactive Power payments following implementation of CAP169.
- 4.20 The view expressed within the Working Group was that the most appropriate means for payment to embedded generators under such restrictions would be for the DNO imposing the restriction to pay for the Reactive Power output. The Working Group acknowledged, however, that whilst this may appear the most suitable model it is not within the jurisdiction of the CUSC or Grid Code to introduce such a change.
- 4.21 The Working Group questioned the extension of the 20% default payment value within the existing CUSC provisions (Schedule 3, Appendix 1 and 2). It was suggested that the existing reduced default payment arrangements were aimed at incentivising generators to restore full reactive capability in order to return to full payment. This is in contrast to a restriction imposed by a DNO on an embedded generator where the ability to make use of the full Reactive Power range is outside of the generator's control. National Grid acknowledged the nature of existing restrictions within Schedule 3 of the CUSC, however considers that the 20% payment is appropriate for the restrictions under consideration in CAP169. This payment recognises the Grid Code requirement for Reactive Power capability and the dynamic benefit this provides, whilst also recognising that it is not possible for National Grid as GBSO to despatch the Reactive Power from such generators to 0 Mvar in line with system operation requirements.

- 4.22 The group also discussed that a 20% payment for a DNO restricted capability may effectively provide more favourable terms than those received by some generators with the full capability available which are instructed to 0 Mvar on a continual basis.
- 4.23 One member of the Working Group stated that generators under such connection restrictions should not be paid at all for the provision of Reactive Power. This view was based on the fact the Mvar production from restricted embedded generators may in fact contribute to a requirement for additional balancing actions, therefore increasing costs to other system users.

Materiality

- 4.24 The Working Group requested a view on the materiality associated with part 3 of CAP169. National Grid prepared an estimate of the materiality by 2011/12 (please see annex 3 for an outline of this estimate) which indicates a cost of approximately £1.2m – £2.1m per year from generators subject to Reactive Power connection restrictions. Were a 20% payment introduced, this cost would be reduced to £0.24m - £0.42m.

Possible Alternatives to part 3

- 4.25 The Working Group brainstormed a number of possible alternatives to part 3 of the original CAP169 Amendment Proposal. The ideas from the brainstorm and discussion are outlined below:
- 4.26 *Restriction applicable to all embedded generators unable to receive a reactive despatch instruction (without reference to 0Mvar).* National Grid explained that the original CAP169 Amendment Proposal was drafted with reference to 0 Mvar to ensure that it did not capture other forms of reactive range restriction (such as those with a restricted range that are able to pass through 0 Mvar). The ability to turn payment off (by instruction to 0) is critical for the proposal to ensure that the facility to turn off payments is available. Therefore National Grid believes reference to 0 Mvar is crucial to the Amendment Proposal.
- 4.27 *Removal of reactive capability requirement, or separation of steady state and dynamic capability requirements, for embedded generators under connection restrictions which prevent instruction from National Grid to 0 Mvar.* The Working Group debated whether the reactive capability requirements within the Grid Code should be amended for those under such connection restrictions, either by removing the capability requirement entirely or removing the steady state requirement. The Working Group agreed that the Grid Code requirement for steady state capability inherently provides dynamic capability, which currently cannot be separated. The group also agreed that amending the capability requirements within the Grid Code may be a disproportionate solution to the issue under consideration. National Grid reiterated that the original Amendment Proposal seeks to remunerate appropriately for the dynamic capability and cost incurred through the Grid Code obligation provided via the 20% payment being proposed.
- 4.28 *Embedded generators with DNO restrictions that prevent instruction from National Grid to 0 Mvar should have a nominal 0 within the restricted range and would receive 0 or 20% payment when instructed to this point. Other instructions within the specified restricted range would be possible, with full payment made.* National Grid explained that this proposal would introduce significant settlement system changes to both set up and implement on an ongoing basis. In National Grid's view it would be complex to administer,

without introducing appropriate additional benefits to the original Amendment Proposal. The Working Group debated the possible alternative with some members acknowledging that it may introduce a more complete solution to the original Amendment Proposal; however the Working Group acknowledged the significant additional complexities that would be required for implementation.

- 4.29 *Embedded generators with DNO restrictions that prevent instruction from National Grid to 0 Mvar do not get paid when operating within the specified range of restriction, but when able to receive instruction outside of this range payment would be received accordingly.* The Working Group debated that this proposal may have merit as once a restriction has been notified no payment would be made until such times as notification has been received that instruction can be given (with in such instances full payment made). However, it was acknowledged by the Working Group that this was more complex and difficult to administer than the original Amendment Proposal.
- 4.30 *Connection and operational restrictions.* The group discussed a possible alternative covering both connection restrictions (known up front at time of connection as with the original CAP169 proposal) and long term operational restrictions not known at the time of connection. National Grid's view is that any restriction lasting longer than 12 months should be considered in the same way as a connection condition. Restrictions in place for such protracted periods are likely to be as a result of configuration of the DNO network and the embedded connection to this network. Moreover once 12 months has been exceeded multiple outage years begin to be impacted. National Grid expressed that this possible alternative represents an equitable solution to ensure that both connection conditions and long term restrictions are covered.
- 4.30.1 The Working Group discussed the proposed 12 month window which would be triggered following initial notification of a restriction until further notification that the restriction has been removed is received. The group agreed that, whilst the 12 month period was arbitrary, it felt appropriate.
- 4.30.2 The Working Group discussed the possible incentive for a restriction to be temporarily removed to prevent the 12 month period from being met. Whilst there may be no incentive on the DNO to remove the restriction it was agreed that a prudent approach would be to specify that the 12 month period may be non-consecutive within a specified period longer than 12 months (e.g. 24 months).
- 4.30.3 The Working Group also discussed when the reduced payment would most appropriately be applied. It was initially suggested that it should be applied for the full time a restriction was in place (with either the length of time for the restriction communicated up front, or 80% of the previous 12 months payment being clawed back once 12 months had been exceeded). The Working Group discussed that this may introduce inequitable treatment for generators during the initial 12 months (for instance with a restriction lasting just under 12 months resulting in full payment for the duration of the restriction whilst a restriction lasting just over 12 months would result in a 20% payment for the duration of the restriction). The group agreed that it would be more equitable for the 20% payment to apply only once the initial 12 months has been exceeded.

- 4.30.4 Following discussion within the Working Group National Grid developed this proposal into a draft Working Group Alternative Amendment for the purposes of the Working Group Consultation. See section 5 for details.
- 4.31 *Removal of part 3 from the Amendment Proposal.* Given the agreement within the Working Group that part 1 and part 2 of the original Amendment Proposal introduced positive changes to the current version of the CUSC, whilst part 3 generated greater debate, the Working Group considered the merit of raising an alternative which would include parts 1 and 2, but not part 3 of CAP169. It was felt by the Working Group that this would be a prudent approach to ensure that any concerns which may exist with regards to part 3 do not impact on the implementation of parts 1 and 2 should the Authority be minded to implement parts 1 and 2. A member of the Working Group pointed out that should this alternative be implemented the number of embedded generators that may thereafter enter into an MSA and receive full payment for the provision of Reactive Power but be unable to be despatched to 0 Mvar is likely to increase. As such a further Amendment Proposal to address this may be required in the future.
- 4.31.1 On behalf of the Working Group National Grid prepared a draft Working Group Alternative Amendment for the purposes of the Working Group Consultation. See section 5 for details.
- 4.32 **Please note that not all of the ideas brainstormed and detailed above have been considered for further progress by the Working Group.**

(Consideration of Working Group Consultation responses and WG Consultation requests following consultation period)

5.0 WORKING GROUP ALTERNATIVE AMENDMENT

Draft Alternative Amendment 1

- 5.1 Draft Working Group Alternative Amendment 1 was raised by National Grid and is included in Annex 4.
- 5.2 As outlined in 4.30 it relates to part 3 of CAP169 and extends CAP169 to cover long term restrictions not communicated at the time of connection.
- 5.3 In particular the Working Group would invite views on the 12 and 24 month time periods proposed in draft Working Group Alternative Amendment 1.

Draft Alternative Amendment 2

- 5.4 Draft Working Group Alternative Amendment 2 was prepared by National Grid on behalf of the Working Group and is included in Annex 5.
- 5.5 As outlined in 4.31 it contains parts 1 and 2 of the original Amendment Proposal with part 3 removed.

6.0 ASSESSMENT AGAINST APPLICABLE CUSC OBJECTIVES

Proposed Amendment

- 6.1 National Grid believes that CAP169 would better facilitate CUSC objective (a) the efficient discharge by the Licensee of the obligations imposed upon it under the Act and by the Transmission Licence by:
 - 6.1.1 Ensuring that National Grid can despatch Reactive Power from Power Park Modules, and Large Power Stations, and facilitate payment for this service. This will increase the pool of potential providers of Reactive Power and result in increased stability and Transmission system security.
 - 6.1.2 Ensuring alignment of the CUSC and the Grid Code.
 - 6.1.3 Ensuring appropriate remuneration through ensuring full payment is made only in instances where full access to the service is available for the purposes of Transmission system operation, whilst partial payment (reflecting the Grid Code obligation and associated dynamic benefits) is made when restrictions on instruction to 0 Mvar are in place. Thereby ensuring the system is operated and managed in the most economic and efficient manner.
- 6.2 The Working Group initial discussion with regards the CUSC objectives raised a concern over the impact of CAP169 on CUSC Objective (b) facilitating effective competition in generation and supply of electricity and facilitating such competition in the sale, distribution and purchase of electricity. This concern was due to the possible ability for National Grid to choose to instruct a generator under restriction within the restricted range (receiving a 20% payment) as an alternative to a generator for which full payment would be required. The introduction of this differential rate was considered by some members of the group to not better facilitate competition.
- 6.3 Other members of the Working Group reflected that in fact the proposed 20% payment for a restricted despatch capability provided more favourable terms than those received by some generators with the full capability available which are instructed to 0 Mvar on a continual basis. Therefore the differential rate introduced was not considered by all members of the Working Group as detracting from competition.
- 6.4 The Working Group will consider the applicable CUSC objectives in more detail following conclusion of the Working Group Consultation.

7.0 PROPOSED IMPLEMENTATION

- 7.1 National Grid proposes that CAP169 should be implemented 3 months after an Authority decision to allow all MSAs which require amendment to be prepared. The Working Group agreed that this proposed implementation date seemed reasonable.
- 7.2 For purpose of the Working Group Consultation views are invited on this proposed implementation date.

8.0 IMPACT ON THE CUSC

- 8.1 CAP169 requires amendment to the following sections of the CUSC:
 - 8.1.1 Part 1: Section 1, Section 4, Section 11, Schedule 2 and Schedule 3
 - 8.1.2 Part 2: Schedule 3 (2.8ii and Appendix 6, 1.2)

- 8.1.3 Part 3: Section 11 (definitions for Network Operator, Reactive Despatch Network Restriction and Pre-Connection Reactive Despatch Network Restriction) and Schedule 3 (Appendix 1, 2e and Appendix 2, 2e)
- 8.2 The draft text required to give effect to the Original Proposal is contained as Part A of Working Group Consultation Volume 2. Most of the changes required relate to part 1 of CAP169, apart from those specifically detailed above for parts 2 and 3.
- 8.3 The draft text to give effect to the draft Working Group Alternative Amendment 1 is attached as Part B of Working Group Consultation Volume 2. In addition to the changes proposed for the original, this will require introduction of an additional definition for Temporary Enduring Reactive Despatch Network Restriction, and an alternative proposal for the changes to Schedule 3 (appendix 1 and 2).
- 8.4 The detail of the draft text to give effect to the draft Working Group Alternative Amendment 2 is attached as Part C of Working Group Consultation Volume 2.
- 8.5 Dual offshore drafting may be required for the report submitted to the Authority. However, for the purposes of the Working Group Consultation the text has been developed based on the current version of the CUSC.

9.0 IMPACT ON INDUSTRY DOCUMENTS

Impact on Core Industry Documents

Grid Code

- 9.1 A revision to the Grid Code is required with regards part 1 of CAP169 whereby the appropriate capability data table for submission of revised Mvar capability by Power Park Modules is required within BC2 Appendix 3.
- 9.2 Part 3 of CAP169 also requires the Grid Code to be amended to facilitate communication of the specified connection restriction from both the DNO and the embedded generator. It was proposed that this be introduced to PC.A.3.2.2 (with corresponding changes required to DRC Schedule 11 and OC2).
- 9.3 Additional definitions would also be required in the Grid Code to facilitate part 3 (Reactive Despatch Instruction, Commercial Boundary and Reactive Despatch Network Restriction).
- 9.4 Draft Working Group Alternative Amendment 1 would require additional Grid Code changes to be introduced to facilitate communication of operational restrictions, with the proposal to amend BC1.6 and BC2 Appendix 3.
- 9.5 Draft Working Group Alternative Amendment 2 would not require any additional change to be made to the Grid Code to that outlined in 9.1 above.
- 9.6 As the CAP169 Working Group is a joint CUSC and Grid Code Working Group these proposed changes were discussed within the Working Group. For information the draft text to give effect to the proposed Grid Code changes are included as Part D of Working Group Consultation Volume 2 and a summary of the Working Group discussion is outlined below.

Grid Code Discussion

- 9.7 The Working Group discussed whether it was appropriate for the communication of such restrictions to be made by the DNO and/or the embedded generator. The group initially felt that as the restriction was imposed by the DNO the onus for communication should be on the DNO. However, as there is no incentive on the DNO to communicate removal of such restrictions in an expeditious manner and the generator has a direct relationship with National Grid (via the MSA), it was felt that it should also be a requirement for the generator. Therefore, the group agreed that provided it was clear that the generator was communicating about a reactive despatch restriction as opposed to a reactive capability restriction the communication should come from both the generator and DNO. **Comments are invited on the proposed communication from both generators and/or DNOs.**
- 9.8 The group discussed the best placement within the Grid Code for the changes, with the Planning Code (PC.A.2.3.3) being agreed as the most suitable place. This allows both forms of communication (from DNOs and generators) to be captured consistently within the same clause. It is also applied up front prior to connection, but facilitates additional communication in the event that the restriction is removed or amended.
- 9.9 To correspond to the changes in PC.A.2.3.3 minor changes are also required to DRC Schedule 11 and OC2.
- 9.10 Definitions for Reactive Despatch Instruction, Commercial Boundary and Reactive Despatch Network Restriction will also be required.
- 9.11 For draft Working Group Alternative Amendment 1 additional changes are required to BC1.6 extending the existing DNO obligation relating to one operational day to cover more than one operational day and BC2 Appendix 3 extending the existing communication of revised Mvar data (relating to capability) to cover reactive despatch restrictions.

Methodology for the Aggregation of Reactive Power Metering

- 9.12 CAP169 also requires minor amendment to the Methodology for the Aggregation of Reactive Power Metering to accommodate potential metering configurations of Power Park Modules.
- 9.13 The changes being proposed to the document as a result of CAP169 are similar to those being proposed to the CUSC text. They seek to amend the terminology used within the methodology to include Power Park Modules (as an alternative to Generating Units) to ensure that Power Park Module Reactive Power metering configurations are accounted for within the current metering categories. It is envisaged by National Grid, having considered a number of Power Park Module metering configurations, that Category A of the methodology document is likely to apply in most cases.
- 9.14 The changes proposed are included in Working Group Consultation Volume 2 part E. Comments on the proposed changes to the Methodology are invited.

Impact on other Industry Documents

- 9.15 In the Amendment Proposal National Grid indicated that control room software EDL and EDT would require updating to allow an instruction to be

sent to Power Park Modules to change slope setting or setpoint voltage. Upon review National Grid believes that such changes are not required to implement CAP169, therefore no changes to these systems will be brought forward as a result of CAP169.

10.0 WORKING GROUP VIEW / RECOMMENDATION

[to be included after the consultation period]

11.0 NATIONAL GRID INITIAL VIEW

[to be included after the consultation period]

12.0 INDUSTRY VIEWS AND REPRESENTATIONS

[to be included after the consultation period]

12.1 Responses to the Working Group Consultation

12.1.1 The following table provides an overview of the representations received. Copies of the representations are contained in Working Group Report Volume 2.

Reference	Company	Supportive	Comments
CAP169-WGC-01			

12.2.2 The following table provides an overview of the WG Consultation Requests received. Copies of the representations are contained in Working Group Report Volume 2.

Reference	Company	Details of the proposal	Working Group Comments
CAP169-WGCR-01			

[to be included after the consultation period]

12.2 Views of Panel Members

[to be included after the consultation period]

12.3 Views of Core Industry Document Owners

[to be included after the consultation period]

ANNEX 1 – ORIGINAL PROPOSAL

CUSC Amendment Proposal Form	CAP:169
Title of Amendment Proposal: Provision of Reactive Power from Power Park Modules, Large Power Stations and Embedded Power Stations	
Description of the Proposed Amendment (<i>mandatory by proposer</i>): <u>Amendment Proposal Part 1</u> This Amendment Proposal looks to amend various sections of CUSC to accommodate the provision of Reactive Power from Power Park Modules. Currently, the vehicle to enable National Grid to despatch and pay Providers for Reactive Power, the Mandatory Services Agreement (MSA), does not reflect the capability requirement as per Grid Code CC6.3.2 for Power Park Modules i.e. within the Capability Data Tables. It is therefore proposed that additional tables be added to the MSA pro forma in CUSC (Schedule 2 Exhibit 4). This Amendment Proposal also looks to update the Reactive Power Definitions and Interpretations section (Schedule 3, Part I, Clause 1) in line with the Grid Code CC8.1 provisions to reflect that Reactive Power from Power Park Modules is a Mandatory (not Enhanced) Ancillary Service. The current Capability Data Tables within the MSA for Synchronous Generators are not applicable to Power Park Modules due to differences in the Grid Code (CC.6.3.2) requirement. For Synchronous Generators the Reactive Capability requirement is at Rated MW at the LV Stator Terminals whereas the requirement for a Power Park Module is at the Grid Entry Point or User System Entry Point (if embedded) in England and Wales or the HV terminals of the 33/132kV or 33/275kV or 33/400kV transformer in Scotland. It is proposed that the MSA pro forma shall capture the reactive capability at 100%, 50%, 20% and 0% Rated MW for a Power Park Module. Table A of Capability Data Tables shall capture the capability at the Commercial Boundary and Table B will capture the capability at the Grid Entry Point (or User System Entry Point). In order to account for all types of connection configurations of Power Park Modules and remove any ambiguity as to the location of the Commercial Boundary in each case, it is proposed that the Commercial Boundary, at which the Provider will be paid for provision of Reactive Power, is defined within each Power Park Module MSA. The current definition of Commercial Boundary within CUSC allows this flexibility and will therefore not need amending. Sections of CUSC associated with Reactive Power provision (see 'Impact on the CUSC' below) also require amendment in order to accommodate the addition of Power Park Modules as an alternative option to Generating Units and CCGT Modules. The proposal also looks to make similar changes to include DC Converters for which the Reactive Power requirement has also been previously added to Grid Code CC6.3.2. Certain sections also require amendment to reflect that Reactive Power supplied by Power Park Modules from synchronous compensation or static compensation is a System Ancillary Service and Obligatory Reactive Power Service (in line with Grid Code CC8.1) <u>Amendment Proposal Part 2</u> CUSC Schedule 3, Clause 2.8 states that National Grid is only "obliged" to conclude or	

amend Mandatory Service Agreements if the Reactive Power capability of the Generating Unit is 15Mvar or more. This equates to a Generating Unit with a size of approximately 45MW. Large Power Stations are defined as those which in NGET's Transmission system have a Registered Capacity of 100MW or more; in SPT's Transmission system have a Registered Capacity of 30MW or more; and in SHETL's Transmission system have a Registered Capacity of 10MW or more. As such all three categories of Large Power Stations are obliged to be signatory to the CUSC, and therefore through the Grid Code have the obligation to provide a Reactive Power Service. However National Grid is only obliged to amend/conclude Mandatory Service Agreements with those above approximately 45MW. This Amendment Proposal seeks to extend the obligation whereby, upon request from a Large Power Station with a reactive capability below 15Mvar, National Grid is obliged to conclude a Mandatory Service Agreement.

Amendment Proposal Part 3

A function of the technical specifications that are placed upon Generators by National Grid results in a control philosophy that produces or consumes Reactive Power dependant on the voltage at the Point of Connection (as defined in the Grid Code) to the Distribution System. As generators export Active Power onto the system they cause the voltage at the Point of Connection to rise. The control system is designed in such a manner so that when this occurs generators will consume Reactive Power to control the voltage.

Generators directly connected to Distribution System produce Reactive Power which is of benefit to the distribution network operator (DNO) and National Grid and assists in managing voltage on their network. Some DNOs impose connection restrictions which prevent instruction(s) from National Grid to the embedded generator to reduce output to 0 Mvar. These restrictions would result in National Grid being unable to instruct the relevant generator to achieve economic and efficient use of the Reactive Power across the Transmission system, despite the imposed requirement and capability being in place.

The Proposed Amendment seeks to facilitate partial payment to those embedded generators under such restriction conditions by DNOs. This partial payment reflects the Grid Code requirement and dynamic benefit from generators under restriction, whilst acknowledging that it is not possible for National Grid to despatch Reactive Power from such generators to 0 Mvar in line with Transmission system operation requirements.

Payment under such restrictions would be in line with current arrangements in CUSC Schedule 3, Appendix I (2) whereby a 20% payment is made in the event that certain conditions are not met. This Amendment Proposal would therefore seek to include an additional provision in CUSC Schedule 3, Appendix I (2).

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

Amendment Proposal Part 1

Grid Code CC6.3 and CC8.1 have already been amended² to document the reactive capability requirements of Power Park Modules. Corresponding changes to CUSC were not made; hence the existing Mandatory Services Agreement template does not explicitly cater for the required method of recording the capability of Power Park Modules. The proposed changes are therefore driven by the requirement to update CUSC to reflect changes made to Grid Code CC 6.3.2 to allow National Grid to despatch Reactive Power from Power Park Modules, and for Providers to be paid accordingly. It is envisaged that the proposed

² Grid Code amendment G/06 Power Park Modules and Synchronous Generating Units
<http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/consultationpapers/2006/>

changes will increase the pool of potential providers of Reactive Power and result in increased system security.

The Proposed Amendment also looks to ensure alignment with the Grid Code by ensuring Reactive Power from Power Park Modules is classified as an Obligatory Reactive Power Service and Mandatory Ancillary Service.

Amendment Proposal Part 2

The Proposed Amendment looks to extend Schedule 3, Part 1, Clause 2.8 to ensure that National Grid is obliged to conclude/amend Mandatory Service Agreements with all Large Power Stations, with a reactive capability below 15Mvar, upon request from the Large Power Station.

Amendment Proposal Part 3

The Proposed Amendment seeks to ensure that appropriate payments are made for the provision of a Reactive Power service from embedded generators. It recognises that some embedded generators have connection conditions which prevent National Grid, as GBSO, from despatching through 0 Mvar, and thereby using the service for the purpose of Transmission system operation.

When such circumstances occur a 20% payment will be applied to reflect the capability obligation imposed on such generators, and the associated dynamic benefits. However, the full payment will not be made in recognition of the inability of National Grid to make use of the Reactive Power service through providing a despatch instruction to 0 Mvar.

It is envisaged that the Proposed Amendment will allow the most economic and efficient operation of the system by facilitating appropriate remuneration in all circumstances

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

Changes would be required to Section 1, Section 4, Schedule 3, Schedule 11 and Schedule 2 Exhibit 4, Schedule 3 Part 1.

Further details of the proposed changes are as follows:

Section 1: Applicability of Sections and Related Agreements Structure

- Addition of referencing to Power Park Modules and DC Converters

Section 4: Balancing Services

- Addition of referencing to Power Park Modules and DC Converters

Section 11: Definitions

- Addition of definition of DC Converter

Schedule 2 Exhibit 4: Mandatory Services Agreement

- Clause 3.2.2 expanded to include non-synchronous generating units, DC Converter and Power Park Module in line with changes to Grid Code
- Clause 3.3 (Capability Data) expanded to include two further sections for Power Park Modules. These two further sections refer to new capability tables for Power Parks in Appendix 1
- New Capability Tables added to Appendix 1 depending upon the capability of the Power Park i.e. as per Grid Code CC6.3.2(d) (i) or (ii); the second table in each set is required only in a situation where metering is not located at the Commercial Boundary
- Commercial Boundary of the Power Park Module to be defined in the MSA in the definitions section

Schedule 3, Part 1: Balancing Services Market Mechanism – Reactive Power

- Clause 1.1 amended to reflect that a Power Park Module, where Synchronous or static compensators within the Power Park Module may be used to provide Reactive Power, is classified as Obligatory Reactive Power Service.
- Clause 1.2(b) amended to reflect that a Power Park Module, where Synchronous or static compensators within the Power Park Module may be used to provide Reactive Power, is no longer classified as a Commercial Ancillary Service.
- Clause 2.8(a) amended to reflect the obligation to conclude/amend Mandatory Service Agreements with any Large Power Station with a reactive capability below 15Mvar on request from the Large Power Station.
- Appendix I (2) with an additional provision added to Clause 2, to reflect that a 20% payment will be made at such times when the BM Unit is unable to comply with a Reactive Despatch Instruction to zero Mvar, based on a restriction imposed by the Network Operator.

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

Minor amendments would be required to the Methodology for the Aggregation of Reactive Power Metering to accommodate potential metering configurations of Power Park Modules.

Corresponding change to Grid Code whereby DNOs will be required to communicate when such restrictions are in place.

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

The control room software EDL and EDT will need to be updated to allow an instruction to be sent to a Power Park Module asking it to change its slope setting or setpoint voltage.

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

None

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

National Grid believes that this proposal will better facilitate CUSC Applicable Objective

(a) (The efficient discharge by the licensee of the obligations imposed upon it under the Act and by the Transmission Licence) and

by ensuring that National Grid can despatch Reactive Power from Power Park Modules, and Large Power Stations, and facilitate payment for this service. This will increase the pool of potential providers of reactive power and result in increased stability and Transmission system security.

The proposal will also ensure appropriate remuneration through ensuring full payment is made only in instances where full access to the service is available for the purposes of Transmission system operation, whilst partial payment (reflecting the Grid Code obligation and associated dynamic benefits) is made when restrictions on instruction to 0 Mvar are in place. Thereby ensuring the system is operated and managed in the most economic and efficient manner.

This amendment will ensure alignment of the CUSC and the Grid Code.

Details of Proposer: Organisation's Name:	National Grid
Capacity in which the Amendment is being proposed: (i.e. CUSC Party, BSC Party or "energywatch")	CUSC Party
Details of Proposer's Representative: Name: Organisation: Telephone Number: Email Address:	Carole Hook National Grid 01926 654211 carole.hook@uk.ngrid.com
Details of Representative's Alternate: Name: Organisation: Telephone Number: Email Address:	Katharine Clench National Grid 01926 656036 Katharine.clench@uk.ngrid.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:

Bali Virk
Panel Secretary
Commercial Frameworks
National Grid
National Grid House
Warwick Technology Park
Gallows Hill
Warwick
CV34 6DA

Or via e-mail to: bali.virk@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 Electricity Transmission plc Licence under Section C7F, paragraph 15. Reference should be made to this section when considering a proposed amendment.

ANNEX 2 – WORKING GROUP TERMS OF REFERENCE

Working Group Terms of Reference and Membership

TERMS OF REFERENCE FOR CAP169 WORKING GROUP

1. The Balancing Services Standing Group (BSSG) has been actioned to act in the capacity of a Working Group for the evaluation of CAP169. Nominations from parties not currently represented on the BSSG have been invited.
2. Given the consequential Grid Code change which may be required as a result of CAP169 an invitation for Grid Code Panel representation has also been made. Therefore these Terms of Reference apply to a joint Working Group with the Grid Code, under the governance of the CUSC. An overview of the governance process envisaged is outlined in annex 1.

RESPONSIBILITIES

3. The Working Group is responsible for assisting the CUSC Amendments Panel in the evaluation of CUSC Amendment Proposal CAP169 tabled by National Grid at the Amendments Panel meeting on 27th February 2009.
4. The Working Group is also responsible for considering the corresponding Grid Code changes required by the proposal, and reporting accordingly to the Grid Code Review Panel.
5. The relevant aspects of the proposal must be evaluated to consider whether it better facilitates achievement of the applicable CUSC and Grid Code objectives.

SCOPE OF WORK

6. The Working Group must consider the issues raised by the Amendment Proposal and consider if the proposal identified better facilitates achievement of the Applicable CUSC Objectives. The consequential Grid Code changes must be evaluated in line with the Grid Code objectives.
7. In addition to the overriding requirement of paragraph 6, the Working Group shall consider and report on the following specific issues:
 - Identify the consequences of the proposed amendment/any WGAAAs, including, but not limited to:
 - Impact on the CUSC/Grid Code and any other associated documents
 - Impact on CUSC/Grid Code parties and other affected parties
 - Impact on industry and wider issues as appropriate in accordance with the applicable CUSC/Grid Code objectives

Annex 2 – Working Group Terms of Reference

- Review with regards to the Guidelines for the Assessment of Carbon Costs Associated with Code Amendments
 - Consider implementation
8. The Working Group is responsible for the formulation and evaluation of any Working Group Alternative Amendments (WGAAs) arising from Group discussions which would, as compared with the Amendment Proposal, better facilitate achieving the applicable CUSC objectives in relation to the issue or defect identified.
 9. The Working Group should become conversant with the definition of Working Group Alternative Amendments which appears in Section 11 (Interpretation and Definitions) of the CUSC. The definition entitles the Group and/or an individual Member of the Working Group to put forward a Working Group Alternative Amendment if the Member(s) genuinely believes the Alternative would better facilitate the achievement of the Applicable CUSC Objectives. The extent of the support for the Amendment Proposal or any Working Group Alternative Amendment arising from the Working Group's discussions should be clearly described in the final Working Group Report to the CUSC Amendments Panel.
 10. There is an obligation on the Working Group Members to propose the minimum number of Working Group Alternatives where possible.
 11. All proposed Working Group Alternatives should include the proposer(s) details within the Final Working Group Report, for the avoidance of doubt this includes Alternative(s) which are proposed by the entire Working Group or subset of members.
 12. There is an obligation on the Working Group to undertake a period of Consultation in accordance with CUSC 8.17. This consultation will relate only to proposed changes to the CUSC (as with usual practice for CUSC Working Group consultations any relevant consequential Grid Code changes will be outlined in the consultation). The Working Group Consultation period shall be for a period of 2 weeks as determined by the Amendments Panel.
 13. Following the Consultation period the Working Group is required to consider all responses including any WG Consultation Requests. As appropriate the Working Group will be required to undertake any further analysis and update the Original and/or Working Group Alternatives. All responses including any WG Consultation Requests shall be included within the final report including a summary of the Working Groups deliberations and conclusions.
 14. The Working Group is to submit their final report to the CUSC Panel Secretary on 18th June 2009 for circulation to Panel Members. The conclusions will be presented to the CUSC Panel meeting on 26th June 2009.
 15. The Working Group will also prepare a report for submission to the Grid Code Review Panel. The Working Group will endeavour to prepare this report for consideration by the Grid Code Review Panel at the meeting on May 21st 2009.

MEMBERSHIP

16. Membership of the joint Working Group for CAP169 will be drawn from the Grid Code Review Panel, or their nominated representatives, the BSSG, additional nominated CUSC party representatives and the Authority.

17. It is recommended that the Working Group has the following members:

Chair	Malcolm Arthur	
National Grid	Carole Hook/Katharine Clench	
Industry representatives	Jonathan Atyeo	GDF
	Claver Chitambo	RES
	James Evans	British Energy
	Claire Maxim	E.on (GCRP member)
	Campbell McDonald	SSE (GCRP member)
	Christopher Proudfoot	Centrica
	Raoul Thulin	RWE
Authority representative	Lesley Nugent	Ofgem
	Roberta Fernie	Ofgem
Technical Secretary	Bushra Akhtar	National Grid
Observer	Peter Twomey	UUES

18. The Chair of the Working Group and the Chair of the CUSC Panel must agree a number that will be quorum for each Working Group meeting. The agreed figure for CAP169 is that at least 5 Working Group members must participate in a meeting for quorum to be met.
19. A vote is to take place by all eligible Working Group members on the proposal and each Working Group Alternative, as appropriate, as to whether it better facilitates the CUSC Applicable Objectives and indicate which option is considered the BEST with regard to the CUSC Applicable Objectives. The results from the vote shall be recorded in the Working Group Report. A recommendation regarding any proposed Grid Code change should also be made.
20. Working Group Members or their appointed alternates are required to attend a minimum of 50% of the Working Group Meetings to be eligible to participate in the Working Group vote.
21. The Technical Secretary is to keep an Attendance Record, for the Working Group meetings and to circulate the Attendance Record with the Action Notes after each meeting. This will be attached to the Final Working Group Report.
22. The membership can be amended from time to time by the CUSC Amendments Panel.

RELATIONSHIP WITH AMENDMENTS PANEL

23. The Working Group shall seek the views of the Amendments Panel before taking on any significant amount of work. In this event the Working Group Chairman should contact the CUSC Panel Secretary.
24. The Working Group shall seek the Amendments Panel advice if a significant issue is raised during the Consultation process which would require a second period of Consultation in accordance with 8.17.17.
25. Where the Working Group requires instruction, clarification or guidance from the Amendments Panel, particularly in relation to their Scope of Work, the Working Group Chairman should contact the CUSC Panel Secretary.

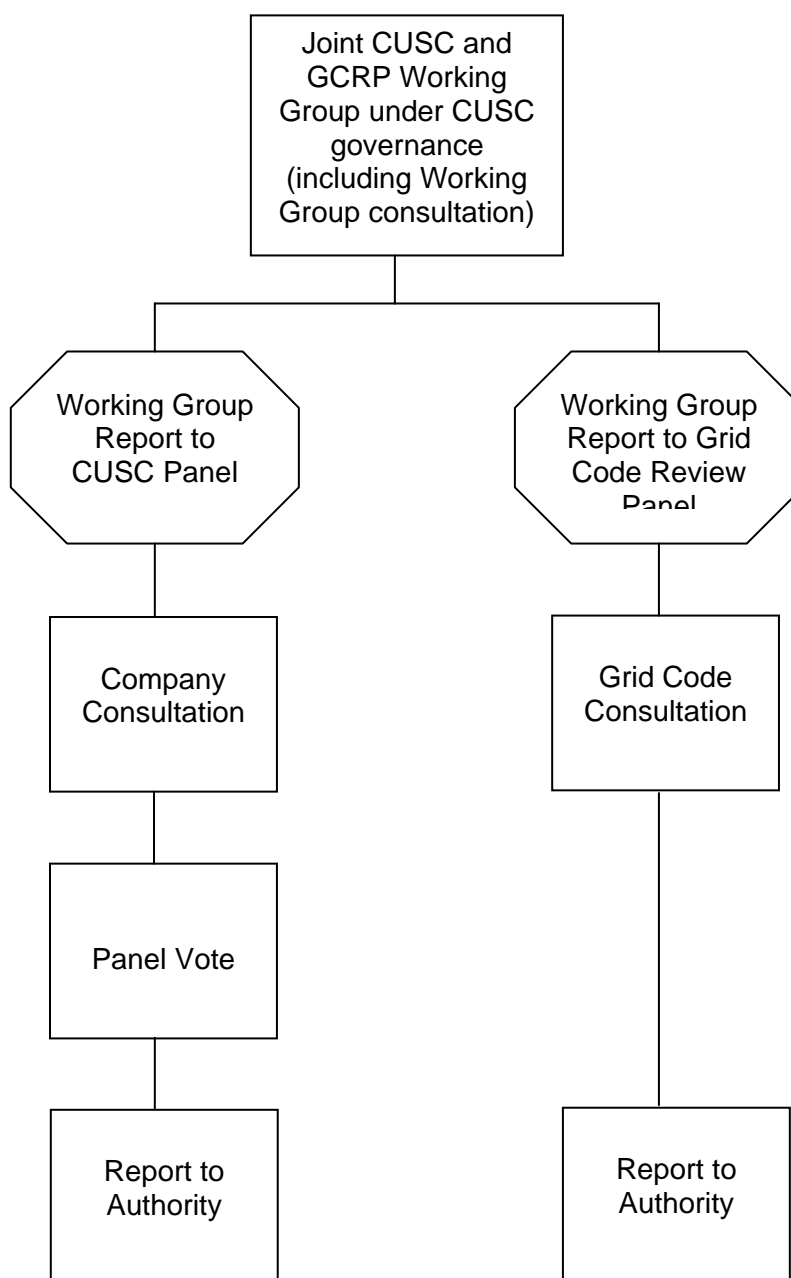
MEETINGS

26. The Working Group shall, unless determined otherwise by the Amendments Panel, develop and adopt its own internal working procedures and provide a copy to the Panel Secretary for each of its Amendment Proposals.

REPORTING

27. The Working Group Chairman shall prepare a final report to the 26th June 2009 CUSC Amendments Panel responding to the matter set out in the Terms of Reference including all Working Group Consultation Responses and Requests.
28. A report will also be prepared for submission to the Grid Code Review Panel. The Working Group will endeavour to prepare this for consideration at the meeting on May 21st 2009.
29. A draft Working Group Report must be circulated to Working Group members with not less than five business days given for comments.
30. Any unresolved comments within the Working Group must be reflected in the final Working Group Report.
31. The Chairman (or another member nominated by him) will present the Working Group report to the Amendments Panel and Grid Code Review Panel as required.

Annex 1



ANNEX 3 – MATERIALITY ESTIMATE

Estimate of Materiality of DNO Restriction on instruction to 0 Mvar:

Based on the SYS in Scotland by 2011/12 there will be approximately:
750MW of embedded capacity below 48MW, and
1000MW of embedded capacity above 48MW (the current limit for obligatory MSA),
TOTAL – 1750MW

The reactive output from a sample of five large embedded generators with a total capacity of 250MW from the period August 2007 - August 2008, gives a total reactive absorption of 75,000 MVARh.

Based on a reactive price of £4/MVARh this would give a total cost of £300,000 for the year.

If this is scaled up for the estimated 1750MW by 2011/12 it would equate to £2.1m for the year (this would be reduced to £0.42m based on a 20% payment).

If this is scaled up for the estimated 1000MW of generators above 48MW by 2011/12 it would equate to £1.2m for the year (this would be reduced to £0.24m based on a 20% payment).

The current budget for reactive power is £63m for 2008/09.

Assumptions used:

- Focus only on Scottish Distribution networks
- Embedded capacity will be in line with the SYS forecast
- All large embedded generation in Scotland will be subject to such restrictions
- £/MVARh cost prediction of £4/MVARh
- Reactive absorption in line with a sample of 5 existing embedded generators (including a scaled load factor of 33% for those commissioning)
- Reactive power budget remains at the same level as the 2008/09 forecast

Rationale for Raising Amendment:

The connection of large generators to distribution networks can create high voltage within the distribution network. This can be avoided by system reinforcement within the distribution network. However, in lieu of system reinforcement, especially in less robust parts of the network, often a condition of connection is placed on embedded generators to absorb reactive power in order to balance the voltage increase which their connection causes. Under such restrictions National Grid would be unable to instruct the embedded generator to reduce output to 0 Mvar.

In this context the 20% payment for a restricted reactive power service would appear preferable to the alternative of a restriction on generating output or requirement for system reinforcement. This 20% payment recognises the Grid Code requirement and dynamic benefit from the embedded generator, whilst also compensating for the fact that National Grid is unable to make use of the full reactive power service.

Annex 3 – Materiality Estimate

Thereby ensuring that the system is operated and managed in the most economic and efficient manner.

National Grid would consider an additional £2.1m (and indeed £1.2m) cost for a reactive power service that is not able to be utilised for Transmission system operational requirements to be material in warranting a reduction in payment. This forecast could be predicted to increase as additional embedded generation connects in subsequent years.

ANNEX 4 - DRAFT WORKING GROUP ALTERNATIVE AMENDMENT 1

CAP169 Alternative Amendment Proposal - Long term restrictions not known at time of connection (proposed by National Grid)

The original Amendment Proposal CAP169 describes connection conditions which prevent despatch from National Grid (as GBSO) through 0Mvar. Such conditions would be known by the relevant Network Operator and embedded generator and communicated to National Grid upfront prior to connection. National Grid would also consider that any operational restrictions preventing despatch through 0 Mvar lasting longer than 12 months are long term restrictions and should be considered in the same way as permanent connection conditions. Therefore, this alternative seeks to extend part 3 of the original CAP169 to include long term reactive despatch restrictions where the restriction is in place for 12 months or more.

National Grid believes that 12 months is an appropriate period of time to signal such a long term reactive despatch restriction, as restrictions for such protracted periods are likely to be as a result of the configuration of the DNO network and the embedded connection to this network, rather than representing a short term temporary operational restriction. Moreover once the 12 month period has been exceeded the restriction begins to impact upon multiple outage years.

The 20% payment associated with such restrictions will be applied once the 12 month period has been exceeded (with full payment made until this 12 month period is reached). It will continue to apply until such time as notification is received that the restriction has been removed.

The 12 month period may be non-consecutive over a continuous period of 24 months. This is to ensure that there is no impact on the appropriate payment terms by temporarily removal of the restriction.

The element associated with the payment terms would be facilitated through the CUSC Schedule 3. Administration of this payment mechanism can be achieved through the existing settlements system and processes in place. As with the connection restrictions, National Grid would foresee communication of the long term reactive despatch restrictions being facilitated through the Grid Code.

Benefits

National Grid considers that this alternative proposal would allow the most economic and efficient operation of the system by facilitating appropriate remuneration in all circumstances – capturing both up front connection conditions and long term reactive despatch restrictions not known at the time of connection.

National Grid believes that this will offer an equitable solution ensuring that both categories as described above are treated in the same way, whilst not capturing short term temporary operational restrictions. The reduction in payment will not commence until 12 months has passed to ensure equitable treatment within this initial 12 months.

Through this, National Grid believes that this extension to the original Amendment Proposal will bring additional benefits to the original Amendment Proposal through extending the circumstances in which partial payment for Reactive Power will be

made when there is an extended period with a restriction in place on the ability to despatch to 0 Mvar.

Changes Proposed

CUSC

Over and above the changes proposed to the original CAP169, this alternative will require an alternative amendment to the CUSC, Schedule 3, appendix 1 and 2

- Point 2e describing notification of a reactive despatch restriction either:
 - Pre-connection (as with the original), or
 - On a temporary (operational) basis

A new definition will also be required for “Temporary Enduring Reactive Despatch Network Restriction” (which could either be for 12 consecutive months or 12 non-consecutive months with any 24 consecutive month period).

Grid Code

Over and above the changes proposed to the original Amendment Proposal, this alternative proposal will require additional Grid Code changes to facilitate communication of temporary reactive despatch restrictions.

It is proposed that communication of restrictions should be made by both the relevant Network Operator and the generator. In order to facilitate this, there are likely to be changes made to Grid Code sections BC1.6 (extending the existing Network Operator obligation relating to one Operational Day to cover more than one Operational Day) and BC2 Appendix 3 (extending the existing communication of revised Mvar data (relating to capability) to cover Constrained Reactive Despatch Restrictions).

ANNEX 5 – DRAFT WORKING GROUP ALTERNATIVE AMENDMENT 2

Draft Working Group Alternative Amendment 2 – Parts 1 and 2 of CAP169 (proposed by the CAP169 WG)

Description

CAP169 introduces three discreet changes relating to Reactive Power. These were raised by National Grid as one Amendment Proposal to allow complete consideration of the changes relating to Reactive Power that National Grid would like to see introduced to the CUSC at this time.

During Working Group discussion of the proposal it was clear that Amendment Proposal part 1 (as defined in the CAP169 Amendment Proposal relating to Reactive Power from Power Park Modules) and Amendment Proposal part 2 (as defined in the CAP169 Amendment Proposal relating to Reactive Power from Large Power Stations with a reactive capability below 15Mvar) raised little concern or debate within the group and were generally accepted as positive changes to the current version of the CUSC. However, Amendment Proposal part 3 (as defined in the CAP169 Amendment Proposal relating to embedded generators) generated greater debate within the group with alternatives to this section more likely to be introduced.

This draft Working Group Alternative Amendment contains Amendment Proposal part 1 and Amendment Proposal part 2 of the original Amendment Proposal, with Amendment Proposal part 3 removed.

Benefits

Given the agreement by the Working Group on Amendment Proposal part 1 and Amendment Proposal part 2 of CAP169 it was felt by the group that a prudent approach would be to raise a draft Working Group Alternative Amendment to CAP169 which comprises only Amendment Proposal part 1 and Amendment Proposal part 2. This should ensure that if, following submission of the Amendment Report to the Authority, there is a view that Amendment Proposal part 3 should not be implemented the implementation of Amendment Proposal part 1 and Amendment Proposal part 2 will not be adversely affected.

Changes Proposed

The changes proposed with this draft Working Group Alternative Amendment would be the same as those proposed for Amendment Proposal part 1 and Amendment Proposal part 2 of CAP169. In terms of the indicative text prepared for the original Amendment Proposal CAP169 this would see removal of the following changes:

- Definition of Network Operator and Restricted Despatch Restriction
- Schedule 3, appendix 1, 2e
- Schedule 3, appendix 2, 2e

ANNEX 6 - CUSC Working Group consultation – RESPONSE Proforma

CAP169 Provision of Reactive Power from Power Park Modules, Large Power Stations and Embedded Power Stations

CUSC parties are invited to respond to this consultation, expressing their views and in respect of the specific questions detailed below. Parties are invited to supply the rationale for their responses.

Please send your responses by cusc.team@uk.ngrid.com by 1st June 2009. Please note that any responses received after the deadline may not receive due consideration by the Working Group.

Any queries on the content of the consultation should be addressed to carole.hook@uk.ngrid.com

These responses will be considered by the Working Group and will record the conclusion they reach on your request; as well as showing their discussions of your requests and the conclusion they reach on your request. If appropriate the group will amend their report accordingly and will record your response in the Working Group Report.

Respondent:	<i>Name and contact details</i>
Company Name:	
Please express your views including rational with regard to the Working Group Consultation? Including any issues, suggestions or queries	
Do you believe that the proposed original or any of the alternatives better facilitate the CUSC applicable objectives, please state your reasoning?	

<p>Do you support the proposed implementation of CAP169, if no please state why and provide an alternative suggestion were possible?</p> <p>Do you agree with the Working Group suggested implementation date, if no please state why and provide an alternative suggestion if possible?</p>	
<p>Any other comments?</p>	

<p>Do you wish to raise a WG Consultation Request for the Working Group to consider?</p>	<p><i>YES / NO</i></p> <p>If your response is yes please complete a WG Consultation Request form and return to the above address with your completed Working Group Consultation responses proforma.</p>

Specific questions for CAP169:

Q	Question	Rationale
1.	Are the 12 and 24 month time period proposed in draft Working Group Alternative Amendment 1 appropriate?	The time periods were considered appropriate by the Working Group, however views from the industry are invited (see section 4.30 and 5.0)
2.	The implementation timescales proposed in section 7 of this document	Does the industry consider that the implementation timescales proposed are reasonable? (see section 7)
3.	Comments invited on the changes proposed to the Methodology for the Aggregation of Reactive power Metering.	Discussed within the Working Group, with industry views invited (see section 9.21)
4.	Comments invited on the proposal for communication of a reactive despatch restriction to be made by both generators and DNOs.	Discussed within the Working Group, with industry views invited (see section 9.6)