



**A REPORT TO THE AUTHORITY**  
**Pursuant to Paragraph 2 of Condition C14 of the**  
**Transmission Licence**

**Consequential Grid Code changes relating to CUSC**  
**Amendment Proposal 169**

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

**The purpose of this document is to assist the Authority in its  
decision of whether to implement the proposed  
Grid Code Modification**

Consultation Paper Ref	E/09
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Prepared by	National Grid

## **DISTRIBUTION**

Name	Organisation
Authority	Ofgem
Grid Code Review Panel Members	Various
National Grid Industry Information Website	

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## **SUMMARY OF PROPOSALS**

- 0.1 The proposed changes to the Grid Code, as outlined in this Report, were developed by a joint Working Group of the Grid Code Review Panel (GCRP) and the CUSC Balancing Services Standing Group (BSSG). The intention of the proposals is to facilitate the provision of Reactive Power from Power, Park Modules, Large Power Stations and Embedded Power Stations. The proposals were discussed at the GCRP meeting on 2<sup>nd</sup> September 2009 and the Panel agreed that they should be taken to industry consultation.
- 0.2 National Grid has consulted Authorised Electricity Operators on this issue. All respondents were supportive or neutral to the proposals. Some text changes intended as clarifications were suggested and have been included.
- 0.3 The proposals will ensure that whichever, if any, of the proposals made under CAP169 are approved by the Authority, will have the necessary supporting modifications to the Grid Code to facilitate its efficient implementation.
- 0.4 National Grid recommends to the Authority that these proposals be approved.

## **A. INTRODUCTION**

1. Paragraph 2 of Condition C14 of the Transmission Licence granted to National Grid Electricity Transmission plc ("National Grid") provides that National Grid shall, in consultation with Authorised Electricity Operators liable to be materially affected thereby, periodically review the Grid Code and its implementation. That paragraph also requires National Grid, following such review, to send to the Authority:-
  - (a) a report on the outcome of such review;
  - (b) any proposed revisions to the Grid Code as National Grid (having regard to the outcome of such review) reasonably thinks fit for the achievement of the objectives set out in sub-paragraph (b) of Condition C14 of the Transmission Licence; and
  - (c) any written representations or objections from authorised electricity operators (including any proposals by such operators for revisions to the Grid Code not accepted by National Grid in the course of the review) arising during the consultation process and subsequently sustained.
2. This review examines proposed consequential amendments to the Grid Code relating to CAP169 and the provision of Reactive Power from Power Park modules, Large Power Stations and Embedded Power Stations. The proposals were developed through the joint Grid Code/ CUSC Balancing Services Standing Group CAP169 Working Group.
3. The proposed changes to the Grid Code were discussed with the Grid Code Review Panel (GCRP) on 2<sup>nd</sup> September 2009. Panel Members agreed that National Grid should issue a Consultation Paper regarding the proposed changes.
4. National Grid, in accordance with its obligations under its Transmission Licence, consulted Authorised Electricity Operators by including Consultation Paper E/09 on the National Grid Industry Information website. This paper contained an explanation of the proposed amendments to the Grid Code and a copy is attached to this Report as Appendix B. National Grid informed interested parties that a copy of the Consultation Paper had been placed on its website to ensure its wide availability.
5. Comments were invited from all such Authorised Electricity Operators by 7<sup>th</sup> October 2009. National Grid received four responses from Authorised Electricity Operators.
6. The proposed revisions to the Grid Code are explained below.

## **B. DESCRIPTION OF THE PROPOSED AMENDMENTS AND THEIR EFFECTS**

### 7. Background

7.1 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.

7.2 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 was a joint CUSC and Grid Code Working Group, to allow the relevant changes for both codes to be considered and developed in parallel.

### 8. Part 1 – Provision of Reactive Power from Power Park Modules

8.1 The Grid Code has previously been amended (G/06) to mandate the reactive capability requirement from Power Park Modules. Part 1 of CAP169 looks to amend various sections of CUSC to similarly 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.

8.2 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.

8.3 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.

8.4 The corresponding Grid Code change for this part 1 of CAP169 is to BC2 Appendix 3, whereby the appropriate capability data table for submission of revised Mvar capability by Power Park Modules has not yet been added.

### 9. Part 2 - Provision of Reactive Power from Large Power Stations

9.1 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.

9.2 This part 2 of CAP169 does not require any corresponding Grid Code changes.

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

- 10.1 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.
- 10.2 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.
- 10.3 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).
- 10.4 This part 3 of CAP169 requires amendment to the Grid Code to allow communication of such connection restrictions to be provided to National Grid.

11. Consequential Grid Code Changes

- 11.1 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.
- 11.2 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. It was proposed that this be introduced to PC.A.3.2.2 with corresponding changes required to DRC Schedule 11 and OC2. In addition, three new definitions are required for Part 3.

12. Working Group discussions

- 12.1 The complete and full Working Group discussions relating to main CUSC element of this amendment are contained in the CAP169 Final Amendment Report<sup>1</sup>. To avoid extensive duplication, only the elements directly relevant to the consequential changes to the Grid Code are included in this Report.
- 12.2 The Working Group developed three alternatives:
- CUSC Working Group Alternative Amendment 1 (WGAA1) was raised by National Grid and relates to part 3 of CAP169, extending CAP169 to cover long term restrictions not communicated at the time of connection.

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<sup>1</sup> CAP169 Final Amendment Report:  
<http://www.nationalgrid.com/uk/Electricity/Codes/systemcode/amendments/currentamendmentproposals/>

- CUSC Working Group Alternative Amendment 2 (WGAA2) was prepared by National Grid on behalf of the Working Group and contains parts 1 and 2 of the Original Amendment Proposal with part 3 removed.
  - CUSC Working Group Alternative Amendment 3 (WGAA3) was raised as a WG Consultation Alternative Request by EdF Energy. It proposes zero payment where a 3<sup>rd</sup> party restriction exists (preventing the embedded unit providing the service in accordance with an instruction from National Grid). It also proposes that where such a restriction has been notified no despatch instruction will be issued by NGET.
- 12.3 Each of the four alternative options (the original, WGAA1, WGAA2 and WGAA3) would require different amendments to the Grid Code. The associated discussion and required changes are outlined below and within Appendix A.

### **Grid Code Specific Discussions**

- 12.4 The Working Group acknowledged that the revised Mvar form as it stood did not accommodate the provision of Reactive Power from Power Park Modules, as required by part 1, and therefore discussed the Grid Code changes required, namely a revision to BC2 Appendix 3. Revisions were subsequently developed and agreed by the Working Group.
- 12.5 With regards to part 3 of CAP169, 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.
- 12.6 On the request of the Grid Code Review Panel during the May 2009 meeting, two additional DNO representatives participated in the CAP169 Working Group meeting of 26th June. The appropriateness of the proposed communication from both the DNO and the embedded generator was discussed and agreed during the meeting.
- 12.7 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.
- 12.8 To correspond to the changes in PC.A.2.3.3 minor changes are also required to DRC Schedule 11 (for communication from Network Operators) and OC2 (for communication from generators).
- 12.9 Definitions for Reactive Despatch Instruction, Commercial Boundary and Reactive Despatch Network Restriction will also be required. As with normal practice it was felt that there were advantages of consistency if the definition were the same across both the CUSC and the Grid Code. As such Reactive

Despatch Network restriction is defined in the Grid Code (with reference made to the Grid Code definition in the CUSC), whilst Reactive Despatch Instruction and Commercial Boundary are defined in the CUSC, with reference to these definitions being proposed for the Grid Code.

- 12.10 For 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.
- 12.11 The Working Group agreed it was important that the Grid Code changes needed to make clear that the communication of a DNO imposed reactive dispatch restriction from a generator is not a capability restriction. Consequently a specific section was added to the generator performance chart and the MVA<sub>r</sub> redeclaration form to differentiate a DNO restriction from a capability restriction.
- 12.12 For WGAA3 the group discussed the additional requirement when such restrictions were in place for no instruction to be issued by National Grid to the restricted generator. It was agreed that BC2 was the most appropriate place for this to be introduced.

#### **Local Voltage Control**

- 12.13 The Working Group discussed specific restrictions where embedded generators were required, by the Distribution Network Operator, to follow local voltage conditions for local voltage control purposes. The group agreed that whilst this was not a specific range restriction it clearly represents a reactive despatch network restriction for National Grid. The Authority representative questioned why embedded generators are being frequently connected with the obligation to control local volts.
- 12.14 A DNO representative informed the Working Group that the majority of developers in Scotland have chosen to connect directly to the 33kV distribution network, with a cable connection driven by concerns of low connection costs and avoiding planning issues. By requesting such wind farms to operate in voltage control mode, rather than unity power factor, breaching of the statutory voltage limit is avoided. This allows reactive support to be spread across all Users and minimises reactive demand from the DNO networks.
- 12.15 The representative stated that if future payments are to be made to the wind farms providing reactive support, this may have to be balanced by reflecting the costs onto sites that present a reactive demand on the network. The status quo seems a sensible alternative where such small parties are not involved in the reactive market. Another option identified would be force connection at 132kV although such connections may be unpopular with developers as such directly connected generators would have higher connection costs.
- 12.16 The Working Group discussed that if a generator had been instructed by the Distribution Network Operator to maintain local volts, it would not be possible to communicate such a restriction on the proposed Generator Performance Chart, as although the full reactive range remains possible, the generator is not available for instruction by the System Operator. National Grid confirmed that such a constraint would be captured by part 3 of CAP169 and the addition of a tick box on the generator performance chart, would allow it be

effectively communicated.

### 13. Proposed Grid Code Changes

13.1 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.

13.2 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).

13.3 Additional definitions would also be required in the Grid Code to facilitate part 3:

- Reactive Despatch Instruction - as defined in the CUSC
- Commercial Boundary - as defined in the CUSC
- Reactive Despatch Network Restriction - A restriction placed upon an Embedded Generating Unit, Embedded Power Park Module or DC Converter at an Embedded DC Converter Station by the Network Operator that prevents the Generator or DC Converter Station owner in question (as applicable) from complying with any Reactive Despatch Instruction with respect to that Generating Unit, Power Park Module or DC Converter whether to provide MVars over the range referred to in CC 6.3.2 or otherwise.

13.4 WGAA1 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.

13.5 WGAA2 would only require the Grid Code change outlined in 13.1 above.

13.6 WGAA3 would require the same Grid Code drafting as WGAA1 (detailed in 13.2 and 13.3 above). The Grid Code (BC2) will also require an additional point to reflect that where a reactive despatch network restriction is in place no instruction will be given.

13.7 As the CAP169 Working Group was a joint CUSC and Grid Code Working Group the proposed Grid Code changes were discussed within the Working Group. A separate CUSC report has been prepared for the CUSC Amendments Panel and the Authority detailing the discussions within the Working Group relating to the CUSC and the associated drafting.

13.8 The proposed solution will:

- Give the ability for generators to notify the System Operator appropriately regarding changes to their availability for reactive despatch.
- Facilitate the CUSC Amendment Proposal CAP169, (Original and Alternatives), which will improve the efficiency and effectiveness of the despatch of reactive services from generation.

### 14. Impact on National Electricity Transmission System

14.1 The proposal will ensure that the System Operator will have the commercial

and code mechanisms to allow the dispatch of reactive power from a greater range of power stations, all of which have an obligation to provide the capability to do so, which should lead to a more efficient and cost effective market. The proposals also allow Power Park Modules to communicate revised reactive capability and therefore facilitate the effective and efficient operation of the system.

15. Impact on Grid Code Users

15.1 The changes to the Grid Code under part 1, facilitates Power Park Modules in communicating revised reactive power capability after connection.

15.2 Under part 3, both Distribution Network Operators and Embedded Generators have an obligation to communicate reactive despatch restrictions at connection under the Original proposals. Under WGAA1 there is also a require to communicate operational reactive restrictions. Reactive Despatch restrictions are communicated by the Generator (or Power Park Module) Performance Chart for a generator and via the Data Registration Code by the Network Operator.

16. Assessment Against Grid Code Objectives

16.1 The proposed changes outlined in E/09 Report to the Authority will better facilitate Grid Code Objectives, in particular:

ii) to facilitate competition in the generation and supply of electricity;

and

iii) to promote the security and efficiency of the electricity generation, transmission and distribution system in Great Britain

17. Impact on Industry Documents

**Impact on Core Industry Documents**

17.1 The requirements for this Grid Code modification stems from the CUSC Amendment Proposals, CAP169 which has various proposed changes to the CUSC. Grid Code Report to the Authority E/09, itself, has no further impact upon other Core Industry Documents.

**Impact on other Industry Documents**

17.2 Grid Code Report to the Authority A/09 has no impact upon other Industry Documents.

18. Environmental Impact Assessment

18.1 The Working Group considered whether a carbon costing exercise was required for CAP169, and concluded that the baseline carbon profile would not be altered as a result of the amendment. This conclusion was based on the fact that the main impact of the proposal will be on payment provisions and access to a Reactive Power service which is already provided for (through the Grid Code capability requirement). Therefore, the Working Group concluded that CAP169 and E/09 would have no direct impact on the environment.

## **C. CONSULTATION RESPONSES**

19. National Grid has consulted Authorised Electricity Operators on this issue and four responses were received. All respondents were supportive of the implementation of at least one of the Working Group Alternative Amendments. These responses, along with National Grid's replies, are included as Appendix C.
20. Respondent E/09-CR-01 (EDF Energy) was generally supportive of parts 1 and 2 of the proposals, although EDF believed that part 3 of the Original should not be applied and therefore supports WGAA3 as the best option. Part 3 was not thought appropriate as a DNO restriction is not under an embedded generator's direct control and so application of the "default" payment is not justified.
21. EDF noted that on occasion the DNO restriction on embedded generators may be in place because the generator originally requested a specific type of connection, which the DNO had previously considered sub-optimal. This was thought to be a compelling case why generators ought not to receive payments from National Grid which stem from a User choice restricted connection.
22. Respondent E/09-CR-02 (ENW) stated that it was not directly affected by the proposed Grid Code changes but was comfortable that they seemed appropriate, in relation to the CUSC changes. No comments were presented on parts 1 and 2 of the proposals. The respondent was unclear why, historically embedded generators had been obliged to provide reactive power capability and why there appeared to be a difference in treatment between synchronous and asynchronous embedded generators, where the later has to absorb and generate reactive power. The respondent argued that such arrangements leads National Grid to be exposed to payment for reactive power that is determined by DNO network flows, which are not under their control.
23. The respondent confirmed that reactive restrictions that stem from the DNO's network generally are a result of the connection requested by the embedded generator that, for example, may often be to achieve as cheap a connection as possible. The respondent stated that because of little bearing on DNOs, he was indifferent between WGAA1, WGAA3 and the Original. Regarding WGAA2, it was noted that such arrangements leaves National Grid exposed to inappropriate reactive power payments.
24. Respondent E/09-CR-03 (E.ON UK) summarised its position as being supportive of WGAA2 and very cautiously supportive of WGAA1. Specific comments were made on the proposed Grid Code drafting for BC2 Appendix 3 Annexure 3 and several revisions were suggested to improve the clarity of the proposed form. All of the three suggested wording changes have been included in the final drafting. The suggestions included a change of layout for clarity, the deletion of an unnecessary "at" and the clarification of which voltage level Power Park Module reactive power capability should be measured at.
25. Respondent E/09-CR-04 (RWE Group) was supportive of parts 1 and 2 of the changes as it was thought to increase the pool of reactive providers of reactive power and therefore facilitate competition in the area. The respondent remained unconvinced of part 3 of the original proposals where a reduced payment to the generator does not reflect the generators continued

ability to provide some useful reactive power service to National Grid or its ability to restore its reactive capability.

26. The respondent was also not persuaded by WGAA3, which it was believed would reduce the number of providers of reactive services National Grid has available. Consequently, the preferred option was WGAA2 which implements part 1 and 2, only.
27. In conclusion all responses either supported the proposed Grid Code changes or were neutral to them, no matter which of the Working Group Alternative Amendments were implemented.

## **D. LEGAL TEXT AND RECOMMENDATIONS**

### **Balancing Code**

28. All four proposals require an amendment to BC2; part of the change under the Original and WGAA2 is identical (Annexure 3) whereas WGAA2 has an additional clause added. Both WGAA1 and WGAA3 have unique changes to this section.
29. Under the Original and all Working Group Alternatives, it is proposed to add an additional annexure, BC Appendix 3 Annexure 3. The annexure provides Power Park Units and DC Converters a pro-forma by which it can communicate its reactive power capability at a range of active power output levels.
30. In addition, under WGAA2, an additional two clauses are added to BC1.6.1, namely (d) and (e). The clauses outline the form of submission that a Network Operator must submit if a generator is required to either control local voltage or limit its MVar output to a specific range for greater than one operational day.
31. Under WGAA1, a generator is required to communicate not only reactive despatch restrictions at the time of connection but those stemming from long term operational constraints from the local network. Consequently the proposed pro-forma under BC Appendix 3 Annexure 3, including a tick box by which a generator can communicate whether it is under a Reactive Despatch Network Restriction.
32. The drafting under WGAA3 proposed a new clause, BC.2.8.5, relating to the rejection of Ancillary Service instructions. The clause ensures that if National Grid receives the appropriate notification that a Reactive Despatch Network Restriction is in place on a Embedded Generator, then the generator will not be dispatched for reactive services.

### **Planning Code**

33. Under the Original, WGAA1 and WGAA3, it is proposed to add a number of new clauses to PC.A.3 that puts an obligation upon Embedded Generators to communicate if it is under any Reactive Despatch Network Restrictions by highlighting them on the Generator Performance Chart.

### **Operating Code**

34. Under the Original, WGAA1 and WGAA3, it is proposed to add two additional lines to the Generator Performance Chart pro-forma within OC.2. A tick box has also been added so generators that are required to follow local volt conditions can communicate this. The revisions to this chart allow the generator to communicate to National Grid the range over which it is available for reactive despatch. The corresponding changes are also proposed for the Power Park Module Performance Chart which also forms part of OC2 Appendix 1.

### **Data Registration Code**

35. Under the Original, WGAA1 and WGAA3, it is proposed to add a new line to the Connection Point Data table within DRC Schedule 11. The new line ensures the DNO informs National Grid of any Reactive Despatch Network Restrictions on an Embedded Generator at the time of connection.

### **Glossary and Definitions**

36. Under the Original, WGAA1 and WGAA3, additional definitions in the Grid Code are required to facilitate part 3. The current definition from the CUSC for Reactive Despatch Instruction and Commercial Boundary are proposed and a new definition for Reactive Despatch Network Restriction is proposed.
37. Recommendation
38. National Grid recommends to the Authority that these consequential proposals be approved such that there is greater communication and clarity of the availability for reactive despatch of Power Park Modules and Embedded Generation. Such changes are required by CUSC Amendment Proposal 169, which seeks to improve the reactive provisions within in the CUSC for Power Park Modules, Large Generators and Embedded Generators.
39. The proposed Grid Code changes are shown in Appendix A with deletions shown struck through and insertions highlighted by text in red with a double underline.
40. As indicated above, National Grid proposes the revisions to the Grid Code set out in Appendix A, which revisions we reasonably think fit for the achievement of the objectives referred to in sub-paragraph (b) of paragraph 1 of Condition C14 of the Transmission Licence. In view of this, National Grid would be grateful if the Authority would approve the revisions pursuant to paragraph 3 of Condition C14 of the Transmission Licence.
41. Given the logistic exercise of organising replacement pages to reflect the changes required by your letter of approval, I would be grateful if you would contact me prior to issuing any letter specifying an effective date in order to ensure that the date is consistent with any other Code changes which may then be approved or be close to being approved.

Tom Ireland

## **APPENDIX A: PROPOSED GRID CODE CHANGES**

The proposed legal text is reflective of the current Grid Code baseline as specified in Issue 4 Revision 0. Each part reflects the required Grid Code changes for the Original amendment and all three of the Working Group Alternatives:

- **PART A      PROPOSED LEGAL TEXT - ORIGINAL**
- **PART B      PROPOSED LEGAL TEXT - WGAA1**
- **PART C      PROPOSED LEGAL TEXT - WGAA2**
- **PART D      PROPOSED LEGAL TEXT - WGAA3**

**PART A: PROPOSED LEGAL TEXT TO MODIFY THE CUSC – ORIGINAL**

The text required to give effect to each part of the proposals is:

- Part 1: BC2 Appendix 3
- Part 2:
- Part 3: PCA3, DRC Schedule 11, OC2 Appendix 1 and Glossary and Definitions

**The following pages show the proposed marked up changes for the following sections of the Grid Code:**

- 1. BC2 Appendix 3**
- 2. PCA3**
- 3. OC2 Appendix 1**
- 4. DRC Schedule 11**
- 5. Glossary and Definitions**

Changes are marked as outlined in the table below:

<b>Legend:</b>
<u>Insertion</u>
<del>Deletion</del>

### Appendix 3 – Submission of Revised Mvar Capability

BC2.A.3.1 For the purpose of submitting revised Mvar data the following terms shall apply:

Full Output	In the case of a <b>Synchronous Generating Unit</b> (as defined in the Glossary and Definitions and not limited by BC2.2) is the MW output measured at the generator stator terminals representing the LV equivalent of the <b>Registered Capacity</b> at the <b>Grid Entry Point</b> , and in the case of a <b>Non-Synchronous Generating Unit</b> (excluding <b>Power Park Units</b> ), <b>DC Converter</b> or <b>Power Park Module</b> is the <b>Registered Capacity</b> at the <b>Grid Entry Point</b>
Minimum Output	In the case of a <b>Synchronous Generating Unit</b> (as defined in the Glossary and Definitions and not limited by BC2.2 ) is the MW output measured at the generator stator terminals representing the LV equivalent of the <b>Minimum Generation</b> at the <b>Grid Entry Point</b> , and in the case of a <b>Non-Synchronous Generating Unit</b> (excluding <b>Power Park Units</b> ), <b>DC Converter</b> or <b>Power Park Module</b> is the <b>Minimum Generation</b> at the <b>Grid Entry Point</b>

BC2.A.3.2 The following provisions apply to faxed submission of revised Mvar data:

- (a) The fax must be transmitted to **NGET** (to the relevant location in accordance with GC6) and must contain all the sections from the relevant part of Annexure 1 and from either Annexure 2 or 3 (as applicable) but with only the data changes set out. The "notification time" must be completed to refer to the time of transmission, where the time is expressed as London time.
- (b) Upon receipt of the fax, **NGET** will acknowledge receipt by sending a fax back to the **User**. The acknowledgement will either state that the fax has been received and is legible or will state that it (or part of it) is not legible and will request re-transmission of the whole (or part) of the fax.
- (c) Upon receipt of the acknowledging fax the **User** will, if requested, re-transmit the whole or the relevant part of the fax.
- (d) The provisions of paragraphs (b) and (c) then apply to that re-transmitted fax.

APPENDIX 3 - ANNEXURE 1



Company name **REVISED Mvar DATA**

TO: **NGET** Transmission Control Centre

Fax telephone No.

Number of pages inc. header:.....

Sent By : .....

Return Acknowledgement Fax to .....

For Retransmission or Clarification ring.....

Acknowledged by **NGET**: (Signature)

.....

Acknowledgement time and date .....

Legibility of FAX :

Acceptable

Unacceptable  
(List pages if appropriate)

( Resend FAX )

Grid Code BC2 Appendix 3 – CAP169 corresponding changes

APPENDIX 3 - ANNEXURE 2

To: **NGET** Transmission Control Centre

From : [Company Name & Location]

**REVISED Mvar DATA – GENERATING UNITS EXCLUDING POWER PARK UNITS AND DC CONVERTERS**

NOTIFICATION TIME:

HRS	MINS	DD	MM	YY
.	/	/		

GENERATING UNIT* <del>POWER PARK MODULE</del> DC CONVERTER	
--	--

Start Time/Date (if not effective immediately)

**REACTIVE POWER CAPABILITY AT SYNCHRONOUS GENERATING UNIT STATOR TERMINAL**  
(at rated terminal volts) ~~OR AT THE CONNECTION POINT FOR OTHER GENSETS AND DC CONVERTERS~~

	MW	LEAD (Mvar)	LAG (Mvar)
<b>AT RATED MW</b>			
AT FULL OUTPUT (MW)			
AT MINIMUM OUTPUT (MW)			

**GENERATING UNIT STEP-UP TRANSFORMER DATA, WHERE APPLICABLE**

TAP CHANGE RANGE (+%,-%)	TAP NUMBER RANGE

**OPTIONAL INFORMATION** (for Ancillary Services use only) -

**REACTIVE POWER CAPABILITY AT COMMERCIAL BOUNDARY** (at rated stator terminal and nominal system volts)

	LEAD (Mvar)	LAG (Mvar)
<b>AT RATED MW</b>		

Predicted End Time/Date (to be confirmed by redeclaration)

Redeclaration made by (Signature) \_\_\_\_\_

**Generating Unit** has the meaning given in the Glossary and Definitions and is not limited by BC2.2.

\* For a CCGT, the redeclaration is for an individual CCGT unit and not the entire module.

APPENDIX 3 - ANNEXURE 3

To: NGET Transmission Control Centre

From : [Company Name & Location]

REVISED Mvar DATA – POWER PARK UNITS AND DC CONVERTERS

<u>HRS MINS DD MM YY</u> ____ / ____ / ____
--

NOTIFICATION TIME:

<u>POWER PARK MODULE/ DC CONVERTER</u>	
--	--

Start Time/Date (if not effective immediately)

REACTIVE POWER CAPABILITY AT:

- GRID ENTRY POINT (ENGLAND AND WALES); OR
- HV SIDE OF RELEVANT TRANSFORMER (SCOTLAND); OR
- USER SYSTEM ENTRY POINT (IF EMBEDDED) OF THE POWER PARK MODULE; OR
- DC CONVERTER OR THE AGGREGATED CAPABILITY OF THE POWER PARK UNITS AT THE POWER PARK UNIT TERMINALS

	<u>MW</u>	<u>LEAD (Mvar)</u>	<u>LAG (Mvar)</u>
<u>AT RATED MW</u>			
<u>AT 50% OF RATED MW</u>			
<u>AT 20% OF RATED MW</u>			
<u>BELOW 20% OF RATED MW</u>			
<u>AT 0% OF RATED MW</u>			

Confirmation of voltage to which these figures relate

POWER PARK MODULE OR DC CONVERTER STEP-UP TRANSFORMER DATA, WHERE APPLICABLE

<u>TAP CHANGE RANGE (+%,-%)</u>	<u>TAP NUMBER RANGE</u>

Predicted End Time/Date (to be confirmed by redeclaration)

Redeclaration made by (Signature) \_\_\_\_\_

GRID CODE PCA.3 – CAP169 corresponding drafting

PC.A.3 **GENERATING UNIT AND DC CONVERTER DATA**

PC.A.3.1 **Introduction**

**Directly Connected**

PC.A.3.1.1 Each **Generator** and **DC Converter Station** owner with an existing, or proposed, **Power Station** or **DC Converter Station** directly connected, or to be directly connected, to the **National Electricity Transmission System**, shall provide **NGET** with data relating to that **Power Station** or **DC Converter Station**, both current and forecast, as specified in PC.A.3.2 to PC.A.3.4.

**Embedded**

PC.A.3.1.2 (a) Each **Generator** and **DC Converter Station** owner in respect of its existing, and/or proposed, **Embedded Large Power Stations** and/or **Embedded DC Converter Stations** and/or its **Embedded Medium Power Stations** subject to a **Bilateral Agreement** and each **Network Operator** in respect of its **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** and/or **Embedded DC Converter Stations** not subject to a **Bilateral Agreement** within such **Network Operator's System** in each case connected to the **Subtransmission System**, shall provide **NGET** with data relating to that **Power Station** or **DC Converter Station**, both current and forecast, as specified in PC.A.3.2 to PC.A.3.4.

(b) No data need be supplied in relation to any **Small Power Station** or any **Medium Power Station** or installations of direct current converters which do not form a **DC Converter Station**, connected at a voltage level below the voltage level of the **Subtransmission System** except:-

(i) in connection with an application for, or under, a **CUSC Contract**, or

(ii) unless specifically requested by **NGET** under PC.A.3.1.4.

PC.A.3.1.3 (a) Each **Network Operator** shall provide **NGET** with the data specified in PC.A.3.2.2(c)([\(i\) and \(ii\)](#)) and PC.A.3.2.2(i).

(b) **Network Operators** need not submit planning data in respect of an **Embedded Small Power Station** unless required to do so under PC.A.1.2(b) or unless specifically requested under PC.A.3.1.4 below, in which case they will supply such data.

PC.A.3.1.4 (a) PC.A.4.2.4(b) and PC.A.4.3.2(a) explain that the forecast **Demand** submitted by each **Network Operator** must be net of the output of all **Small Power Stations** and **Medium Power Stations** and **Customer Generating Plant** and all installations of direct current converters which do not form a **DC Converter Station**, **Embedded** within that **Network Operator's System**. The **Network Operator** must inform **NGET** of the number of such **Embedded Power Stations** and such **Embedded** installations of direct current converters (including the number of **Generating Units** or **Power**

GRID CODE PCA.3 – CAP169 corresponding drafting

**Park Modules or DC Converters**) together with their summated capacity.

- (b) On receipt of this data, the **Network Operator or Generator** (if the data relates to **Power Stations** referred to in PC.A.3.1.2) may be further required, at **NGET's** reasonable discretion, to provide details of **Embedded Small Power Stations** and **Embedded Medium Power Stations** and **Customer Generating Plant** and **Embedded** installations of direct current converters which do not form a **DC Converter Station**, both current and forecast, as specified in PC.A.3.2 to PC.A.3.4. Such requirement would arise where **NGET** reasonably considers that the collective effect of a number of such **Embedded Power Stations** and **Customer Generating Plants** and **Embedded** installations of direct current converters may have a significant system effect on the **National Electricity Transmission System**.

Busbar Arrangements

PC.A.3.1.5 Where **Generating Units**, which term includes **CCGT Units** and **Power Park Modules**, and **DC Converters**, are connected to the **National Electricity Transmission System** via a busbar arrangement which is or is expected to be operated in separate sections, the section of busbar to which each **Generating Unit, DC Converter or Power Park Module** is connected is to be identified in the submission.

PC.A.3.2 Output Data

PC.A.3.2.1 (a) Large Power Stations and Gensets

Data items PC.A.3.2.2 (a), (b), (c), (d), (e), (f) and (h) are required with respect to each **Large Power Station** and each **Generating Unit** and **Power Park Module** of each **Large Power Station** and for each **Genset** (although (a) is not required for **CCGT Units** and (b), (d) and (e) are not normally required for **CCGT Units** and (a), (b), (c), (d), (e), (f) and (h) are not normally required for **Power Park Units**).

(b) Embedded Small Power Stations and Embedded Medium Power Stations

Data item PC.A.3.2.2 (a) is required with respect to each **Embedded Small Power Station** and **Embedded Medium Power Station** and each **Generating Unit** and **Power Park Module** of each **Embedded Small Power Station** and **Embedded Medium Power Station** (although (a) is not required for **CCGT Units** or **Power Park Units**). [In addition, data item PC.A.3.2.2\(c\)\(ii\) is required with respect to each Embedded Medium Power Station.](#)

(c) CCGT Units/Modules

- (i) Data item PC.A.3.2.2 (g) is required with respect to each **CCGT Unit**;

GRID CODE PCA.3 – CAP169 corresponding drafting

- (ii) data item PC.A.3.2.2 (a) is required with respect to each **CCGT Module**; and
- (iii) data items PC.A.3.2.2 (b), (c), (d) and (e) are required with respect to each **CCGT Module** unless **NET** informs the relevant **User** in advance of the submission that it needs the data items with respect to each **CCGT Unit** for particular studies, in which case it must be supplied on a **CCGT Unit** basis.

Where any definition utilised or referred to in relation to any of the data items does not reflect **CCGT Units**, such definition shall be deemed to relate to **CCGT Units** for the purposes of these data items. Any **Schedule** in the DRC which refers to these data items shall be interpreted to incorporate the **CCGT Unit** basis where appropriate;

(d) **Cascade Hydro Schemes**

Data item PC.A.3.2.2(i) is required with respect to each **Cascade Hydro Scheme**.

(e) **Power Park Units/Modules**

Data items PC.A.3.2.2 (j) is required with respect to each **Power Park Module**.

(f) **DC Converters**

Data items PC.A.3.2.2 (a), (b), (c), (d) (e) (f) (h) and (i) are required with respect to each **DC Converter Station** and each **DC Converter** in each **DC Converter Station**. For installations of direct current converters which do not form a **DC Converter Station** only data item PC.A.3.2.2.(a) is required.

PC.A.3.2.2

Items (a), (b), (d), (e), (f), (g), (h), (i), (j) and (k) are to be supplied by each **Generator**, **DC Converter Station** owner or **Network Operator** (as the case may be) in accordance with PC.A.3.1.1, PC.A.3.1.2, PC.A.3.1.3 and PC.A.3.1.4. Item (c) is to be supplied by each **Network Operator** in all cases:-

- (a) **Registered Capacity** (MW);
- (b) **Output Usable** (MW) on a monthly basis;
- (c) (i) **System Constrained Capacity** (MW) ie. any constraint placed on the capacity of the **Embedded Generating Unit**, **Embedded Power Park Module**, an **Offshore Transmission System** at an **Interface Point** or **DC**

GRID CODE PCA.3 – CAP169 corresponding drafting

**Converter** at an **Embedded DC Converter Station** due to the **Network Operator's System** in which it is embedded. Where **Generating Units** (which term includes **CCGT Units**), **Power Park Modules**, an **Offshore Transmission System** at an **Interface Point** or **DC Converters** are connected to a **Network Operator's User System** via a busbar arrangement which is or is expected to be operated in separate sections, details of busbar running arrangements and connected circuits at the substation to which the **Embedded Generating Unit, Embedded Power Park Module, an Offshore Transmission System** at an **Interface Point** or **Embedded DC Converter** is connected sufficient for **NGET** to determine where the **MW** generated by each **Generating Unit, Power Park Module** or **DC Converter** at that **Power Station** or **DC Converter Station** or **Offshore Transmission System** at an **Interface Point** would appear onto the **National Electricity Transmission System**;

(iii) [any Reactive Despatch Network Restrictions:](#)

- (d) **Minimum Generation (MW);**
- (e) **MW obtainable from Generating Units, Power Park Modules or DC Converters at a DC Converter Station in excess of Registered Capacity;**
- (f) **Generator Performance Chart:**
  - (i) at the **Onshore Synchronous Generating Unit** stator terminals
  - (ii) at the electrical point of connection to the **Offshore Transmission System** for an **Offshore Synchronous Generating Unit**.
  - (iii) at the electrical point of connection to the **National Electricity Transmission System** (or **User System if Embedded**) for a **Non Synchronous Generating Unit** (excluding a **Power Park Unit**), **Power Park Module** and **DC Converter** at a **DC Converter Station**;

[Where a Reactive Despatch Network Restriction applies, its existence and details should be highlighted on the Generator Performance Chart, in sufficient detail for NGET to determine the nature of the restriction;](#)

- (g) a list of the **CCGT Units** within a **CCGT Module**, identifying each **CCGT Unit**, and the **CCGT Module** of which it forms part, unambiguously. In the case of a **Range CCGT Module**, details of the possible configurations should also be submitted, together:-
  - (i) (in the case of a **Range CCGT Module** connected to the **National Electricity Transmission System**) with details of the single **Grid Entry Point** (there can only be one) at which power is provided from the **Range CCGT Module**;
  - (ii) (in the case of an **Embedded Range CCGT Module**) with details of the single **User System Entry Point** (there can only be one) at which power is provided from the **Range CCGT Module**;

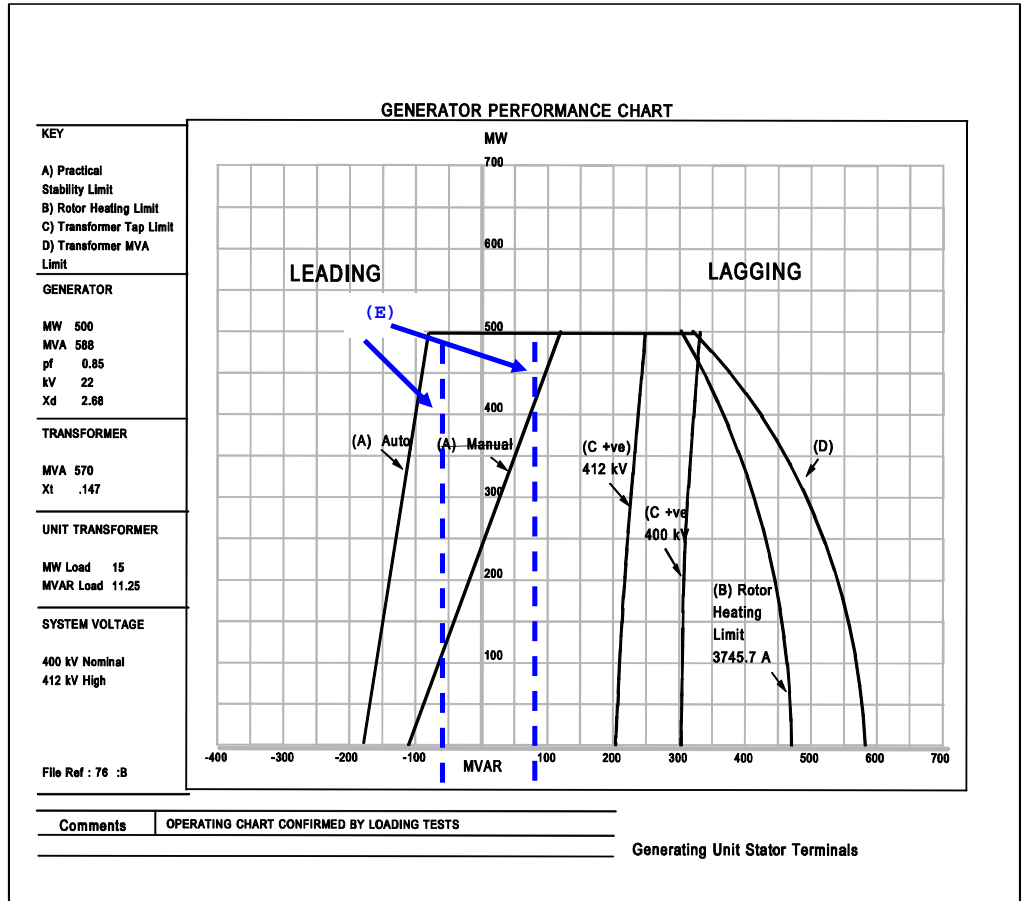
### GRID CODE PCA.3 – CAP169 corresponding drafting

Provided that, nothing in this sub-paragraph (g) shall prevent the busbar at the relevant point being operated in separate sections;

- (h) expected running regime(s) at each **Power Station** or **DC Converter Station** and type of **Generating Unit**, eg. **Steam Unit**, **Gas Turbine Unit**, **Combined Cycle Gas Turbine Unit**, **Power Park Module**, **Novel Units** (specify by type), etc;
- (i) a list of **Power Stations** and **Generating Units** within a **Cascade Hydro Scheme**, identifying each **Generating Unit** and **Power Station** and the **Cascade Hydro Scheme** of which each form part unambiguously. In addition:
  - (i) details of the **Grid Entry Point** at which **Active Power** is provided, or if **Embedded** the **Grid Supply Point(s)** within which the **Generating Unit** is connected;
  - (ii) where the **Active Power** output of a **Generating Unit** is split between more than one **Grid Supply Points** the percentage that would appear under normal and outage conditions at each **Grid Supply Point**.
- (j) The following additional items are only applicable to **DC Converters** at **DC Converter Stations**.
  - Registered Import Capacity** (MW);
  - Import Usable** (MW) on a monthly basis;
  - Minimum Import Capacity** (MW);
  - MW that may be absorbed by a **DC Converter** in excess of **Registered Import Capacity** and the duration for which this is available;
- (k) the number and types of the **Power Park Units** within a **Power Park Module**, identifying each **Power Park Unit**, and the **Power Park Module** of which it forms part, unambiguously. In the case of a **Power Station** directly connected to the **National Electricity Transmission System** with multiple **Power Park Modules** where **Power Park Units** can be selected to run in different **Power Park Modules**, details of the possible configurations should also be submitted. In addition for **Offshore Power Park Modules**, the number of **Offshore Power Park Strings** that are aggregated into one **Offshore Power Park Module** should also be submitted.

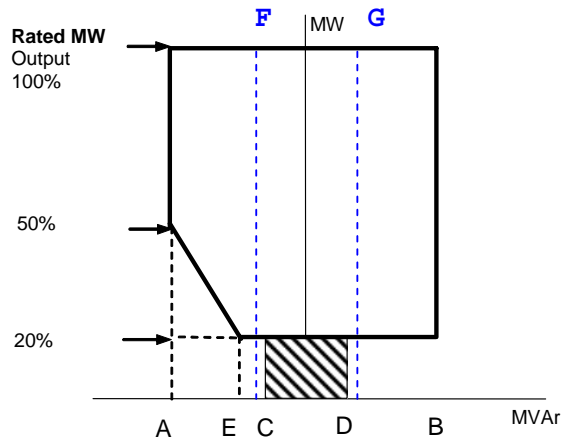
OC2, Appendix 1

(E) User System




Where a Reactive Despatch Network Restriction is in place which requires following of local voltage conditions, alternatively to (E), please check this box.

### POWER PARK MODULE PERFORMANCE CHART AT THE CONNECTION POINT OR USER'S SYSTEM ENTRY POINT



LEADING

LAGGING

Point A is equivalent (in MVar) to: 0.95 leading **Power Factor** at **Rated MW** output

Point B is equivalent (in MVar) to: 0.95 lagging **Power Factor** at **Rated MW** output

Point C is equivalent (in MVar) to: -5% of **Rated MW** output

Point D is equivalent (in MVar) to: +5% of **Rated MW** output

Point E is equivalent (in MVar) to: -12% of **Rated MW** output

Line F is equivalent (in MVar) to: [Leading Power Factor Reactive Dispatch Network Restriction](#)

Line G is equivalent (in MVar) to: [Lagging Power Factor Reactive Dispatch Network Restriction](#)

[Where a Reactive Dispatch Network Restriction is in place which requires following of local voltage conditions, alternatively to Line F and G, please check this box.](#)

**DRC SCHEDULE 11 – CAP169 CORRESPONDING CHANGES**

**DATA REGISTRATION CODE**

**CONNECTION POINT DATA**

**SCHEDULE 11**

Page 1 of 2

The following information is required from each **Network Operator** and from each **Non-Embedded Customer**. The data should be provided in calendar week 24 each year (although **Network Operators** may delay the submission until calendar week 28).

**Connection Point:**

<b>Connection Point Demand</b> at the time of - (select each one in turn) (Provide data for each Access Period associated with the Connection Point)	a) maximum <b>Demand</b> b) peak <b>National Electricity Transmission System Demand</b> (specified by <b>NGET</b> ) c) minimum <b>National Electricity Transmission System Demand</b> (specified by <b>NGET</b> ) d) maximum <b>Demand</b> during <b>Access Period</b> e) specified by either <b>NGET</b> or a <b>User</b>
Name of <b>Transmission Interface Circuit</b> out of service during <b>Access Period</b> (if reqd).	<b>PC.A.4.1.4.2</b>

DATA DESCRIPTION (CUSC Contract □ & CUSC Application Form ■)	Outturn	Outturn Weather Corrected	F.Yr 1	F.Yr 2	F.Yr 3	F.Yr 4	F.Yr 5	F.Yr 6	F.Yr 7	F.Yr 8	DATA CAT
Date of a), b), c), d) or e) as denoted above.											<b>PC.A.4.3.3</b>
Time of a), b), c), d) or e) as denoted above.											<b>PC.A.4.3.3</b>
<b>Connection Point Demand</b> (MW)											<b>PC.A.4.3.1</b>
<b>Connection Point Demand</b> (MVA <sub>r</sub> )											<b>PC.A.4.3.1</b>
Deduction made at <b>Connection Point</b> for <b>Small Power Stations, Medium Power Stations and Customer Generating Plant</b> (MW)											<b>PC.A.4.3.2(a)</b>
Reference to valid <b>Single Line Diagram</b>											<b>PC.A.4.3.5</b>
Reference to node and branch data.											<b>PC.A.2.2</b>

Note: The following data block can be repeated for each post fault network revision that may impact on the Transmission System.

Reference to post-fault revision of <b>Single Line Diagram</b>											<b>PC.A.4.5</b>
Reference to post-fault revision of the node and branch data associated with the <b>Single Line Diagram</b>											<b>PC.A.4.5</b>
Reference to the description of the actions and timescales involved in effecting the post-fault actions (e.g. auto-switching, manual, teleswitching, overload protection operation etc)											<b>PC.A.4.5</b>

<b>Access Group:</b>	
----------------------	--

Note: The following data block to be repeated for each **Connection Point** with the **Access Group**.

Name of associated <b>Connection Point</b> within the same <b>Access Group:</b>											<b>PC.A.4.3.1</b>
<b>Demand</b> at associated <b>Connection Point</b> (MW)											<b>PC.A.4.3.1</b>
<b>Demand</b> at associated <b>Connection Point</b> (MVA <sub>r</sub> )											<b>PC.A.4.3.1</b>
Deduction made at associated <b>Connection Point</b> for <b>Small Power Stations, Medium Power Stations and Customer Generating Plant</b> (MW)											<b>PC.A.4.3.2(a)</b>

Embedded Generation Data											
Connection Point:											
DATA DESCRIPTION	Outturn	Outturn Weather Corrected	F.Yr 1	F.Yr 2	F.Yr. 3	F.Yr. 4	F.Yr. 5	F.Yr 6	F.Yr 7	F.Yr 8	DATA CAT
<b><u>Small Power Station, Medium Power Station and Customer Generation Summary</u></b>	For each <b>Connection Point</b> where there are <b>Embedded Small Power Stations, Medium Power Stations or Customer Generating Stations</b> the following information is required:										
No. of <b>Small Power Stations, Medium Power Stations or Customer Power Stations</b>											<b>PC.A.3.1.4(a)</b>
Number of <b>Generating Units</b> within these stations											<b>PC.A.3.1.4(a)</b>
Summated Capacity of all these <b>Generating Units</b>											<b>PC.A.3.1.4(a)</b>

## DRC SCHEDULE 11 – CAP169 CORRESPONDING CHANGES

Where the <b>Network Operator's System</b> places a constraint on the capacity of an <b>Embedded Large Power Station</b>											
<b>Station Name</b>											PC.A.3.2.2(c)(i)
<b>Generating Unit</b>											PC.A.3.2.2(c)(i) <a href="#">and (ii)</a>
<b>System Constrained Capacity</b>											PC.A.3.2.2(c)(i) <a href="#">and (ii)</a>
<a href="#">Reactive Despatch Network Restriction</a>											<a href="#">PC.A.3.2.2(c)(ii)</a>

Where the <b>Network Operator's System</b> places a constraint on the capacity of an <b>Offshore Transmission System</b> at an <b>Interface Point</b>											
<b>Offshore Transmission System Name</b>											PC.A.3.2.2(c) <a href="#">(i)</a>
<b>Interface Point Name</b>											PC.A.3.2.2(c) <a href="#">(i)</a>
<b>Maximum Export Capacity</b>											PC.A.3.2.2(c) <a href="#">(i)</a>
<b>Maximum Import Capacity</b>											PC.A.3.2.2(c) <a href="#">(i)</a>

NOTES:

1. 'F.Yr.' means '**Financial Year**'. F.Yr. 1 refers to the current financial year.
2. All **Demand** data should be net of the output (as reasonably considered appropriate by the **User**) of all **Embedded Small Power Stations, Medium Power Stations** and **Customer Generating Plant**. Generation and / or Auxiliary demand of **Embedded Large Power Stations** should not be included in the demand data submitted by the **User**. **Users** should refer to the **PC** for a full definition of the **Demand** to be included.
3. Peak **Demand** should relate to each **Connection Point** individually and should give the maximum demand that in the **User's** opinion could reasonably be imposed on the **National Electricity Transmission System**. **Users** may submit the **Demand** data at each node on the **Single Line Diagram** instead of at a **Connection Point** as long as the user reasonably believe such data relates to the peak (or minimum) at the **Connection Point**.

In deriving **Demand** any deduction made by the **User** (as detailed in note 2 above) to allow for **Embedded Small Power Stations, Medium Power Stations** and **Customer Generating Plant** is to be specifically stated as indicated on the Schedule.

4. **NGET** may at its discretion require details of any **Embedded Small Power Stations** or **Embedded Medium Power Stations** whose output can be expected to vary in a random manner (eg. wind power) or according to some other pattern (eg. tidal power)
5. Where more than 95% of the total **Demand** at a **Connection Point** is taken by synchronous motors, values of the **Power Factor** at maximum and minimum continuous excitation may be given instead. **Power Factor** data should allow for series reactive losses on the **User's System** but exclude reactive compensation network susceptance specified separately in Schedule 5.
6. [Where a Reactive Despatch Network Restriction is in place which requires the generator to maintain a target voltage set point should be stated as an alternative to the size of the Reactive Despatch Network Restriction.](#)

## **GLOSSARY AND DEFINITIONS**

**Commercial Boundary** Has the meaning set out in the CUSC

**Reactive Despatch Instruction** Has the meaning set out in the CUSC

**Reactive Despatch Network Restriction** A restriction placed upon an **Embedded Generating Unit, Embedded Power Park Module or DC Converter** at an **Embedded DC Converter Station** by the **Network Operator** that prevents the **Generator or DC Converter Station** owner in question (as applicable) from complying with any **Reactive Despatch Instruction** with respect to that **Generating Unit, Power Park Module or DC Converter** at a **DC Converter Station**, whether to provide Mvars over the range referred to in CC 6.3.2 or otherwise.

**PART B: PROPOSED LEGAL TEXT TO MODIFY THE GRID CODE – WGAA1**

In addition to the changes proposed for the original, draft WGAA1 will also require a addition to BC1.6 and an alternative proposal for the changes to BC2 Appendix 3. For the purposes of the report only the additional changes are included, the remaining changes (not repeated here) in Part A of the Report to the Authority also being applicable.

**The following pages show the proposed marked up changes for the following sections of the CUSC:**

1. BC2 Appendix 3.
2. BC1.6

Changes are marked as outlined in the table below:

<b>Legend:</b>
<a href="#">Insertion</a>
<del>Deletion</del>

## Appendix 3 – Submission of Revised Mvar Capability

BC2.A.3.1 For the purpose of submitting revised Mvar data the following terms shall apply:

Full Output	In the case of a <b>Synchronous Generating Unit</b> (as defined in the Glossary and Definitions and not limited by BC2.2) is the MW output measured at the generator stator terminals representing the LV equivalent of the <b>Registered Capacity</b> at the <b>Grid Entry Point</b> , and in the case of a <b>Non-Synchronous Generating Unit</b> (excluding <b>Power Park Units</b> ), <b>DC Converter</b> or <b>Power Park Module</b> is the <b>Registered Capacity</b> at the <b>Grid Entry Point</b>
Minimum Output	In the case of a <b>Synchronous Generating Unit</b> (as defined in the Glossary and Definitions and not limited by BC2.2 ) is the MW output measured at the generator stator terminals representing the LV equivalent of the <b>Minimum Generation</b> at the <b>Grid Entry Point</b> , and in the case of a <b>Non-Synchronous Generating Unit</b> (excluding <b>Power Park Units</b> ), <b>DC Converter</b> or <b>Power Park Module</b> is the <b>Minimum Generation</b> at the <b>Grid Entry Point</b>

BC2.A.3.2 The following provisions apply to faxed submission of revised Mvar data:

- (a) The fax must be transmitted to **NGET** (to the relevant location in accordance with GC6) and must contain all the sections from the relevant part of Annexure 1 and from either Annexure 2 or 3 (as applicable) but with only the data changes set out. The "notification time" must be completed to refer to the time of transmission, where the time is expressed as London time.
- (b) Upon receipt of the fax, **NGET** will acknowledge receipt by sending a fax back to the **User**. The acknowledgement will either state that the fax has been received and is legible or will state that it (or part of it) is not legible and will request re-transmission of the whole (or part) of the fax.
- (c) Upon receipt of the acknowledging fax the **User** will, if requested, re-transmit the whole or the relevant part of the fax.
- (d) The provisions of paragraphs (b) and (c) then apply to that re-transmitted fax.

APPENDIX 3 - ANNEXURE 1



Company name **REVISED Mvar DATA**

TO: **NGET** Transmission Control Centre

Fax telephone No.

Number of pages inc. header:.....

Sent By : .....

Return Acknowledgement Fax to .....

For Retransmission or Clarification ring.....

Acknowledged by **NGET**: (Signature)

.....

Acknowledgement time and date .....

Legibility of FAX :

Acceptable


Unacceptable  
(List pages if appropriate)

( Resend FAX )

APPENDIX 3 - ANNEXURE 2

To: **NGET** Transmission Control Centre

From : [Company Name & Location]

**REVISED Mvar DATA – GENERATING UNITS EXCLUDING POWER PARK UNITS AND DC CONVERTERS**

NOTIFICATION TIME:

HRS	MINS	DD	MM	YY
.	/	/		

GENERATING UNIT* <del>POWER PARK MODULE</del> DC CONVERTER	
--	--

Start Time/Date (if not effective immediately)

**REACTIVE POWER CAPABILITY AT SYNCHRONOUS GENERATING UNIT STATOR TERMINAL**  
(at rated terminal volts) ~~OR AT THE CONNECTION POINT FOR OTHER GENSETS AND DC CONVERTERS~~

	MW	LEAD (Mvar)	LAG (Mvar)
<b>AT RATED MW</b>			
AT FULL OUTPUT (MW)			
AT MINIMUM OUTPUT (MW)			

**GENERATING UNIT STEP-UP TRANSFORMER DATA, WHERE APPLICABLE**

TAP CHANGE RANGE (+%,-%)	TAP NUMBER RANGE

**OPTIONAL INFORMATION** (for Ancillary Services use only) -

**REACTIVE POWER CAPABILITY AT COMMERCIAL BOUNDARY** (at rated stator terminal and nominal system volts)

	LEAD (Mvar)	LAG (Mvar)
<b>AT RATED MW</b>		

Predicted End Time/Date (to be confirmed by redeclaration)

This is a REACTIVE DESPATCH NETWORK RESTRICTION (please tick if appropriate)

Redeclaration made by (Signature) \_\_\_\_\_

## Draft WGAA1 - Grid Code BC2 Appendix 3

**Generating Unit** has the meaning given in the Glossary and Definitions and is not limited by BC2.2.  
\* For a CCGT, the redeclaration is for an individual CCGT unit and not the entire module.

APPENDIX 3 - ANNEXURE 3

To: NGET Transmission Control Centre

From : [Company Name & Location]

REVISED Mvar DATA – POWER PARK UNITS AND DC CONVERTERS

<u>HRS MINS DD MM YY</u> ./ /
----------------------------------

NOTIFICATION TIME:

<u>POWER PARK MODULE/ DC CONVERTER</u>	
--	--

Start Time/Date (if not effective immediately)

REACTIVE POWER CAPABILITY AT:

- GRID ENTRY POINT (ENGLAND AND WALES); OR
- HV SIDE OF RELEVANT TRANSFORMER (SCOTLAND); OR
- USER SYSTEM ENTRY POINT (IF EMBEDDED) OF THE POWER PARK MODULE; OR
- DC CONVERTER OR THE AGGREGATED CAPABILITY OF THE POWER PARK UNITS AT THE POWER PARK UNIT TERMINALS

	<u>MW</u>	<u>LEAD (Mvar)</u>	<u>LAG (Mvar)</u>
<u>AT RATED MW</u>			
<u>AT 50% OF RATED MW</u>			
<u>AT 20% OF RATED MW</u>			
<u>BELOW 20% OF RATED MW</u>			
<u>AT 0% OF RATED MW</u>			

Confirm voltage to which these figures relate

POWER PARK MODULE OR DC CONVERTER STEP-UP TRANSFORMER DATA, WHERE APPLICABLE

<u>TAP CHANGE RANGE (+%,-%)</u>	<u>TAP NUMBER RANGE</u>

Predicted End Time/Date (to be confirmed by redeclaration)

This is a **REACTIVE DESPATCH NETWORK RESTRICTION** (please tick if appropriate)

Redeclaration made by (Signature) \_\_\_\_\_

BC1.6 Special Provisions relating to **Network Operators**

BC1.6.1 **User System Data from Network Operators**

- (a) [Subject to \(d\) below](#). By 1000 hours each day each **Network Operator** will submit to **NGET** in writing, confirmation or notification of the following in respect of the next **Operational Day**:
- (i) constraints on its **User System** which **NGET** may need to take into account in operating the **National Electricity Transmission System**. In this BC1.6.1 the term "constraints" shall include restrictions on the operation of **Embedded CCGT Units**, and/or **Embedded Power Park Modules** as a result of the **User System** to which the **CCGT Unit** and/or **Power Park Module** is connected at the **User System Entry Point** being operated or switched in a particular way, for example, splitting the relevant busbar. It is a matter for the **Network Operator** and the **Generator** to arrange the operation or switching, and to deal with any resulting consequences. The **Generator**, after consultation with the **Network Operator**, is responsible for ensuring that no **BM Unit Data** submitted to **NGET** can result in the violation of any such constraint on the **User System**.
  - (ii) the requirements of voltage control and Mvar reserves which **NGET** may need to take into account for **System** security reasons.
  - (iii) where applicable, updated best estimates of **Maximum Export Capacity** and **Maximum Import Capacity** and **Interface Point Target Voltage/Power Factor** for any **Interface Point** connected to its **User System** including any requirement for post-fault actions to be implemented on the relevant **Offshore Transmission System** by **NGET**.
- (b) The form of the submission will be:
- (i) that of a **BM Unit** output or consumption (for MW and for Mvar, in each case a fixed value or an operating range, on the **User System** at the **User System Entry Point**, namely in the case of a **BM Unit** comprising a **Generating Unit** (as defined in the Glossary and Definitions and not limited by BC1.2) on the higher voltage side of the generator step-up transformer, or in the case of a **Power Park Module**, at the point of connection) required for particular **BM Units** (identified in the submission) connected to that **User System** for each **Settlement Period** of the next **Operational Day**;
  - (ii) adjusted in each case for MW by the conversion factors applicable for those **BM Units** to provide output or consumption at the relevant **Grid Supply Points**.
- (c) At any time and from time to time, between 1000 hours each day and the expiry of the next **Operational Day**, each **Network Operator** must submit to **NGET** in writing any revisions to the information submitted under this BC1.6.1.

- (d) Where a **Network Operator** wishes to submit to **NGET** in writing a single confirmation or notification of constraints on its **User System** and/or requirements of voltage control and Mvar reserve with respect to more than one **Operational Day**, then the form of the submission will be:
- (i) that of a **BM Unit** output or consumption (for MW and for Mvar, in each case a fixed value or an operating range, on the **User System** at the **User System Entry Point**, namely in the case of a **BM Unit** comprising a **Generating Unit** (as defined in the Glossary and Definitions and not limited by BC1.2) on the higher voltage side of the generator step-up transformer, or in the case of a **Power Park Module**, at the point of connection) required for particular **BM Units** (identified in the submission) connected to that **User System**, together with the **Network Operator's** best estimate of the duration of that restriction;
  - (ii) adjusted in each case for MW by the conversion factors applicable for those **BM Units** to provide output or consumption at the relevant **Grid Supply Points**.
- (e) The confirmation or notification made in accordance with BC1.6.1(d) will be considered applicable until such time as a revision to the information submitted under BC1.6.1(d) has been received by **NGET** in writing from the relevant **Network Operator**.

#### BC1.6.2 Notification of Times to **Network Operators**

**NGET** will make available indicative **Synchronising** and **De-Synchronising** times to each **Network Operator**, but only relating to **BM Units** comprising a **Generating Unit** (as defined in the Glossary and Definitions and not limited by BC1.2) or a **Power Park Module** or a **CCGT Module Embedded** within that **Network Operator's User System** and those **Gensets** directly connected to the **National Electricity Transmission System** which **NGET** has identified under **OC2** as being those which may, in the reasonable opinion of **NGET**, affect the integrity of that **User System**. If in preparing for the operation of the **Balancing Mechanism**, **NGET** becomes aware that a **BM Unit** directly connected to the **National Electricity Transmission System** may, in its reasonable opinion, affect the integrity of that other **User System** which, in the case of a **BM Unit** comprising a **Generating Unit** (as defined in the Glossary and Definitions and not limited by BC1.2) or a **CCGT Module** or a **Power Park Module**, it had not so identified under **OC2**, then **NGET** may make available details of its indicative **Synchronising** and **De-Synchronising** times to that other **User** and shall inform the relevant **BM Participant** that it has done so, identifying the **BM Unit** concerned.

**PART C: PROPOSED LEGAL TEXT TO MODIFY THE GRID CODE – WGAA2**

The text required to give effect to WGAA2 will be all the text outlined in Part A of Appendix A of this Report to the Authority, apart from the text specifically associated with part 3 of the original CAP169.

To be clear, this will include changes to:

- Part 1: BC2 Appendix 3
- Part 2:

But will not include changes to:

- Part 3: PCA3, DRC Schedule 11, OC2 Appendix 1 and Glossary and Definitions

For the purposes of this Report to the Authority the text associated with parts 1 and 2 has not been repeated here.

**PART D: PROPOSED LEGAL TEXT TO MODIFY THE GRID CODE – WGAA3**

WGAA3 will require the same changes as WGAA1 for parts 1, 2 and 3 (as outlined in Part B Appendix A of this Report to the Authority), although alternative drafting is required for BC2 Appendix 3:

- BC2 Appendix 3

For the purposes of the Report to the Authority only the drafting associated with the alternative BC2 has been included:

**1. BC2**

Changes are marked as outlined in the table below:

<b>Legend:</b>
<u>Insertion</u>
<del>Deletion</del>

**BC2.8**

New BC2.8.5

BC2.8.5      **Reactive Despatch Network Restrictions**

Where **NGET** has received notification pursuant to the **Grid Code** that a **Reactive Despatch Network Restriction** is in place with respect to any **Embedded Generating Unit, Embedded Power Park Module** or **DC Converter** at an **Embedded DC Converter Station**, then **NGET** will not issue any **Reactive Despatch Instruction** with respect to that **Generating Unit, Power Park Module** or **DC Converter** until such time as notification is given to **NGET** pursuant to the **Grid Code** that such **Reactive Despatch Network Restriction** is no longer affecting that **Generating Unit, Power Park Module** or **DC Converter**.

**APPENDIX B: CONSULTATION PAPER E/09**



**Consultation Document**

**Consequential Grid Code changes relating to CUSC**

**Amendment Proposal CAP169**

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

Amendment Ref	E/09
Issue	V1.1
Date of Issue	15/09/09
Prepared by	National Grid

I DOCUMENT CONTROL  
a National Grid Document Control

Version	Date	Author	Change Reference
V0.1	05/08/09	National Grid	Version for WG comment
V1.0	28/08/09	National Grid	Version for GCRP comment
V1.1	15/09/09	National Grid	Version for Industry Consultation

b Distribution

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

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## 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 27<sup>th</sup> 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 amended<sup>1</sup> 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 them to 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 was 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 Working Group Alternative Amendment 1 (WGAA1) 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 Working Group Alternative Amendment 2 (WGAA2) 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.

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

- 1.8 A WG Consultation Alternative Request (WGAA3) was made which proposes that where a 3<sup>rd</sup> party restriction exists (preventing the embedded unit providing the service in accordance with an instruction from National Grid) £0 (zero) payment should be made.
- 1.9 Consequential changes are required to the Grid Code to allow power park modules and embedded generators to communicate their MVA<sub>r</sub> capability and whether they are available to receive a reactive despatch instruction.

## **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, with particular focus on the effect and consequential changes required within the Grid Code.
- 2.2 CAP169 was proposed by National Grid and submitted to the CUSC Amendments Panel for their consideration on February 27<sup>th</sup> 2009. The Amendments Panel determined that the proposal should be considered by a Joint 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 The CAP169 Working Group requested a one month extension on the 4<sup>th</sup> June 2009, which was accepted by the CUSC Panel.
- 2.4 CAP169 was introduced to the Grid Code Review Panel meeting on 5<sup>th</sup> February 2009. The Amendment was also discussed at the Panel meeting of 18<sup>th</sup> May 2009, during which the suggestion was made for additional DNO representation to be requested as the envisaged solution required additional data submission obligations to be made.
- 2.5 A copy of the Terms of Reference for CAP169 is provided in Annex 2.
- 2.6 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/](http://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. It was proposed that this be introduced to PC.A.3.2.2

with corresponding changes required to DRC Schedule 11 and OC2. In addition, three new definitions are required for Part 3.

#### **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 could 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 a 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 the network operator to which they are connected 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 may 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.
- 4.24 The potential differential treatment between active and reactive power was noted in the Working Group. This relates to the fact that embedded generators receive no payment if constrained for active power, yet part 3 of CAP169 proposes a 20% payment for a reactive restriction. National Grid clarified that the difference was justifiable on the basis that the specific reactive range is defined as a capability requirement in the Grid Code, and the proposed payment recognises the continued provision of a dynamic service from those for which the range is restricted. Therefore, National Grid considers that the 20% payment proposed is appropriate.

***Materiality***

- 4.25 National Grid prepared for the Working Group an estimate of the financial implications of CAP169. This assessment was updated and refined following the publication of the 2009 Seven Year Statement and is based on 2011/12. Details of the assessment and assumptions used can be found in annex 3
- 4.26 **Estimate of materiality for part 1** The extension of appropriate MSAs for Power Park Modules introduced through Part 1 is estimated to result in MSAs for an additional 403MW of embedded Power Park Modules with capacity above 48MW by 2011/12. Based on the above assumptions this would equate to a cost of **£0.48m**.
- 4.27 **Estimate of materiality for part 2** The proposal to amend the obligation to conclude MSAs, upon request, with all Large Power Stations with a reactive range below 15Mvar is estimated to increase the capacity eligible to receive MSAs to 1519MW. This could equate to a cost of **£1.82m** were such generators to request MSAs, or a lower range of **£0.55m** if no generation below 48MW requests MSAs.
- 4.28 **Estimate of materiality for part 3** If part 3 is introduced the 20% payment would result in a reduction in the estimate of this cost to between **£0.11m** and **£0.36m** (this spread being dependent on the number of Large Power Stations below 48MW which request MSAs).
- 4.29 Annex 3 provides details of the data and assumptions used in preparing this materiality estimate. In particular, please note, the forecast of embedded capacity is taken from the 2009 Seven Year Statement for 2011/12 and the assumption is that going forward all forecast large embedded generation in Scotland will be subject to such restrictions.

***Possible Alternatives to part 3***

- 4.30 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:

- 4.31 *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.
- 4.32 *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 via the 20% payment being proposed.
- 4.33 *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.
- 4.34 *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.
- 4.35 *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 (temporary enduring reactive despatch network restriction). 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.

- 4.35.1 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.
- 4.35.2 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. The Working Group agreed that 24 months felt an appropriate time period.
- 4.35.3 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.
- 4.35.4 For clarification purposes:
- Initial count of a Temporary Enduring Reactive Despatch Network Restriction would begin on notification of the first Temporary Enduring Reactive Despatch Network Restriction
  - The length of time this Temporary Enduring Reactive Despatch Network Restriction is in place would be recorded, with a trigger regarding the payment mechanism when 12 months is reached
  - If the restriction is removed before 12 months is reached the count will stop until such times as notification of a further Temporary Enduring Reactive Despatch Network Restriction is received
  - Upon receipt of a further Temporary Enduring Reactive Despatch Network Restriction the count will continue (provided that 24 months has not lapsed since receipt of the previous notice for removal of the Reactive Despatch Network Restriction)
  - Payment will be reduced when 12 (consecutive or) non-consecutive months of Temporary Enduring Reactive Despatch Network Restriction has been in place within an initial total of 24 consecutive months
- 4.35.5 Following discussion within the Working Group National Grid developed this proposal into a Working Group Alternative Amendment (WGAA1). See section 5 for details.
- 4.36 *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 introduce 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 a 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.

- 4.36.1 On behalf of the Working Group National Grid prepared a Working Group Alternative Amendment (WGAA2). See section 5 for details.

#### **WG Consultation Alternative Request**

- 4.37 One WG Consultation Alternative Request was received. This alternative proposes that where a 3<sup>rd</sup> party restriction exists (preventing the embedded unit providing the service in accordance with National Grid instruction) £0 (zero) payment should be made. Under such circumstances, National Grid would not be permitted to issue any instruction.

- 4.37.1 The proposer of the WG Consultation Alternative Request considers that this proposal is more appropriate than WGAA1 and the original which could distort competition by providing an artificially low cost service to National Grid (in preference to those not under restriction) and would have the potential to increase the BSUoS costs paid by other parties. As such the proposer considers that this alternative resolves the original defect identified by CAP169 without introducing a new perverse defect. The proposer considers that the defect identified could get significantly worse in the future with increased connection of embedded generation and potential implementation of parts 1 and 2 of CAP169.

- 4.37.2 On discussion of the WG Consultation Alternative Request, some members of the Working Group considered that this alternative was not suitable as it does not provide any recognition of the capability requirement which is in place on such embedded generators through the Grid Code, and does not provide any remuneration for the dynamic service provided.

- 4.37.3 This proposal is being taken forward as WGAA3.

- 4.37.4 WGAA3 will require the same amendments as the original for parts 1 and 2. For part 3, only Reactive Despatch Network Restriction will require definition. For schedule 3 the same change will be required to appendix 2 as for the original (and WGAA1), and appendix 1 will require drafting to reflect 0 payment when a reactive despatch network restriction is in place. The Grid Code (BC2) will also require an additional point to reflect that where a reactive despatch network restriction is in place no instruction will be given.

#### **Environmental Assessment**

- 4.38 The Working Group considered whether a carbon costing exercise was required for CAP169, and concluded that the baseline carbon profile will not be altered as result of CAP169. This conclusion was based on the fact that the main impact of CAP169 will be on payment provisions and access to a Reactive Power service which is already provided for (through the Grid Code capability requirement). Therefore, the Working Group concluded that CAP169 will have no direct impact on the environment.

### **Offshore**

- 4.39 Drafting for CAP169 (and the alternatives) has been prepared using the industry code baseline following the implementation of Offshore Go-active (as designated by the Secretary of State on the 24<sup>th</sup> June 2009).
- 4.40 It is recognised that the offshore Reactive Power arrangements require additional debate and consideration in collaboration with the industry. It is anticipated that this may result in the requirement for amendment to the Charging Methodologies and may require an amendment to the CUSC. The defined terms used in drafting CAP169 reflect both onshore and offshore generation to ensure consistency with the existing offshore provisions, where MSAs are applicable for both offshore and onshore generation. This should ensure that the drafting for CAP169 does not preclude future application for offshore (or require further additional code amendment) once the Reactive Power provisions for offshore are finalised.

### **Grid Code Specific Discussions**

- 4.41 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.
- 4.42 On the request of the Grid Code Review Panel during the May 2009 meeting, two additional DNO representatives participated in the CAP169 Working Group meeting of 26<sup>th</sup> June. The appropriateness of the proposed communication from both the DNO and the embedded generator was discussed and agreed during the meeting.
- 4.43 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.
- 4.44 To correspond to the changes in PC.A.2.3.3 minor changes are also required to DRC Schedule 11 and OC2.
- 4.45 Definitions for Reactive Despatch Instruction, Commercial Boundary and Reactive Despatch Network Restriction will also be required. It was felt that there were advantages of consistency if the definition were the same across both the CUSC and the Grid Code. The only definition that was believed to warrant a difference is that of Reactive Despatch Network Restriction which under the proposed CUSC definition contains a reference to a generators ability to comply to an instruction to achieve its specified range of reactive power and/or "0 MVARs". It was agreed that the Grid Code definition would not contain the reference to "0 MVARs" as this was a commercial reference point and of no technical significance.

- 4.46 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.
- 4.47 The Working Group agreed it was important that the Grid Code changes needed to make clear that the communication of a DNO imposed reactive despatch restriction from a generator is not a capability restriction. Consequently a specific section was added to the generator performance chart and the MVAR redeclaration form to differentiate a DNO restriction from a capability restriction.

### **Local Voltage Control**

- 4.48 The Working Group discussed specific restrictions where embedded generators were required, by the Distribution Network Operator, to follow local voltage conditions for local voltage control purposes. The group agreed that whilst this was not a specific range restriction it clearly represents a reactive despatch network restriction for National Grid. The Authority representative questioned why embedded generators are being frequently connected with the obligation to control local volts.
- 4.49 A DNO representative informed the Working Group that the majority of developers in Scotland have chosen to connect directly to the 33kV distribution network, with a cable connection driven by concerns of low connection costs and avoiding planning issues. By requesting such wind farms to operate in voltage control mode, rather than unity power factor, breaching of the statutory voltage limit is avoided. This allows reactive support to be spread across all Users and minimises reactive demand from the DNO networks.
- 4.50 The representative stated that if future payments are to be made to the wind farms providing reactive support, this may have to be balanced by reflecting the costs onto sites that present a reactive demand on the network. The status quo seems a sensible alternative where such small parties are not involved in the reactive market. Another option identified would be force connection at 132kV although such connections may be unpopular with developers as such directly connected generators would have higher connection costs.
- 4.51 The Working Group discussed that if a generator had been instructed by the Distribution Network Operator to maintain local volts, it would not be possible to communicate such a restriction on the proposed Generator Performance Chart, as although the full reactive range remains possible, the generator is not available for instruction by the System Operator. National Grid confirmed that such a constraint would be captured by part 3 of CAP169 and the addition of a tick box on the generator performance chart, would allow it be effectively communicated.

## **5.0 WORKING GROUP ALTERNATIVE AMENDMENTS**

### **Alternative Amendment 1**

- 5.1 WGAA1 was raised by National Grid and is included in Annex 4, of the CUSC Working Group Report.
- 5.2 It relates to part 3 of CAP169 and extends CAP169 to cover long term restrictions not communicated at the time of connection.

### **Alternative Amendment 2**

- 5.3 WGAA2 was prepared by National Grid on behalf of the Working Group and is included in Annex 5, of the CUSC Working Group Report.
- 5.4 It contains parts 1 and 2 of the original Amendment Proposal with part 3 removed.

### **Alternative Amendment 3**

- 5.5 WGAA3 was raised as a WG Consultation Alternative Request by EdF Energy and is included in Annex 6, of the CUSC Working Group Report..
- 5.6 It proposes zero payment where a 3<sup>rd</sup> party restriction exists (preventing the embedded unit providing the service in accordance with an instruction from National Grid). It also proposes that where such a restriction has been notified no despatch instruction will be issued by NGET.

## **6.0 ASSESSMENT AGAINST APPLICABLE GRID CODE OBJECTIVES**

- 6.1 The proposed consequential changes to the Grid Code as outlined in Volume 2 of this report would better facilitate Grid Code Objectives:

iii) to facilitate competition in the generation and supply of electricity;

and

iii) to promote the security and efficiency of the electricity generation, transmission and distribution system in Great Britain

By facilitating the mechanism for communication of the availability of reactive despatch by which a greater number of generating parties, can participate in the market for the provision of reactive services, namely large Power Stations, Power Park Modules and Embedded Generators.

## **7.0 PROPOSED IMPLEMENTATION**

- 7.1 National Grid proposes that CAP169 and the required consequential Grid Code modifications 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.

## **8.0 IMPACT ON THE GRID CODE**

- 8.1 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.
- 8.2 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).
- 8.3 Additional definitions would also be required in the Grid Code to facilitate part 3:
- 8.3.1 Reactive Despatch Instruction - as defined in the CUSC
- 8.3.2 Commercial Boundary - as defined in the CUSC
- 8.3.3 Reactive Despatch Network Restriction - A restriction placed upon an Embedded Generating Unit, Embedded Power Park Module or DC Converter at an Embedded DC Converter Station by the Network Operator that prevents the Generator or DC Converter Station owner in question (as applicable) from complying with any Reactive Despatch Instruction with respect to that Generating Unit, Power Park Module or DC Converter whether to provide MVars over the range referred to in CC 6.3.2 or otherwise.
- 8.4 WGAA1 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.
- 8.5 WGAA2 would only require the Grid Code change outlined in 8.1 above.
- 8.6 WGAA3 would require the same Grid Code drafting as WGAA1 (detailed in 8.2 and 8.3 above). The Grid Code (BC2) will also require an additional point to reflect that where a reactive despatch network restriction is in place no instruction will be given.
- 8.7 As the CAP169 Working Group is a joint CUSC and Grid Code Working Group the proposed Grid Code changes were discussed within the Working Group. A separate CUSC report has been prepared for the CUSC Panel detailing the discussions within the Working Group relating to the CUSC and the associated drafting.

## **9.0 IMPACT ON INDUSTRY DOCUMENTS**

### **Impact on Core Industry Documents**

- 9.1 CAP169 requires amendment to the following sections of the CUSC:
- 9.1.1 Part 1: Section 1, Section 4, Section 11, Schedule 2 and Schedule 3
- 9.1.2 Part 2: Schedule 3 (2.8ii and Appendix 6, 1.2)
- 9.1.3 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)
- 9.2 The draft CUSC text required to give effect to the Original Proposal and Working Group Alternative Amendments 1, 2 and 3 are contained in Volume 2 of the CUSC Working Group Report
- ### **Methodology for the Aggregation of Reactive Power Metering**
- 9.3 CAP169 also requires minor amendment to the Methodology for the Aggregation of Reactive Power Metering to accommodate potential metering configurations of Power Park Modules.

- 9.4 The changes being proposed to the document as a result of CAP169 are similar to those being proposed to the CUSC. 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.
- 9.5 The changes proposed are included in Working Group Report Volume 2.

### Impact on other Industry Documents

- 9.6 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 INDUSTRY VIEWS AND REPRESENTATIONS

### 10.1 Responses to the Working Group Consultation

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

Reference	Company	Supportive	Comments
CAP169-WGC-01	British Wind Energy Association	No view expressed	No comment on merit of the proposals, but note that dynamic and steady state requirements are not necessarily the same.
CAP169-WGC-02	Edf Energy	No	Whilst CAP169 proposes a solution to align the CUSC with the Grid Code, the proposed solution introduces a new defect in relation to Embedded Power Stations.
CAP169-WGC-03	RWE NPower	WGAA2	Parts 1 and 2 facilitate efficient procurement of Reactive Power. Part 3 does not deal with the obligations on the generator to maintain capability and introduces potential pricing anomalies.

- 10.1.2 Of the responses received, one did not indicate support or otherwise for the original or alternatives proposed. One response did not support the original or either alternative, but instead proposed a WG Consultation Alternative Request. The final response indicated support for WGAA2.

- 10.1.3 Support for WGAA2 was given by one respondent on the basis that parts 1 and 2 of the proposal facilitate the efficient procurement of Reactive Power by expanding the number of available providers that can be instructed and remunerated under the terms of a MSA. However, part 3 only addresses the

payment made for a 3<sup>rd</sup> party restriction, without dealing with the obligations on the generator to maintain capability. The respondent considered that this would introduce pricing anomalies whereby a provider receiving reduced payments may provide an alternative source of Reactive Power to a provider that is not restricted.

- 10.1.4 One respondent did not support the original or alternatives proposed on the basis that the proposed solution introduces a new defect in relation to embedded generators. Whilst the respondent supports the principles of parts 1 and 2 of the proposal, it would exacerbate the defect whereby embedded units under a network operator imposed restriction on Reactive Power may not be able to act in accordance with instructions from National Grid. The respondent considered that amending the payment structure in the CUSC in relation to a 3<sup>rd</sup> party restriction is not the correct approach. The inability to vary Reactive Power provision in accordance with an instruction from National Grid may introduce the requirement for National Grid to procure additional Reactive Power from an alternative unit, incurring additional cost which would be paid for by all Users. Moreover in line with the response detailed above, the respondent considered that potential pricing anomalies would be introduced by part 3 of WGAA1 and the original. This respondent proposed a WG Consultation Alternative Request (detailed in 4.34 and 10.2)

## 10.2 WG Consultation Alternative Request

- 10.2.1 One WG Consultation Alternative Request was received; a copy of which is contained in Annex 6. This alternative proposes that where a 3<sup>rd</sup> party restriction exists (preventing the embedded unit providing Reactive Power in accordance with a National Grid instruction) £0 (zero) payment should be made. Under such circumstances, National Grid would not be permitted to issue instructions to the unit.
- 10.2.2 The proposer of the WG Consultation Alternative Request considers that this proposal is more appropriate than WGAA1 and the original which could distort competition by providing an artificially low cost service to National Grid (in preference to those not under restriction) and will have the potential to increase the BSUoS costs paid by other parties. As such the proposer considers that this alternative resolves the original defect identified by CAP169 without introducing a new perverse defect.

## 11.0 WORKING GROUP VIEW / RECOMMENDATION

- 11.1 The Working Group believes the terms of reference have been fulfilled and CAP169 has been fully assessed. At the Working Group meeting on June 4<sup>th</sup> 2009 five members of the Working Group voted:

### 11.2

View against applicable CUSC objectives	Better than baseline	Not Better than baseline	Best
Original	2	3	0
WGAA1	2	3	2
WGAA2	3	2	2
WGAA3	1	4	1

- 11.3 The CAP169 Working Group had an observer in attendance at all meetings, representing a network operator. The observer's view was that the 20% payment in the original and WGAA1 seem appropriate, with WGAA3s proposal of 0 payment not recognising the dynamic contribution made to the networks.
- 11.4 In line with the definition for Working Group Alternative Amendment, the Working Group chair considered the alternative proposals and concluded that it is important for the full range of options to be available for the Authority's consideration, moreover within the Working Group there has been valid and extensive discussion with regards all options therefore it is appropriate to allow the industry further opportunity to comment (including on WGAA3 proposed as result of the Working Group consultation).

## **12.0 NATIONAL GRID INITIAL VIEW**

- 12.1 National Grid believes that all the resulting consequential Grid Code changes proposed under CAP169 Original, WGAA1, WGAA2 and WAA3 better meet the Grid Code Objectives, in particular:
- iii) to facilitate competition in the generation and supply of electricity;
- and
- iii) to promote the security and efficiency of the electricity generation, transmission and distribution system in Great Britain

## **13.0 VIEWS OF GRID CODE REVIEW PANEL MEMBERS**

- 13.1 An Extraordinary Grid Code Review Panel meeting was held on 2<sup>nd</sup> September 2009 to discuss the Grid Code Consultation for CAP169.
- 13.2 A Panel Member sought clarification why the commercial arrangements for reactive power should differ from those relating to active power, for embedded generation. Namely, that a despatch restriction of a generators reactive range would affect the level of payment it would receive whereas an active power restriction would not affect the rate of payment. National Grid stated that active power requirement stems from supplier demand and therefore it will always be requested and utilised. Whereas, the System Operator uses reactive power to ensure system security and under a reactive dispatch instruction zero reactive output may not be possible which could inhibit this process. A reduced payment is therefore proposed to reflect the limited benefit to transmission system security, limited to dynamic response.
- 13.3 A GCRP member requested clarification on any implications, arising from the proposed amendment, relating to Licence Exempt Embedded Medium Power Stations (LEEMPS). National Grid confirmed that a LEEMPS party is not a signatory to the CUSC and therefore a direct contractual relationship, such as a MSA, does not exist. Any required technical obligations on the generator would be passed on via the relevant Distribution Network Operator.
- 13.4 The Authority Representative sought clarification over the exact nature of the requirement on embedded generators who provide reactive support to the local distribution network, as requested by the relevant DNO. The DNO Representatives confirmed that such operating restriction were a direct

consequence of the connection designs requested by the generator, having advantages associated with lower cost of connection and facilitating planning consent. If an embedded generator required a more robust connection that would allow it to avoid the requirement to maintain a target voltage set point, this could be achieved if the generator funded the required reinforcement but historically this has not been requested on the DNO Representatives' networks.

- 13.5 Panel members raised some general issue relating to the despatch of reactive services from Embedded Generators and whether additional commercial agreements would be required between generators and DNOs. National Grid agreed to consider the points raised, along with any subsequent clarification as part of the consultation process.

#### **14.0 CONSULTATION RESPONSES**

- 14.1 A summary of responses received during this Consultation will be contained as part of the Report to the Authority.
- 14.2 Views are invited upon the proposals outlined in this report, which should be received by the end of **Wednesday, 7<sup>th</sup> October 2009**.
- 14.3 Your formal responses may be:-

Posted to: Tom Ireland  
Electricity Codes  
Regulatory Frameworks  
National Grid Electricity Transmission plc  
National Grid House  
Warwick Technology Park  
Gallows Hill  
Warwick  
CV34 6DA

Emailed to: [thomas.ireland@uk.ngrid.com](mailto:thomas.ireland@uk.ngrid.com)

**ANNEX 1 – ORIGINAL PROPOSAL**

<b>CUSC Amendment Proposal Form</b>	<b>CAP: 169</b>
<p>Title of Amendment Proposal:</p> <p><b>Provision of Reactive Power from Power Park Modules, Large Power Stations and Embedded Power Stations</b></p>	
<p>Description of the Proposed Amendment (<i>mandatory by proposer</i>):</p> <p><u>Amendment Proposal Part 1</u></p> <p>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.</p> <p>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).</p> <p>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.</p> <p>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)</p> <p><u>Amendment Proposal Part 2</u></p> <p>CUSC Schedule 3, Clause 2.8 states that National Grid is only “obliged” to conclude or</p>	

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 amended<sup>2</sup> 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

<sup>2</sup> 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 Dispatch 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.

<p><b>Details of any Related Modifications to Other Industry Codes</b> (where known):</p> <p><b>None</b></p>
<p>Justification for Proposed Amendment with Reference to Applicable CUSC Objectives** (<b>mandatory by proposer</b>):</p> <p><b>National Grid believes that this proposal will better facilitate CUSC Applicable Objective</b></p> <p>(a) (The efficient discharge by the licensee of the obligations imposed upon it under the Act and by the Transmission Licence) and</p> <p>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.</p> <p>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.</p> <p>This amendment will ensure alignment of the CUSC and the Grid Code.</p>

<p><b>Details of Proposer:</b> Organisation's Name:</p>	National Grid
<p>Capacity in which the Amendment is being proposed: (i.e. CUSC Party, BSC Party or "energywatch")</p>	CUSC Party
<p><b>Details of Proposer's Representative:</b> Name: Organisation: Telephone Number: Email Address:</p>	<p>Carole Hook National Grid 01926 654211 carole.hook@uk.ngrid.com</p>
<p><b>Details of Representative's Alternate:</b> Name: Organisation: Telephone Number: Email Address:</p>	<p>Katharine Clench National Grid 01926 656036 Katharine.clench@uk.ngrid.com</p>
<p><b>Attachments (Yes/No):</b> <b>If Yes, Title and No. of pages of each Attachment:</b></p>	

## Annex 1 – Original Amendment Proposal

### 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](mailto: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 27<sup>th</sup> 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 WGAAs, 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 (WGAAAs) 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 18<sup>th</sup> June 2009 for circulation to Panel Members. The conclusions will be presented to the CUSC Panel meeting on 26<sup>th</sup> 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 21<sup>st</sup> 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.

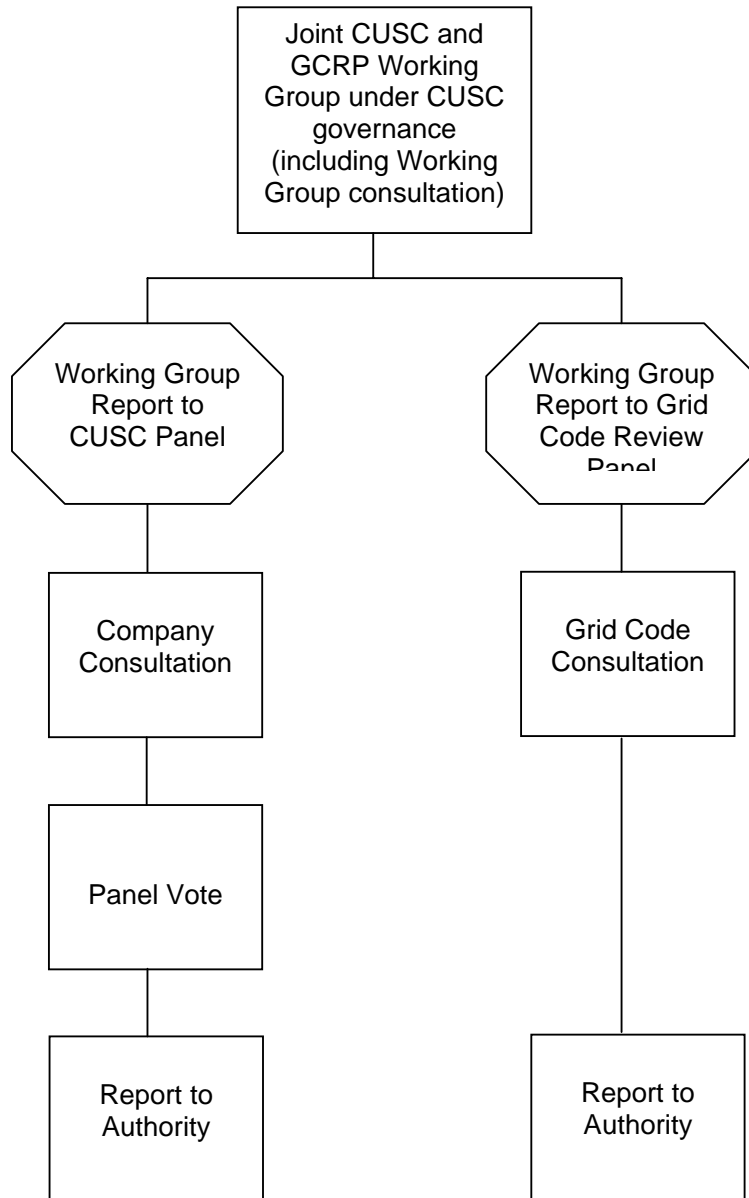
## **MEETINGS**

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 26<sup>th</sup> 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 21<sup>st</sup> 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 CAP169:

#### Estimate of Embedded Generation under restriction

Based on the 2009 Seven Year Statement (SYS) in Scotland (SHETL and SPT) by 2011/12 there will be approximately:

- 1711MW of embedded Large Power Stations (of which 647MW will be above 48MW)
  - 1519MW of which does not currently have MSAs (consisting of Power Park Modules, new Large Power Stations and Large Power Stations with a capacity below 48MW) – of this 455MW is above 48MW<sup>3</sup>
- 1037MW of embedded Large Power Park Modules (of which 403MW will be above 48MW)

#### Estimate of Reactive Output

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. This would equate to 300MVarh per MW.

#### Assumptions:

- Embedded capacity will be in line with the 2009 SYS forecast
- Embedded connection restrictions preventing National Grid despatch to 0Mvar are in place only on Scottish Distribution networks
- All large embedded generation in Scotland (not already connected without such restrictions<sup>4</sup>) will be subject to such restrictions
- £/MVarh cost estimate of £4/MVarh
- Reactive absorption in line with a sample of 5 existing embedded generators

#### Estimate of materiality for part 1

The extension of appropriate MSAs for Power Park Modules introduced through Part 1 is estimated to result in MSAs for an additional 403MW of embedded Power Park Modules with capacity above 48MW by 2011/12. Based on the above assumptions this would equate to a cost of **£0.48m**.

#### Estimate of materiality for part 2

The proposal to amend the obligation to conclude MSAs, upon request, with all Large Power Stations with a reactive range below 15Mvar is estimated to increase the capacity eligible to receive MSAs to 1519MW. This could equate to a cost of **£1.82m** were such generators to request MSAs, or a lower range of **£0.55m** if no generation below 48MW requests MSAs.

#### Estimate of materiality for part 3

If part 3 is introduced the 20% payment would result in a reduction in the estimate of this cost to between **£0.11m and £0.36m** (this spread being dependent on the number of Large Power Stations below 48MW which request MSAs).

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<sup>3</sup> Please note that MSAs are in place for 192MW of existing embedded generation (above 48MW) which are not subject to embedded connection restrictions on the ability to be despatched to 0Mvar – this has therefore not been included for the purposes of this estimate of the materiality of CAP169.

**CAP169 Materiality Estimate**

2010/11 Figure 3.5 SYS 2009

Transmission Licencee		Total MW	Only Power Park Modules (PPMs)	PPMs, new Large Power Stations and Large Power Stations with a capacity below 48MW
<b>SPT</b>	Total Embedded	604	354	484
	Total Embedded 48MW and above	282	110	162
<b>SHETL</b>	Total Embedded	1107	683	1035
	Total Embedded 48MW and above	365	293	293
	<b>TOTAL</b>	<b>1711</b>	<b>1037</b>	<b>1519</b>
	<b>TOTAL 48MW AND ABOVE</b>	<b>647</b>	<b>403</b>	<b>455</b>

		MW	Mvarh/MW	Total Mvarh	£/mvarh	Total cost (£)	20%
	<i>sample output</i>	250	300	75000	£ 4.00	£ 300,000.00	£ 60,000.00
<b>SYS 09 calculation</b>	<b>total embedded</b>	1711	300	513300	£ 4.00	£ 2,053,200.00	£ 410,640.00
	<b>total embedded above 48MW</b>	647	300	194100	£ 4.00	£ 776,400.00	£ 155,280.00
<b>SYS 09 calculation only PPMs</b>	<b>total embedded</b>	1037	300	311100	£ 4.00	£ 1,244,400.00	£ 248,880.00
	<b>total embedded above 48MW</b>	403	300	120900	£ 4.00	<b>£ 483,600.00</b>	<b>£ 96,720.00</b>
<b>SYS 09 calculation all PPMs above 48MW, new generation and all below 48MW</b>	<b>total embedded</b>	1519	300	455700	£ 4.00	<b>£ 1,822,800.00</b>	<b>£ 364,560.00</b>
	<b>total embedded above 48MW</b>	455	300	136500	£ 4.00	<b>£ 546,000.00</b>	<b>£ 109,200.00</b>

## **ANNEX 4 - 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 NETSO) 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 Reactive Despatch Network Restrictions).

## **ANNEX 5 – 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 – WG CONSULTATION ALTERNATIVE REQUEST/WGAA3**

<b>CUSC WG CONSULTATION REQUEST FORM</b>	
<p>Please send your completed form along with your completed Working Group Consultation Response to <a href="mailto:cusc.team@uk.ngrid.com">cusc.team@uk.ngrid.com</a> by 1<sup>st</sup> June 2009.</p> <p>Please note that any responses received after the deadline may not receive due consideration by the Working Group.</p>	
<b>Respondent Name and contact details</b>	<p>James Evans  <a href="mailto:James.evans@british-energy.com">James.evans@british-energy.com</a></p>
<b>CAP169 [Add – Title of the Amendment]</b>	<p>Provision of Reactive Power from Power Park Modules, Large Power Stations and Embedded Power Stations.</p>
<p><b>Capacity in which the WG Consultation Request is being raised :</b>                      (i.e. CUSC Party, BSC Party or “National Consumer Council ”)</p>	<p>CUSC Party</p>
<p><b>Description of the Proposal for the Working Group to consider</b> <i>(mandatory by proposer):</i></p> <p>In the event of a Distribution imposed restriction on the provision of Reactive Power by an embedded Generator then that Embedded Generator will receive £0 (zero) payment for any reactive power provided and will not receive instructions from National Grid (for the purpose of reactive Power provision).</p>	
<p><b>Description of the difference(s) between your proposal compared to Original / Working Group Alternative(s)</b> <i>(mandatory by proposer):</i></p> <p>Where a restriction is imposed by Distribution on an embedded Generator under the current proposal this would result in 20% of the normal payment for any reactive Power provided. Under this alternative, £0 (zero) payment would be made and National Grid would not instruct the unit to vary Reactive Output.</p>	
<p><b>Justification for the proposal</b> <i>(including why the Original proposal / Working Group Alternative(s) does not address the defect)</i> <i>(mandatory by proposer):</i></p> <p>Part 3 of CAP169 attempts to address the new defect that Parts 1 &amp; 2 will introduce such that an Embedded Generator may benefit from a restriction imposed by Distribution. The proposed solutions are not appropriate, as they could distort competition by providing an artificially low cost service provision to National Grid in preference to units of any type not</p>	

<p>subject to a restriction. In addition the effects on BSUoS and the negative demand circumstance resulting in BSUoS payment to the embedded unit (rather than from) combine to form a perverse incentive on the unit not to resolve the restriction.</p>	
<p><b>Impact on the CUSC</b> <i>(this should be given where possible):</i></p>	
<p><b>Impact on Core Industry Documentation</b> <i>(this should be given where possible):</i></p>	
<p><b>Impact on Computer Systems and Processes used by CUSC Parties</b> <i>(this should be given where possible):</i></p>	
<p><b>Justification for the proposal with Reference to Applicable CUSC Objectives*</b> <i>(mandatory by proposer):</i></p> <p>This proposal better facilitates objective (a) by resolving the original defect identified and by preventing the original solution introducing a new perverse defect.</p> <p>This proposal better facilitates objective (b) by ensuring that there is no differential treatment of units fully compliant with the CUSC and Grid Code when compared to a unit under Distribution restriction.</p>	
<p><b>Attachments (Yes/No):</b> If Yes, Title and No. of pages of each Attachment:</p>	

**Notes:**

1. 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 7 – Working Group Attendance

**ANNEX 7 – WORKING GROUP ATTENDANCE**

**CAP169 WORKING GROUP ATTENDANCE**

<b>Name</b>	<b>Company</b>	<b>12/03/2009</b>	<b>02/04/2009</b>	<b>06/05/2009</b>	<b>04/06/2009</b>	<b>26/06/2009 (teleconference)</b>	<b>09/07/2009 (teleconference)</b>
Claire Maxim	Eon	Yes	Yes	No	No	No	Yes
Raoul Thulin	RWE	Yes	Yes	Yes	Yes	Yes	Yes
Christopher Proudfoot	Centrica	No	Yes	No	No	No	No
Jonathan Atyeo	GdF	No	Yes	Yes	Yes	No	No
Claver Chitambo	RES	Yes	Yes	Yes	Yes	No	No
James Evans	British Energy	No	Yes	No	Yes	Yes	Yes
Campbell McDonald	SSE Generation	Yes	Yes	Yes	No	No	No
<b>OBSERVER</b>							
Peter Twomey	UUES	No	Yes	Yes	Yes	Yes	No
Neil Sanderson	SSE	No	No	No	No	Yes	No
Hamish Dallachy	Scottish Power	No	No	No	No	Yes	No
<b>ALTERNATE</b>							
John Morris	British Energy	Yes	No	Yes	No	No	No
<b>OFGEM</b>							
Bridget Morgan		No	No	No	No	Yes	Yes
<b>National Grid</b>							
Malcolm Arthur	Chair	Yes	Yes	Yes	No	Yes	Yes
Katharine Clench	Alternate Proposer	Yes	Yes	Yes	Yes	Yes	Yes
Carole Hook	Proposer	Yes	Yes	Yes	Yes	No	Yes
Tom Ireland	NG Grid Code Rep	No	No	Yes	Yes	Yes	Yes
Bushra Akhtar	Technical Secretary	No	No	Yes	Yes	Yes	Yes
David Smith	Alternate Chair	No	No	No	Yes	No	No
Brian Taylor	GCRP rep	No	No	No	No	No	Yes

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## **APPENDIX C: CONSULTATION RESPONSES TO THE PROPOSED CHANGE**

The following Appendix contains copies of all representations received from Authorised Electricity Operators through the consultation period.

### **Original Responses to E/09 Consultation**

<b>No.</b>	<b>Company</b>	<b>File Number</b>
1	EDF Energy	E/09-CR-01
2	ENW	E/09-CR-02
3	E.ON UK	E/09-CR-03
4	RWE Group	E/09-CR-04

### **National Grid Replies to Consultation Responses**

<b>No.</b>	<b>Company</b>	<b>File Number</b>
1	EDF Energy	E/09-CRR-01
2	ENW	E/09-CRR-02
3	E.ON UK	E/09-CRR-03
4	RWE Group	E/09-CRR-04

Reference	E/09-CR-01
Company	EDF Energy



To: cusc.team@uk.ngrid.com

7<sup>th</sup> October 2009

Dear CUSC team,

**EDF Energy response to CAP169:**

EDF Energy welcomes the opportunity to respond to the consultation on CAP169. We believe that parts 1 and 2 of the original proposal both have merit against the CUSC applicable objectives. However, in respect of part 3 of the original proposal, we believe that WGAA3 is the best option in relation to the CUSC applicable objectives, because the existing default 20% payment rate used in other contexts, is intended for other circumstances and was designed to incentivise generators with restrictions, to invest in or change their plant to get rid of the restriction. The extension of this arrangement to the case at hand in CAP169 is not appropriate, because in this case the restriction is a DNO restriction outwith the generators' control, so that the "default" used in other scenarios, lacks justification in this case. In fact, it is better that the payment rate from Grid in regard to this DNO restriction be zero, as proposed in WGAA3.

We note also from paragraph 13.4 of the associated Grid Code consultation that on occasion the DNO restriction is in place because the generator originally requested the DNO for a particular type of connection that the DNO regarded as sub-optimal in this context. Although we lack further insight into this DNO perspective, it does rather sound on the face of it as though there is a particularly compelling case that generators in this instance ought not to receive monies from Grid in relation to the restricted service.

The original proposal and the other WGAA's (than WGAA3) are distortive of competition by way of giving Grid an artificially low cost service c.f. those not under restriction; WGAA3 lacks this drawback.

If you have any further questions please contact me on 020 724 29050

Yours Sincerely,

Dr Sebastian Eyre,  
Energy Regulation Manager, EDF Energy

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Reference	E/09-CR-02
Company	ENW



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02 October 2009

Dear Tom

#### **CAP 169 and E/09 Consultations**

Given the common issues behind these two consultations we are combining our response to them in this one letter.

We remain perplexed by several aspects of the issues behind these consultations. Dealing first with issues of governance, we are uncertain as to why there appears to be no DNO reps formally included in the CAP 169 WG (CAP 169 Vol 1 Annex 7). This is a surprise as we believed that we had put Peter Twomey forward specifically as a member of the WG. Our confusion is compounded by references to "DNO Representative" in 4.20 of the same volume, which implies that there was a DNO rep forming part of the WG.

Turning to the underlying issue, we generally have no comments on Parts 1 and 2 of CAP169. However we are confused by NGET's treatment of reactive power capability for embedded generators. We never understood why NGET insisted on making the H/04 requirements for reactive capability apply to embedded generation. It is our belief that this particular detail was lost on DNOs in the long gestation period of H/04, and although DNOs bear some culpability for not spotting it, it is concerning that the consultation on H/04 at that time did not make this fundamental change in requirements on embedded medium and large power stations clear to DNOs. As a result there now appears to be a different treatment between embedded synchronous and embedded asynchronous machines, where the latter is actually required to produce or absorb VARs as the DNOs' system voltages change, irrespective of the DNOs' wishes. And, it appears, irrespective of NGET's wishes.

On the other hand there appears to be no such requirement for embedded synchronous generation. I raised this as a query at both the extraordinary GCRP on 2 September and again at the routine GCRP on 17 September. I asked that NGET clarify how the asynchronous case works, given the interaction with the target voltage that needs to be set by the DNO. NGET agreed to explain this, but I have not yet received an explanation. I admit this might be

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\continuation p2

my lack of understanding, rather than any fundamental issue with the G Code, but I suggest if I am confused by this, I will not be alone.

We are also confused as to why NGET has arranged to contract with embedded generators for services that they cannot provide. For many years the equivalent aspect of real power has been dealt with via the DNOs notification to NGET of restrictions under BC1.6 and the DNOs also constraining the embedded generator to these values through the DNO/generation connexion agreement. We are therefore surprised that NGET has instigated a different arrangement under CUSC whereby NGET is exposed to payments to embedded generators that is formulaically linked to DNO network flows, flows that are not under NGET's control.

As asked for in the consultation, we believe that restrictions on DNO network capability in relation to DG will generally be at the request of the DG as part of the connexion process; ie DG often requests a cheap a connexion as possible. This can often be single circuit security, rather than firm, and line ratings (usually existing) that require constraints to be applied from time to time. It is also possible that issues like the appearance or disappearance of large point loads can also bring new restrictions to a DNOs system, and where constraining the generation by agreement in certain circumstances is more cost-effective than reinforcing.

We believe that it would have been better to modify the CUSC so that NGET could choose whether or not to contract with distribution connected generation for ancillary services, recognizing that over time DNOs might also begin to enter into commercial agreements with generators for DNO ancillary services.

However, as the CAP169 WG has not gone down this route, we now comment on the specific proposals. As a DNO we are indifferent to WGAA1 or WGAA3 is chosen over the original. We can see that both have merit. We are also comfortable with WGAA2, but note that this will leave the central issue of NGET's exposure to inappropriate reactive power payments to embedded generators unresolved. We do not believe that any of the proposed CUSC changes will bear on DNOs.

Conversely the Grid Code changes do directly affect us, but we are comfortable that these seem appropriate given the proposed CUSC changes.

Yours sincerely,

**Mike  
Kay**  
Digitally signed by Mike  
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Mike Kay  
Engineering and Planning Director

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<b>Reference</b>	E/09-CR-03
<b>Company</b>	E.ON UK



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Monday 5<sup>th</sup> October 2009

Dear Tom,

**Response to Grid Code Consultation E/09**

Thank you for the opportunity to respond to the above consultation. This response is on behalf of E.ON UK and E.ON Energy Trading

Please note that this response comments only on the merit of the proposed Grid Code text to meet each possible change. Our opinion of the merits of each proposed change may be found in our response to CAP169, although it may be summarised as supportive of WGAA2 and very cautiously supportive of WGAA1.

Our comments on the proposed Grid Code Drafting all pertain to the redeclaration fax at BC2 Appendix 3 Annexure 3, which is difficult to read and interpret in its proposed form.

We suggest changing the large block of text to lower case, and laying it out slightly differently -

“Reactive Power Capability at  
Grid Entry Point (England and Wales); or  
HV side of Transformer (Scotland); or  
User System Entry Point (if embedded) of the Power Park  
Module or DC Converter; or  
the Aggregated Reactive Power Capability of the Power Park Units at  
the Power Park Unit Terminals  
*Please delete those which do not apply*”

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1 | 2



In the box "At below 20% of Rated MW" delete "At" – it is irrelevant.

Confirming whether the measurements are at HV or LV may be confusing for some Power Park Modules with multiple voltages – would it be easier to ask for the voltage to be specified at which the redeclaration is being made?

If you have any queries, please do not hesitate to contact me on the above number.

—  
Yours sincerely

Claire Maxim  
Trading Arrangements

<b>Reference</b>	E/09-CR-04
<b>Company</b>	RWE Group

RWE Supply & Trading



Email: [cusc.team@uk.ngrid.com](mailto:cusc.team@uk.ngrid.com)

Contact Raoul Thulin  
Phone Phone 01793 892634  
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Swindon, 6<sup>th</sup> October 2009

**Consultation Document CUSC Amendment Proposal CAP169**

Dear CUSC Team,

Thank you for the opportunity to comment on the consultation document on CUSC Amendment Proposal CAP169. This response is provided on behalf of the RWE group of companies, including RWE Npower plc, RWE Supply and Trading GmbH and RWE Innogy.

We support the introduction of parts 1 and 2 of the Amendment Proposal as we consider that these changes would allow a greater pool of providers to be available to National Grid for the procurement of Reactive Power and therefore this would facilitate greater competition in the provision of such services.

We remain unconvinced that part 3 of the Amendment Proposal is the correct approach to deal with an issue relating to restrictions placed on a provider by a DNO. The proposal would apply a 20% payment for affected generators, based on the current CUSC arrangements for generators with a restricted reactive power capability that does not include the ability to operate at 0 MVA<sub>r</sub> output. However, the current arrangements serve as an incentive to restore capability, which is not an option available to an embedded generator subject to a DNO restriction.

A restriction applied by a DNO does not of itself necessarily mean that a generator can not provide a useful reactive power service to National Grid although we recognise that the loss of the ability to instruct a unit to 0MVA<sub>r</sub> does remove National Grid's ability to 'turn off' payments for the service. Therefore, circumstances might arise where a provider subject to a DNO restriction could provide a cheaper (to National Grid) alternative to an equivalent provider who is not subject to a DNO restriction, thus undermining rather than facilitating competition.

We are not persuaded by WGAA3, which would remove payments from affected providers and remove National Grid's rights to instruct such plant. This would have the effect of reducing the options available to National Grid, which we do not believe better facilitates competition.

We therefore favour WGAA2, which implements parts 1 and 2 of the original

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proposal. The implementation time proposed in the consultation report appears reasonable.

If you wish to discuss any aspect of our response, please do not hesitate to contact me.

Yours sincerely

By email

Raoul Thulin  
Ancillary Services Manager  
RWE Supply & Trading GmbH

<b>Reference</b>	E/09-CRR-01
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19<sup>th</sup> November 2009

Dear Sebastian

**Grid Code Consultation E/09: Consequential Grid Code changes relating to CAP169**

Thank you for your comments on the above Grid Code consultation received on 7<sup>th</sup> October 2009. We note your support for Working Group Alternative Amendment 3. We also note your view expressed that the despatch restrictions, in place on some embedded power stations, are a direct consequence of the type of connection requested by the generator.

Thank you for taking time to respond to this consultation. Your comments, which relate to the Grid Code element, will be included in the associated Report to the Authority. It is National Grid's intention to submit the 'Report to the Authority' to OFGEM by the end of November 2009.

Yours sincerely

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19<sup>th</sup> November 2009

Dear Mike

**Grid Code Consultation E/09: Consequential Grid Code changes relating to CAP169**

Thank you for your comments on the above Grid Code consultation received on 2<sup>nd</sup> October 2009. We note your stated support of the proposed revisions to the Grid Code, and agreement that they seem appropriate to the given CUSC changes. We also note your joint response to both the CUSC and Grid Code elements to the proposals and this letter only concerns the Grid Code elements or those factors that are directly related.

In order to clarify the point you raised, both at the GCRP and in your letter, regarding the obligations on existing generations, an explanation has been given below. The Grid Code obligations to provide reactive capability apply to all Large and Medium Power Stations, including Power Park Modules, regardless of whether they are synchronous or asynchronous, embedded or Transmission connected. This ensures that they will provide dynamic reactive support in the event of a fault and, in the case of Large Power Stations including Power Park Modules, enable NGET to despatch reactive power to manage voltages on the transmission system and on the LV side of GSPs. For some embedded generation the distribution network will limit the extent to which NGET can despatch reactive power but the obligation to provide dynamic reactive response will remain. To this effect the Grid Code prevents Large and Medium Generating Units from operating in constant power factor mode or constant reactive power mode. These requirements were discussed in detail under Grid Code amendment H/04, to which you referred to in your letter.

The objective of the despatch instruction is to raise or lower voltages on the transmission system or on the LV side of the GSP. This is achieved by issuing set point instructions for asynchronous generation and MVAR instructions for synchronous generation. The despatch process is the same for embedded and transmission connected generation. However these instructions would, in likelihood, only be given to embedded generators which are electrically close enough to the GSP to significantly affect the volts and would be commensurate with any limits imposed by the DNO. This means that deeply embedded generators are unlikely to be despatched, nevertheless they will provide dynamic response in the event of a voltage change.

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Under the CUSC default payment arrangements for reactive power all Large Embedded Generators will receive payment for their reactive output from NGET regardless of whether this output was despatched by NGET or was delivered automatically in response to voltage changes within the transmission network which in turn affected the distribution network. NGET constantly adjust the steady reactive output from Generators to achieve the desired voltage profile in economic and efficient manner. As mentioned above there will be number of embedded generating units where NGET cannot alter the reactive output due to the effect on voltages within the distribution network and they will be paid in full for their reactive output regardless of it's benefit (or lack thereof) to the transmission system. Under the current arrangements the DNOs are obliged to notify NGET of such restrictions in accordance with BC1.6. CAP 169 addresses this by seeking to amend the Grid Code, by introducing enhanced communication from generators and DNOs, and modifies the payment mechanism in the CUSC so that the payments to restricted generators are reduced by 80%. The remaining 20% payment is proposed in recognition of the generator's ability to provide dynamic response.

We note the point you raise that restrictions on an embedded generator stemming from the DNO network capability will generally be at the request of the type of connection selected.

Thank you for taking time to respond to this consultation. Your comments will be included in the associated Report to the Authority. It is National Grid's intention to submit the 'Report to the Authority' to Ofgem by the end of November 2009.

Yours sincerely

Tom Ireland  
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19<sup>th</sup> November 2009

Dear Claire

**Grid Code Consultation E/09: Consequential Grid Code changes relating to CAP169**

Thank you for your comments on the above Grid Code consultation received on 5<sup>th</sup> October 2009. We note your support for WGAA2 and cautious support for WGAA1. In addition, you suggest changes which could be made to the proposed Grid Code text.

National Grid agrees that all three of your suggested drafting changes add to the clarity and ease of reading of BC2 Appendix 3 Annexure 3 and as such, have incorporated them into the final proposals.

Thank you for taking time to respond to this consultation. Your comments will all be included in the associated Report to the Authority. It is National Grid's intention to submit the 'Report to the Authority' to OFGEM imminently.

Yours sincerely

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19<sup>th</sup> November 2009

Dear Raoul

**Grid Code Consultation E/09: Consequential Grid Code changes relating to CAP169**

Thank you for your comments on the above Grid Code consultation received on 6<sup>th</sup> October 2009. We note your support for parts 1 and 2 of the proposed revisions to the Grid Code and your comments relating to part 3.

Thank you for taking time to respond to this consultation. In general, as your specific points are related to the CUSC side of the proposals, they have been dealt with within the CUSC Report to the Authority. It is National Grid's intention to submit the Grid Code 'Report to the Authority' to OFGEM by the end of November 2009.

Yours sincerely

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