

Stage 02: Industry Consultation

Grid Code

GC0037 - Offshore Balancing Mechanism Unit Configuration

What stage is this document at?

01 Workgroup Report

02 Industry Consultation

03 Report to the Authority

This proposal seeks to modify the Grid Code to improve the information exchanged between NGET and Transmission Users regarding the configuration of Power Park Modules and BMUs given the operational flexibility now facilitated under the Transmission Frameworks

This document is open for Industry Consultation. Any interested party is able to make a response in line with the guidance set out in Section 6 of this document.

Published on: 23 August 2013
Length of Consultation: 20 Working Days
Responses by: 24 September 2013



National Grid recommends:

That GC0037 should be implemented as it better facilitates applicable Grid Code objectives (i), (ii) and (iii)



High Impact:

None identified



Medium Impact:

Owners, operators and developers of Power Park Modules



Low Impact:

None identified

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About this document

This Industry Consultation outlines the information required for interested parties to form an understanding of a defect within the Grid Code seeks the views of interested parties in relation to the issues raised by this document.

Parties are requested to respond by **24 September 2013** to grid.code@nationalgrid.com

Document Control

Version	Date	Author	Change Reference
0.1	27 June 2013	National Grid	Draft Industry Consultation
1.0	23 August 2013	National Grid	Final Industry Consultation



Any Questions?

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GC0037 Industry
Consultation

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Version 1.0

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1 Executive Summary

- 1.1 Following the implementation of BSC Modification P240 (Switching Plant and Apparatus between Balancing Mechanism Units) the Offshore Balancing Mechanism Unit Configuration Workgroup was established by the Grid Code Review Panel to review the information exchanged by NGET and Users to enable NGET to manage the Transmission System given that Balancing Mechanism Unit (BMU) configurations can change as a consequence of BSC modification P240.
- 1.2 The Workgroup explored how different degrees of aggregation of Power Park Modules (PPMs) into BMUs impacted on National Grid's requirements to operate the National Electricity Transmission System (NETS). The Workgroup concluded that an appropriate balance needed to be struck, between levels of detail and minimisation of information transfer, which could vary for different network designs.
- 1.3 The Workgroup observed that it was unlikely that every change to a PPM configuration needed to be notified to National Grid via a Grid Code submission and concluded that a degree of flexibility needed to be incorporated into the proposed change. The Workgroup also observed that there was no mechanism under the Grid Code to link PPMs to the BMU that they were part of. The Workgroup felt this was a flaw as the BMU was the only entity which could be controlled using an instruction.
- 1.4 The Workgroup's recommendations, which apply to all Onshore and Offshore PPMs, are:
 - (a) Modifying the PPM Planning Matrix in OC2 Appendix A and PPM Availability Matrix in BC1 Appendix 1 and the provisions of PC.A.3.2.2 and PC.A.3.2.4 to link PPMs to their respective BMUs; and
 - (b) Modifying the provisions of BC1 to relax the requirement to re-submit the PPM Availability Matrix in the event of a change, and instead stipulate that changes should be notified by telephone and only supplemented by fax when deemed absolutely necessary by National Grid.
- 1.5 Views are invited upon the proposals outlined in this consultation, which should be received by **24 September 2013**. Further information on how to submit a response can be found in section 6.

2 Why Change?

- 2.1 On 27 January 2010 BSC Modification P240¹ (Switching Plant and Apparatus between Balancing Mechanism Units) was implemented. This modification allows plant and apparatus that comprise Offshore Power Park strings to be moved between Balancing Mechanism Units (BMUs) in operational timescales.
- 2.2 Leading up to and following the implementation of P240, the Grid Code Review Panel discussed the potential impacts at a number of Panel meetings. It was agreed at the 18 November 2010 Grid Code Review Panel meeting to establish the Offshore Balancing Mechanism Unit Configuration Workgroup to review the information exchanged by NGET and Users to enable NGET to manage the Transmission System given that BMU configurations can change as a consequence of BSC modification P240.
- 2.3 BMUBMUNGET requires information on the composition of a Power Park Module (PPM) and this may need to be revised during planned and unplanned outages (which the BSC had been changed to facilitate). Generators are currently obliged to provide this information via the PPM Availability Matrix and are required to update this should the composition of a PPM change.
- 2.4 The Workgroup observed that it was unlikely that every change to a PPM configuration needed to be notified to National Grid via a Grid Code submission and concluded that appropriate flexibility needed to be incorporated.
- 2.5 Additionally, the Workgroup identified that there was no mechanism under the Grid Code to link PPMs to the BMU that they were part of. This lack of link between PPMs and the BMU was seen as a flaw by the Workgroup as the BMU was the only entity which could be controlled using an instruction.
- 2.6 The Workgroup concluded that:
 - there was a need to define a link between PPMs and the relevant BMU within the information submitted under the Grid Code which could be achieved by adding information to the PPM matrices.
 - the current requirement to notify configuration changes by fax placed an excessive and unnecessary burden on all parties and that operational liaison by telephone would give National Grid enough information to assess whether circumstances meant that notification by fax was necessary.

¹ More information about BSC Modification P240 can be found at: <http://www.elexon.co.uk/mod-proposal/p240-switching-plant-and-apparatus-between-bm-units/>

3 Solution

- 3.1 Following the submission of the Offshore Balancing Mechanism Unit Configuration Workgroup Report to the September 2012 Grid Code Review Panel, National Grid is consulting on their proposed solution.
- 3.2 The proposed changes, which apply to all Onshore and Offshore PPMs, are:
 - (a) Modifying the Power Park Module Availability Matrix in OC2 Appendix A and BC1 Appendix 1 and the provisions of PC.A.3.2.2 and PC.A.3.2.4 to link PPMs to their respective BMUs; and
 - (b) Modifying the provisions of BC1 to relax the requirement to re-submit a Power Park Module Availability Matrix by fax in the event of a change, and instead stipulate that changes should be notified by telephone and only supplemented by fax when deemed absolutely necessary by National Grid.
- 3.3 The proposed solution, whilst addressing the specific issues identified by the Workgroup, did not resolve the issues identified with PPM Matrix submission via fax under the Grid Code.
- 3.4 The Workgroup determined that this was out of scope of their Terms of Reference and that wider changes to the relevant information exchange processes were required. It is therefore proposed that the Electricity Balancing Systems Workgroup consider PPM Matrix submission via the new Electricity Balancing System.
- 3.5 National Grid supports the recommended solution proposed by the Offshore Balancing Mechanism Unit Configuration Workgroup.
- 3.6 The proposed legal text for this modification can be found in Annex 1 of this consultation.



Workgroup Meeting Dates

M1 - 08 September 2011
M2 - 18 October 2011
M3 - 07 December 2011
M4 - 14 February 2012

Purpose & Scope of Workgroup

- 4.1 The first Workgroup meeting was held on 08 September 2011 and the Workgroup met 4 times over the period between 08 September 2011 and 14 February 2012. The Workgroup also convened a number of teleconferences to review the Workgroup Report² which was submitted to the September 2012 Grid Code Review Panel.
- 4.2 The Workgroup discussed the following key areas:
- The clarity of the existing definitions and rules behind 'Switching Groups' and BMU reconfigurations;
 - Determining a simple means of data submission between NGET and User to allow and monitor reconfiguration of BMUs in real time;
 - How these submissions should be formatted and submitted in future to cater for increased flexibility in Offshore BMU configurations; and
 - Any Grid Code changes required to facilitate the recommendations derived from the above considerations.
- 4.3 A copy of the Terms of Reference is available in Annex 2.

Offshore Network Definitions & BSC Definition of Switching Group

- 4.4 Discussions commenced with a review of current provisions, and touched on the sections of the BSC that were relevant to the subject at hand. The provisions relating to Switching Groups were examined (BSC K3.1.4A to D). These allow a combination of PPMs to be identified collectively as a Switching Group and allow the PPMs within a Switching Group to be moved between the BMUs which have also been identified as part of that Switching Group. This facility was introduced by the BSC modification P240.
- 4.5 The Workgroup reached a view that clauses added by P240, BSC K3.1.4A and K3.1.4B, could be clearer, summarising two possible issues with the definition of Switching Group. These issues, which could be addressed under BSC governance if deemed appropriate, are;
- The BSC does not clearly prohibit PPMs in a single BMU from belonging to different Switching Groups. P240 was drafted assuming '1 PPM per BMU which could be a cause of the ambiguity. It was concluded that the legal text could be clarified to address this; and
 - Paragraph K3.1.4B of P240 could be too restrictive for more complex configurations as it implies that all PPMs within a Switching Group must be selectable to all the BMUs within that Switching Group. The Workgroup questioned whether the switching group 'rules' would work with a complex wind farm configuration.
- 4.6 Uncertainty was expressed over whether BSC K3.1.4 (g), as amended by P237³, which defines the criteria for combined Offshore BMUs, was

² A copy of the GC0037 Workgroup Report can be found at:

<http://www.nationalgrid.com/NR/rdonlyres/0749074F-4A4B-47D0-BFF7-2CC8BA514038/61278/OffshoreBMUConfigurationWorkgroupReport.pdf>

³ More information about BSC Modification P237 can be found at: <http://www.elexon.co.uk/mod-proposal/p237-standard-bm-unit-configuration-for-offshore-power-park-modules/>

restricted to Offshore. It was agreed that it was but that that a similar effect could be achieved Onshore by following the non standard BMU registration process.

- 4.7 The Workgroup briefly discussed the implications of registering each Power Park string as a BMU. Metering was seen an issue with this solution as Users would bear the expense of a meter on each string which may not be economic or efficient. Also, if each string was a separate BMU then a single infeed into the system would comprise of multiple BMUs. Thus if NGET wanted to vary that infeed then it would need to issue Bid Offer Acceptances to multiple BMUs, and would need to receive and process the relevant data.
- 4.8 An alternative would be to meter at a point common to more strings (e.g. the LV side of each 132/33kV transformer) and aggregate the contribution from each string.
- 4.9 Fewer BMUs were generally considered easier and more efficient to manage but with a potential loss of required information. More BMUs would however require more discrete meters which could be preferred due to greater flexibility and the ease of determining 'what is coming from where' and applying responsibility.

Discussion of BMU Configuration, Ownership and Metering Arrangements

- 4.10 The Workgroup discussed how various combinations of PPMs within BMUs could be metered effectively. The Workgroup found it useful to examine these by evaluating which active power flow indications needed to be available to National Grid to manage the network.
- 4.11 The examples shown below summarise the main points of discussion by illustrating different levels of aggregation and looking at the impact of one particular outage, planned or otherwise. Two configurations are shown.
- 4.12 Configuration A features the capability to direct the output of turbines to different platforms, whilst Configuration B features cross-connected platforms and transformers. Each diagram shows metering points and normal direction of power flow. The Workgroup noted that some of the options illustrated were unlikely to be adopted in practice.
- 4.13 The Workgroup also discussed the impact of different ownership boundaries, but noted that meters do not need to be placed at the Ownership Boundary for standard Offshore BMU configurations following BSC modification P238⁴.
- 4.14 Figure 1 illustrates the situation where each string is registered as a BMU. Each string is therefore metered, and it is possible to monitor and control power flows through the transformers and offshore circuit using the BMUs as registered.
- 4.15 Given that information on the number of turbines within a PPM forms part of a generator's Grid Code data submission, this arrangement has the advantage of providing all information required under intact conditions. However, NGET has to aggregate a number of BMUs in order to control system conditions and the generator has to manage the data submissions of a number of BMUs.

⁴ More information about BSC Modification P238 can be found at: <http://www.elexon.co.uk/mod-proposal/p238-removal-of-the-requirement-to-meter-each-boundary-point-for-offshore-power-park-modules/>

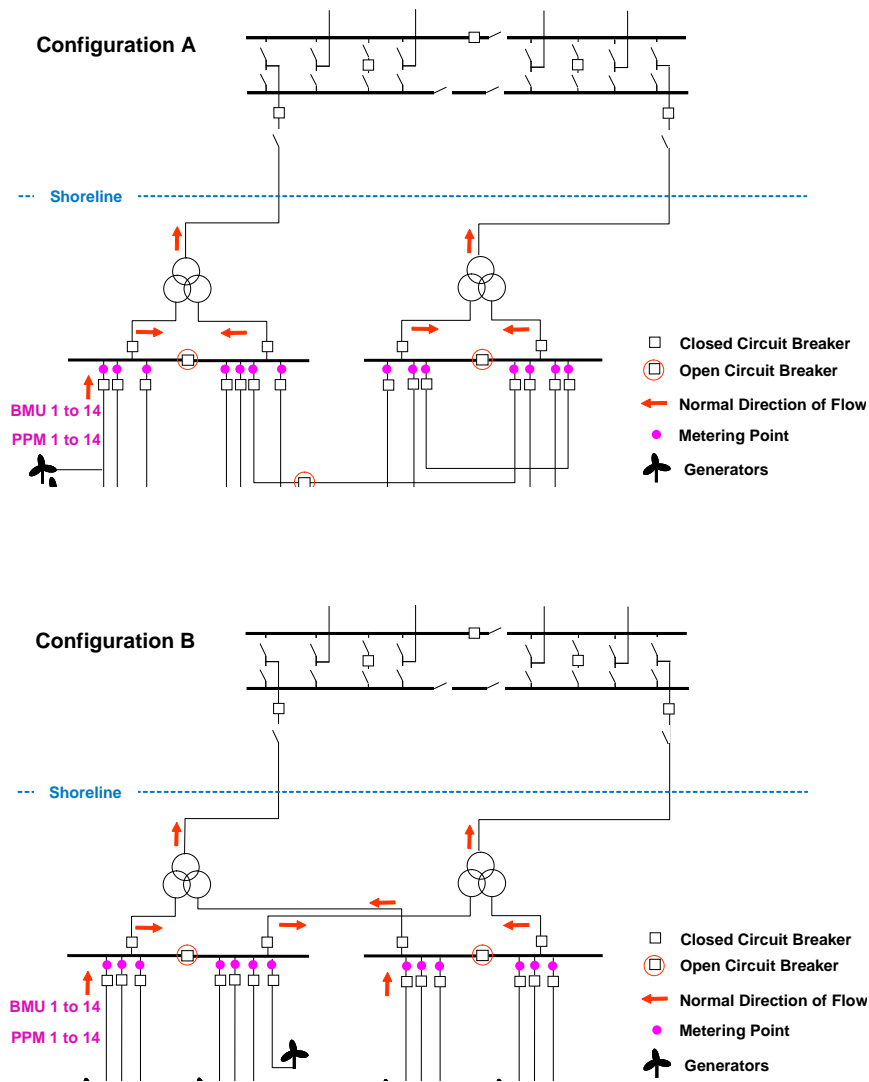


Figure 1: One BMU per String

- 4.16 Figure 2 shows the impact of an outage, which means redirecting the output of some wind turbines to the alternative 'platform' or transformer in these examples. Here it is possible to measure and control metered flow using the BMUs and meters available.
- 4.17 However, under configuration A some BMUs now contain additional turbines and therefore have a higher potential active and reactive power output, amongst other features. The system operator would, in this case, need to factor this change into its operational decisions.

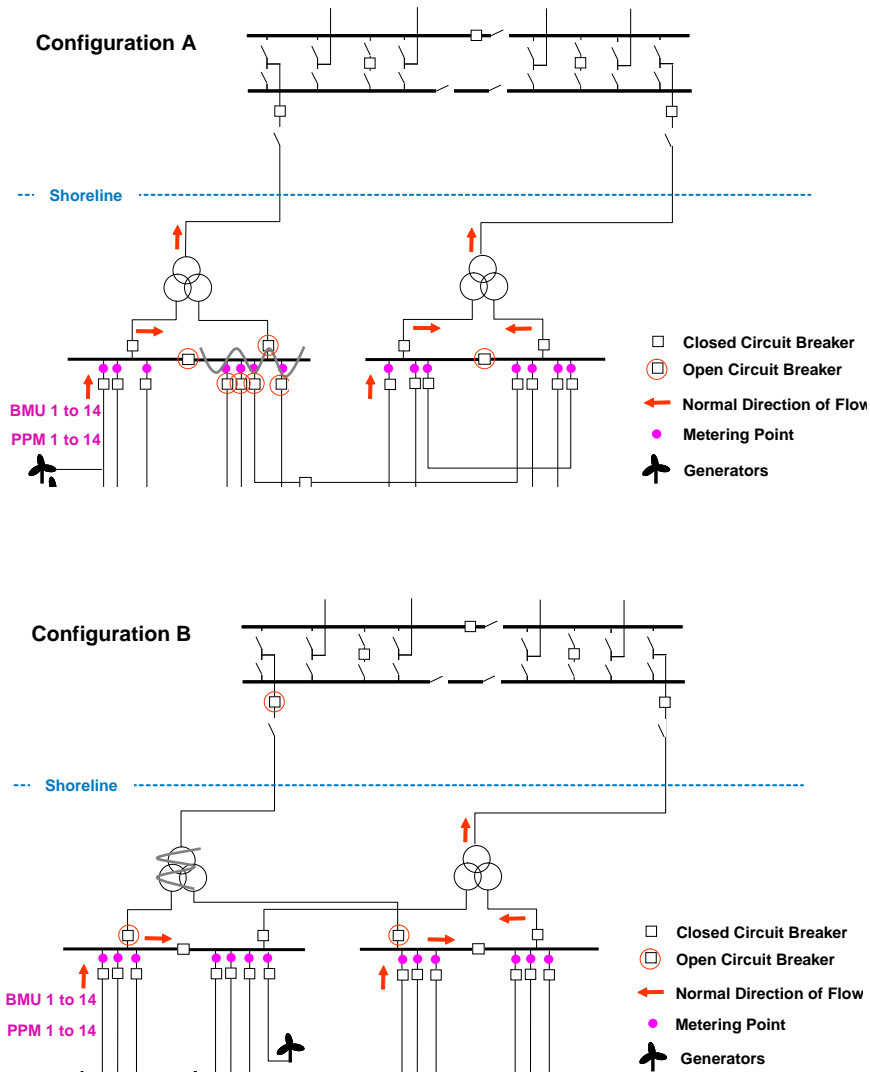


Figure 2: One BMU per String – busbar or transformer Outage

4.18 Figure 3 illustrates the situation where the collection of strings connected to a busbar is defined as a PPM, and each PPM is registered as a BMU. In this case, flows through the transformers (the flow into the LV winding is equivalent to a BMU) and circuits onshore (the sum of two BMUs) can be monitored and controlled with a smaller overhead for both generator and NGET than in the previous example.

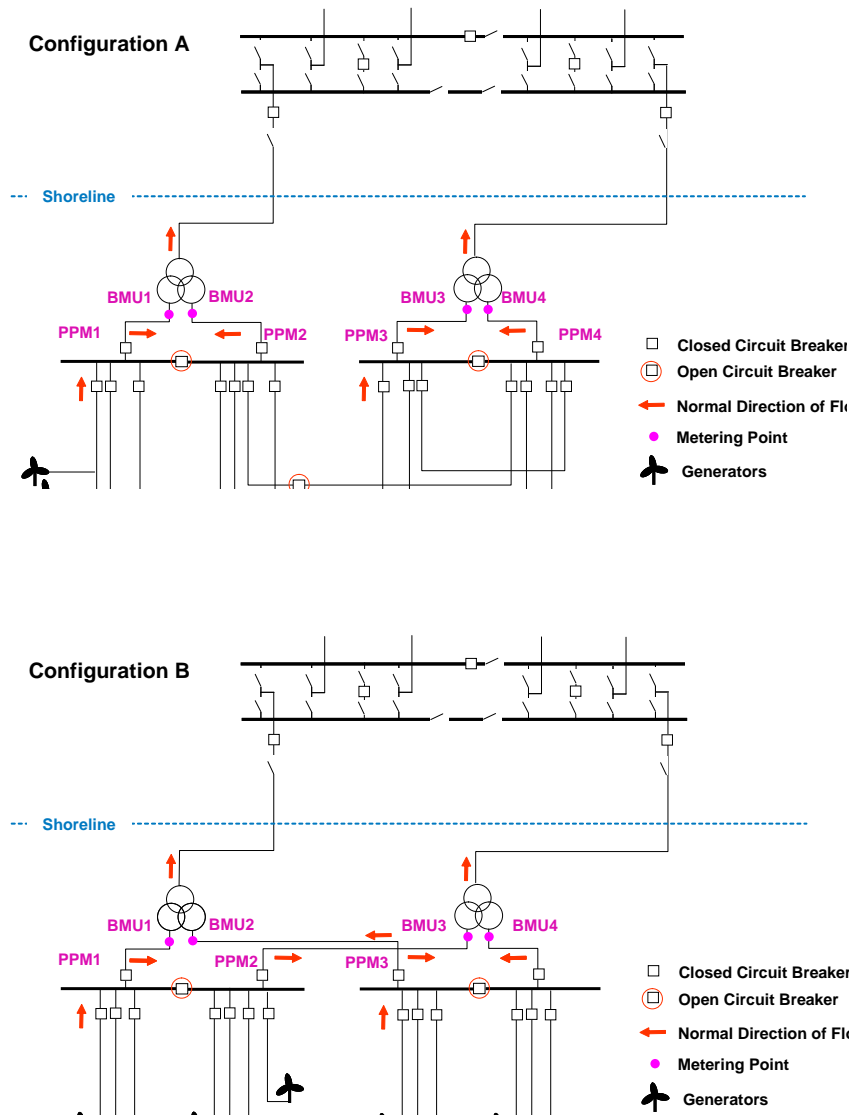


Figure 3: One PPM per BMU

- 4.19 Figure 4 shows the impact of a busbar or transformer outage, which as previously mentioned means redirecting the output of some wind turbines. Here it is possible to measure and control metered flow using the BMUs and meters available.
- 4.20 One of the PPMs has now moved to form part of a different BMU. This BMU now contains additional turbines and therefore has a higher potential active and reactive power output amongst other features. The system operator would, in this case, need to factor this change into its operational decisions. However, in these examples, the information may only be required for the BMU which now comprises more strings and therefore more turbines.

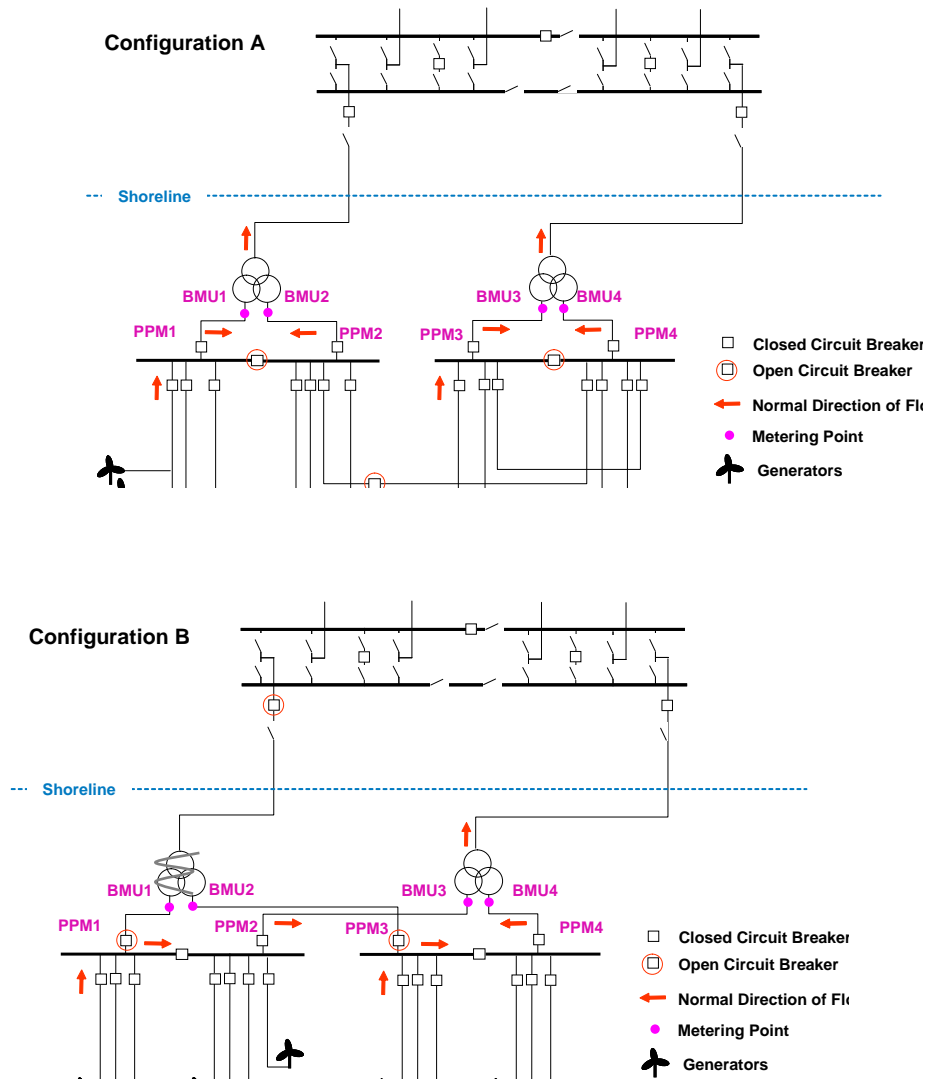


Figure 4: One PPM per BMU – busbar or transformer outage

- 4.21 Figure 5 illustrates the situation where the collection of strings connected to a busbar is defined as a PPM, and each PPM is paired with another to form a BMU.
- 4.22 In this case, flows through the transformers cannot be controlled by despatching a BMU but the onshore circuits can be monitored and controlled. The Workgroup concluded that under intact conditions, the inability to control the output of a PPM by despatching a BMU was unlikely to cause a problem as the network would be designed to cater for maximum output.

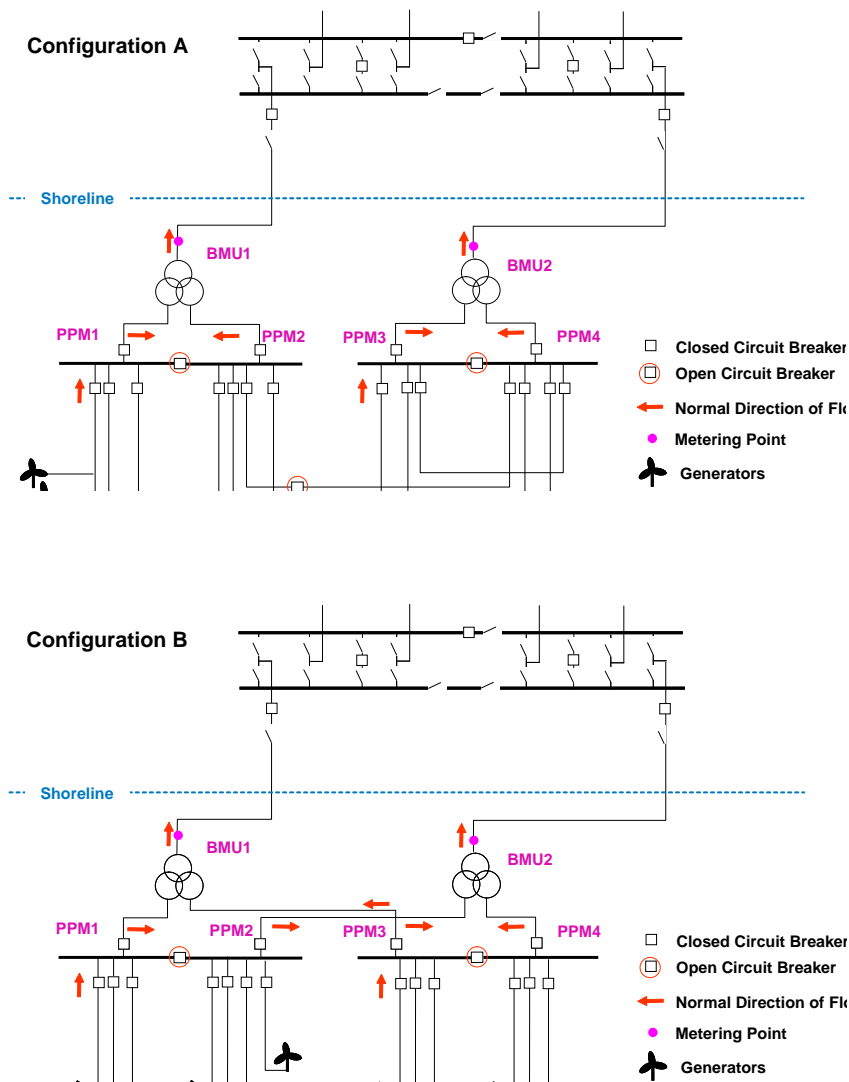


Figure 5: Multiple PPMs per BMU

4.23 Figure 6 shows the impact of a busbar or transformer outage on this arrangement. Here it is possible to measure and control metered flow using the BMUs and meters available. Again, one of the PPMs has moved to form part of a different BMU which now contains additional turbines and therefore has a higher potential active and reactive power output amongst other features.

4.24 The system operator would, in this case, need to factor this change into its operational decisions. Also, the flows through the transformer could only be controlled by despatching BMU 2 which, in the absence of any other measures, could mean curtailing turbine output on strings which need not be (i.e. there is no way of focussing on the flow emerging from PPM3 as distinct to PPM4 as they are both part of BMU2 to which an instruction would need to be delivered). This arrangement may not be acceptable under some circumstances.

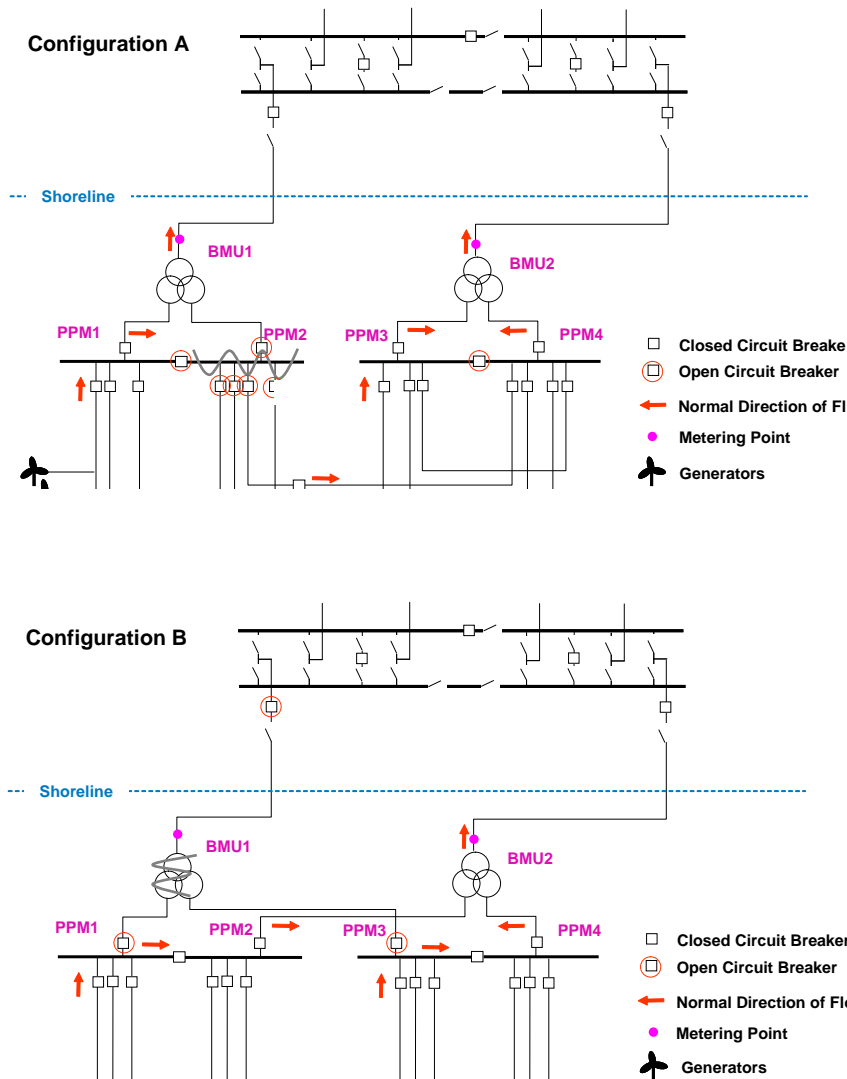


Figure 6: Multiple PPMs per BMU – busbar or transformer outage

Pre Defined Configuration Scenarios

4.25 A proposal to draw up a range of standard BMU, PPM and network configurations in response to particular scenarios, in advance of the event, was discussed at length by the Workgroup.

4.26 The key issues identified for further discussion were;

- Communication between National Grid, the Offshore Transmission Owner (OFTO) and the Generator, particularly when a situation arises where a standard configuration has not previously been looked at and agreed upon;
- Format and quantity of the submitted data; and
- When/where the data should be submitted.

4.27 Generator representatives had considered a number of standard configurations which would be adopted in 'outage on transformer' scenarios. It was proposed that for an event such as this, a number of pre-agreed configurations, for example, would be available for the Generator to select from and simply indicate to National Grid. The Workgroup assumed

Generators wouldn't want to be bound to one option and instead would prefer a range of configurations per scenario to choose from.

- 4.28 The likelihood and desirability of identifying all possible configurations was considered. If this meant a large amount of unnecessary configuration information and diagrams were generated, this approach would be undesirable.
- 4.29 The Workgroup determined that a more suitable solution could be to have a range of scenarios each with a number of planned configurations that can be indicated by the Generator to National Grid. For example, the Generator could submit through a process, perhaps via the Balancing Codes, a configuration statement such as "we are configuration X of Y".
- 4.30 With regards to the format of reconfiguration data submitted by Generators, a "number in the box" approach, as opposed to submission via drawings, was seen as a preferred approach. If pre defined configuration data is utilised, only the configuration reference (e.g. 1-5) would need to be transferred with the PPM Matrix which could be used to capture further required details.
- 4.31 The Workgroup did not develop a proposal to cater for pre-defined configurations as members did not see a strong need for this if the required information could be exchanged at the time it was required.

Defining the Relationship between PPMs & BMU

- 4.32 The Workgroup discussed the current provisions relating to the PPM Matrix as required to be submitted under the Planning Code, Operating Codes and Balancing Codes.
- 4.33 The Workgroup identified a weakness in the current provisions in that there is no obvious mechanism to communicate the PPM to BMU relationship, and hence no explicit link between the PPM and the metered BMU entity that can be despatched. PPM Matrix data, as submitted in Grid Code OC2, gives detail of what is in the PPM, but not the relationship between PPM and BMU.
- 4.34 An ability to determine this relationship, at any point in time, is key and therefore developing a method of defining it became a primary objective of the Workgroup.
- 4.35 The three options to capture the PPM/BMU relationship discussed were;
- (1) Telemeter all of the switchgear that can affect the configuration of the site;
 - (2) Extend the PPM Matrix to include the BMU that each PPM is part of; or
 - (3) Change the PPM Matrix so that it becomes a BMU Matrix.
- 4.36 There are currently provisions within Bilateral Connection Agreements (BCAs) to specify the plant items within a PPM. For proposal (2) above, it could therefore be argued that the BCA already establishes the necessary link. The PPM Matrix and BCA combination could be used to capture the range of possible configurations. The Workgroup decided this could be possible, but the number of conceivable configurations would have to be looked at further as these were likely to be too numerous to be practicable.
- 4.37 In a situation where National Grid controlled the busbar and/or switching on an Offshore platform, then National Grid would have all the information it required via the PPM Matrix or telemetering. However, if the Generator has

the responsibility of controlling the switchgear, a matrix which explicitly tied PPM to BMU would be required.

- 4.38 In response to a Generator representative query as to whether individual turbines out of service would need to be communicated with submission of a new matrix; it was concluded that major changes would require a resubmission and that clarification of instances when resubmissions are required should be further considered. Brief consideration was given to using the Transmission Outages Generation Availability (TOGA) system as a means of capturing these restrictions and a separate mechanism for demonstrating configurations. However, the idea was set aside with the intention of identifying a simpler method (i.e. one which involved the need for only one submission). Telemetry was also briefly highlighted as a possible solution to indicate the active turbines per module, however, this idea was similarly set aside because of the associated cost and that National Grid would prefer to know in advance of turbines becoming out of service.
- 4.39 The Workgroup agreed that options 2 or 3 described in paragraph 4.35 were currently the preferred options. Option 2 was seen as the simplest implementation by the Workgroup whilst still meeting most Workgroup requirements.
- 4.40 A proposed PPM/BMU Matrix suitable for use in the Grid Code and the subsequent code change requirements that would arise from its implementation can be found in Annex 1.

Discussion of possible issues with proposed PPM/BMU Matrix

- 4.41 The Workgroup expressed concern that PPMs do not seem to be named in submissions at present. Denoting which BMU each PPM belongs to (i.e. explicitly indicating 'belongs to BMU 1') could solve this issue, as opposed to giving each PPM a name. It was noted that this issue applied equally to Onshore and Offshore PPMs.
- 4.42 It was also noted that the term BMU is defined in the BSC and not in the Grid Code where a proposed PPM/BMU Matrix would be placed. The definition of BMU in the Grid Code is made by cross-reference to the BSC. The Workgroup concluded that referring to a BMU in the Grid Code would not present a problem and that making use of the term was preferable to relying on the BCA to specify how a PPM related to its BMU.
- 4.43 Knowing the number of turbines per BMU would not remove the need for information on a per PPM basis as, in the Grid Code, the reactive requirements for example are defined per module. Therefore, the number of turbines per PPM would need to be known.
- 4.44 The Workgroup also expressed concern with the means by which the information would be submitted. Currently this seemed to be restricted to an exchange of faxes.
- 4.45 The Workgroup also discussed whether it was necessary for National Grid to know that PPM and hence BMU configurations had changed in all circumstances. The Workgroup concluded that there were a number of situations where the information was necessary to manage active and reactive power flows, ancillary services and in some situations issues such as fault levels. However, the Workgroup noted that module matrix submissions are not being pursued regularly by National Grid at the moment, suggesting that the information was only required in certain situations.

Interaction with other (similar) Workgroups

- 4.46 The Workgroup considered whether the PPM/BMU Matrix should capture:
- Configuration changes only; or
 - Configuration changes plus additional information around wind availability, MEL etc.
- 4.47 The Workgroup felt that the second option was potentially infringing on other existing Workgroups (Electricity Balancing Systems, High Wind Speed Shutdown and Power Available) and was possibly broader than scope.

Conclusions

- 4.48 The Workgroup concluded that there was a need to define a link between PPMs and the relevant BMU within the information submitted under the Grid Code which could be achieved by adding information to the PPM Matrices.
- 4.49 The Workgroup observed that it was unlikely that all changes to PPM configuration needed to be notified to National Grid via a Grid Code submission and concluded that appropriate flexibility needed to be incorporated into the proposed change. The Workgroup concluded that the current requirement to notify configuration changes by fax placed an excessive and unnecessary burden on all parties and that operational liaison by telephone would give National Grid enough information to assess whether circumstances meant that notification by fax was necessary.
- 4.50 The Workgroup recommends:
- (a) Modifying the Power Park Module Availability Matrix in OC2 Appendix A and BC1 Appendix 1 and the provisions of PC.A.3.2.2 and PC.A.3.2.4 to link PPMs to their respective BMUs; and
 - (b) Modifying the provisions of BC1 to relax the requirement to re-submit a Power Park Module Availability Matrix by fax in the event of a change, and instead stipulate that changes should be notified by telephone and only supplemented by fax when deemed absolutely necessary by National Grid.
- 4.51 The Workgroup's recommendations apply to Power Park Modules, and hence to both Onshore Power Park Modules and Offshore Power Park Modules.
- 4.52 The proposed solution, whilst addressing the specific issues identified by the Workgroup, did not resolve the issues identified with PPM Matrix submission via fax under the Grid Code.
- 4.53 The Workgroup determined that this was out of scope of their Terms of Reference and that wider changes to the relevant information exchange processes were required. It is therefore proposed that the Electricity Balancing Systems Workgroup consider PPM Matrix submission via the new Electricity Balancing System.

5 Impact & Assessment

Impact on the Grid Code

- 5.1 GC0037 requires amendments to the following parts of the Grid Code:
- PCA.3.2.2 and PCA.3.2.4;
 - OC2.4.2 and OC2 Appendix 4; and
 - BC1.4.2 and BC1.A.1.8.
- 5.2 The text required to give effect to the proposal is contained in Annex 1 of this consultation.

Impact on National Electricity Transmission System (NETS)

- 5.3 The proposed changes will clarify the relationship between PPMs and BMUs meaning that networks can be controlled more effectively via the monitoring and despatch of BMUs.

Impact on Grid Code Users

- 5.4 The proposed modification will relax the obligation on Users to submit immediate revisions to the PPM Availability Matrix under BC1. Users will have to provide information setting out how PPMs relate to the relevant BMU via the PPM Availability Matrix under BC1 and OC2.

Impact on Greenhouse Gas emissions

- 5.5 The proposed changes will not have a material impact on Greenhouse Gas emissions but will minimise a risk of unnecessary curtailment under outage conditions.

Assessment against Grid Code Objectives

- 5.6 National Grid considers that the proposed changes would better facilitate the Grid Code objective:

- (i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;

The proposed change improves the information provided to NGET by establishing a clear relationship between Power Park Modules and Balancing Mechanism Units meaning that generation and transmission system operation can be co-ordinated more effectively.

- (ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);

The proposed change allows information on the configuration of Power Park Modules and their relationship to Balancing Mechanism Units to be conveyed without placing any restrictions on connection design.

- (iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; and

The proposed change reduces the volume of information required to be exchanged between generators and NGET but provides for appropriate operational liaison to ensure the transmission system can be operated efficiently safely and securely.

- (iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency.

The proposal has a neutral impact on this objective

Impact on core industry documents

5.7 The proposed modification does not impact on any core industry documents

Impact on other industry documents

5.8 The proposed modification does not impact on any other industry documents

Implementation

5.9 National Grid proposes GC0037 should be implemented 10 business days after an Authority decision. Views are invited on this proposed implementation date.

6 Consultation Responses

6.1 Views are invited upon the proposals outlined in this consultation, which should be received by **24 September 2013**. A response proforma is available on the National Grid website at the following link:

<http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/consultationpapers/current/GC0037/>

Your formal responses may be emailed to:

grid.code@nationalgrid.com

6.2 Responses are invited to the following questions:

- (i) Do you support the proposed implementation approach of 10 business days following an Authority decision?
- (ii) Do you believe that GC0037 better facilitates the appropriate Grid Code objectives?
- (iii) Do you agree it is necessary to change the Grid Code to place obligations on a Generator to define and communicate to National Grid which Power Park Modules (PPMs) form part of a Balancing Mechanism Unit (BMU)?
- (iv) Do you agree that it is appropriate to change the Grid Code to relax the obligations on a Generator to submit a Power Park Module Availability Matrix in the event of a change in configuration?
- (v) The Workgroup identified a number of areas within the Grid Code that needed to be changed to deliver its proposals. Are there other parts of the Grid Code that need to be changed to deliver the Workgroup's proposals?

6.3 If you wish to submit a confidential response please note the following:

- (i) Information provided in response to this consultation will be published on National Grid's website unless the response is clearly marked "Private & Confidential", we will contact you to establish the extent of the confidentiality. A response marked "Private and Confidential" will be disclosed to the Authority in full but, unless agreed otherwise, will not be shared with the Grid Code Review Panel or the industry and may therefore not influence the debate to the same extent as a non confidential response.
- (ii) Please note an automatic confidentiality disclaimer generated by your IT System will not in itself, mean that your response is treated as if it had been marked "Private and Confidential".

This section contains the proposed legal text to give effect to the proposals. The proposed new text is in red and is based on Grid Code Issue 5 Revision 4.

PLANNING CODE (PC)

- 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. Items (a), and (f)(iv) are to be supplied (as applicable) by a **User** in the case of **OTSUA** which includes an **OTSDUW DC Converter**. Item (c) is to be supplied by each **Network Operator** in all cases:-
- (a) **Registered Capacity (MW)** or **Interface Point Capacity** in the case of **OTSDUW**;
 - (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 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, Offshore Transmission Systems** 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, 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**;
 - (ii) 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**;
 - (iv) at the **Interface Point** for **OTSDUW Plant and Apparatus**
- 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**;

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 ~~and identifying the **BM Unit** of which each **Power Park Module** 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** ~~and/or **Power Park Modules** can be selected to run in different **BM Units**~~, 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.

PC.A.3.2.3 Notwithstanding any other provision of this PC, the **CCGT Units** within a **CCGT Module**, details of which are required under paragraph (g) of PC.A.3.2.2, can only be amended in accordance with the following provisions:-

- (a) if the **CCGT Module** is a **Normal CCGT Module**, the **CCGT Units** within that **CCGT Module** can only be amended such that the **CCGT Module** comprises different **CCGT Units** if NGET gives its prior consent in writing. Notice of the wish to amend the **CCGT Units** within such a **CCGT Module** must be given at least 6 months before it is wished for the amendment to take effect;
- (b) if the **CCGT Module** is a **Range CCGT Module**, the **CCGT Units** within that **CCGT Module** and the **Grid Entry Point** at which the power is provided can only be amended as described in BC1.A1.6.4.

PC.A.3.2.4 Notwithstanding any other provision of this PC, the **Power Park Units** within a **Power Park Module**, ~~and the **Power Park Modules** within a **BM Unit**~~, details of which are required under paragraph (k) of PC.A.3.2.2, can only be amended in accordance with the following provisions:-

- (a) if the **Power Park Units** within that **Power Park Module** can only be amended such that the **Power Park Module** comprises different **Power Park Units** due to repair/replacement of individual **Power Park Units** if NGET gives its prior consent in writing. Notice of the wish to amend a **Power Park Unit** within such a **Power Park Module** must be given at least 4 weeks before it is wished for the amendment to take effect;
- (b) if the **Power Park Units** within that **Power Park Module** ~~and/or the **Power Park Modules** within that **BM Unit**~~ can be selected to run in different **Power Park Modules** ~~and/or **BM Units**~~ as an alternative operational running arrangement the **Power Park Units** within the **Power Park Module**, ~~the **BM Unit** of which each **Power Park Module** forms part~~, and the **Grid Entry Point** at which the power is provided can only be amended as described in BC1.A.1.8.4.

< END OF PLANNING CODE >

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OPERATING CODE NO. 2
(OC2)

OPERATIONAL PLANNING AND DATA PROVISION

OC2.4.2 DATA REQUIREMENTS

OC2.4.2.1 When a **Statement of Readiness** under the **Bilateral Agreement** and/or **Construction Agreement** is submitted, and thereafter in calendar week 24 in each calendar year,

- (a) each **Generator** shall (subject to OC2.4.2.1(k)) in respect of each of its:-
- (i) **Gensets** (in the case of the **Generation Planning Parameters**); and
 - (ii) **CCGT Units** within each of its **CCGT Modules** at a **Large Power Station** (in the case of the **Generator Performance Chart**)
- submit to **NGET** in writing the **Generation Planning Parameters** and the **Generator Performance Chart**.
- (b) Each shall meet the requirements of CC.6.3.2 and shall reasonably reflect the true operating characteristics of the **Genset**.
- (c) They shall be applied (unless revised under this **OC2** or (in the case of the **Generator Performance Chart** only) **BC1** in relation to **Other Relevant Data**) from the **Completion Date**, in the case of the ones submitted with the **Statement of Readiness**, and in the case of the ones submitted in calendar week 24, from the beginning of week 25 onwards.
- (d) They shall be in the format indicated in Appendix 1 for these charts and as set out in Appendix 2 for the **Generation Planning Parameters**.
- (e) Any changes to the **Generator Performance Chart** or **Generation Planning Parameters** should be notified to **NGET** promptly.
- (f) **Generators** should note that amendments to the composition of the **CCGT Module** or **Power Park Module** at **Large Power Stations** may only be made in accordance with the principles set out in PC.A.3.2.3 or PC.A.3.2.4 respectively. If in accordance with PC.A.3.2.3 or PC.A.3.2.4 an amendment is made, any consequential changes to the **Generation Planning Parameters** should be notified to **NGET** promptly.
- (g) **The Generator Performance Chart** must be as described below and demonstrate the limitation on reactive capability of the **System** voltage at 3% above nominal. It must also include any limitations on output due to the prime mover (both maximum and minimum), **Generating Unit** step up transformer or **User System**.
- (i) For a **Synchronous Generating Unit** on a **Generating Unit** specific basis at the **Generating Unit** Stator Terminals. It must include details of the **Generating Unit** transformer parameters.
 - (ii) For a **Non-Synchronous Generating Unit** (excluding a **Power Park Unit**) on a **Generating Unit** specific basis at the **Grid Entry Point** (or **User System Entry Point** if **Embedded**).
 - (iii) For a **Power Park Module**, on a **Power Park Module** specific basis at the **Grid Entry Point** (or **User System Entry Point** if **Embedded**).
 - (iv) For a **DC Converter** on a **DC Converter** specific basis at the **Grid Entry Point** (or **User System Entry Point** if **Embedded**).

- (h) For each **CCGT Unit**, and any other **Generating Unit** or **Power Park Module** whose performance varies significantly with ambient temperature, the **Generator Performance Chart** shall show curves for at least two values of ambient temperature so that **NGET** can assess the variation in performance over all likely ambient temperatures by a process of linear interpolation or extrapolation. One of these curves shall be for the ambient temperature at which the **Generating Unit's** output, or **CCGT Module** at a **Large Power Station** output or **Power Park Module's** output, as appropriate, equals its **Registered Capacity**.
- (i) The **Generation Planning Parameters** supplied under OC2.4.2.1 shall be used by **NGET** for operational planning purposes only and not in connection with the operation of the **Balancing Mechanism** (subject as otherwise permitted in the **BC**).
- (j) Each **Generator** shall in respect of each of its **CCGT Modules** at **Large Power Stations** submit to **NGET** in writing a **CCGT Module Planning Matrix**. It shall be prepared on a best estimate basis relating to how it is anticipated the **CCGT Module** will be running and which shall reasonably reflect the true operating characteristics of the **CCGT Module**. It will be applied (unless revised under this OC2) from the **Completion Date**, in the case of the one submitted with the **Statement of Readiness**, and in the case of the one submitted in calendar week 24, from the beginning of week 31 onwards. It must show the combination of **CCGT Units** which would be running in relation to any given MW output, in the format indicated in Appendix 3.

Any changes must be notified to **NGET** promptly. **Generators** should note that amendments to the composition of the **CCGT Module** at **Large Power Stations** may only be made in accordance with the principles set out in PC.A.3.2.3. If in accordance with PC.A.3.2.3 an amendment is made, an updated **CCGT Module Planning Matrix** must be immediately submitted to **NGET** in accordance with this OC2.4.2.1(b).

The **CCGT Module Planning Matrix** will be used by **NGET** for operational planning purposes only and not in connection with the operation of the **Balancing Mechanism**.

(k) Each **Generator** shall in respect of each of its **Cascade Hydro Schemes** also submit the **Generation Planning Parameters** detailed at OC2.A.2.6 to OC2.A.2.10 for each **Cascade Hydro Scheme**. Such parameters need not also be submitted for the individual **Gensets** within such **Cascade Hydro Scheme**.

- (l) Each **Generator** shall in respect of each of its **Power Park Modules** at **Large Power Stations** submit to **NGET** in writing a **Power Park Module Planning Matrix**. It shall be prepared on a best estimate basis relating to how it is anticipated the **Power Park Module** will be running and which shall reasonably reflect the operating characteristics of the **Power Park Module** and the **BM Unit of which it forms part**. It will be applied (unless revised under this OC2) from the **Completion Date**, in the case of the one submitted with the **Statement of Readiness**, and in the case of the one submitted in calendar week 24, from the beginning of week 31 onwards. It must show the number of each type of **Power Park Unit** in the **Power Park Module** typically expected to be available to generate and the **BM Unit of which it forms part**, in the format indicated in Appendix 4. The **Power Park Module Planning Matrix** shall be accompanied by a graph showing the variation in MW output with **Intermittent Power Source** (e.g. MW vs wind speed) for the **Power Park Module**. The graph shall indicate the typical value of the **Intermittent Power Source** for the **Power Park Module**.

Any changes must be notified to **NGET** promptly. **Generators** should note that amendments to the composition of the **Power Park Module** at **Large Power Stations** may only be made in accordance with the principles set out in PC.A.3.2.4. If in accordance with PC.A.3.2.4 an amendment is made, an updated **Power Park Module Planning Matrix** must be immediately submitted to **NGET** in accordance with this OC2.4.2.1(a).

The **Power Park Module Planning Matrix** will be used by **NGET** for operational planning purposes only and not in connection with the operation of the **Balancing Mechanism**.

OG2.4.2.2 Each **Network Operator** shall by 1000 hrs on the day falling seven days before each **Operational Day** inform **NET** in writing of any changes to the circuit details called for in PC.A.2.2.1 which it is anticipated will apply on that **Operational Day** (under **BC1** revisions can be made to this data).

APPENDIX 4 - POWER PARK MODULE PLANNING MATRIX

Power Park Module Planning Matrix Example Form

BM Unit Name				
Power Park Module [unique identifier]				
POWER PARK UNIT AVAILABILITY	POWER PARK UNITS			
	Type A	Type B	Type C	Type D
Description (Make/Model)				
Number of units				
Power Park Module [unique identifier]				
POWER PARK UNIT AVAILABILITY	POWER PARK UNITS			
	Type A	Type B	Type C	Type D
Description (Make/Model)				
Number of units				

The **Power Park Module Planning Matrix** may have as many columns as are required to provide information on the different make and model for each type of **Power Park Unit** in a **Power Park Module** and as many rows as are required to provide information on the **Power Park Modules** within each **BM Unit**. The description is required to assist identification of the **Power Park Units** within the **Power Park Module** and correlation with data provided under the **Planning Code**.

< END OF OPERATING CODE NO. 2 >

BALANCING CODE NO. 1
(BC1)

PRE GATE CLOSURE PROCESS

BC1.A.1.8 Power Park Module Availability Matrix

BC1.A.1.8.1 **Power Park Module Availability Matrix** showing the number of each type of **Power Park Units** expected to be available is illustrated in the example form below. The **Power Park Module Availability Matrix** is designed to achieve certainty in knowing the number of **Power Park Units Synchronised** to meet the **Physical Notification** and to achieve a **Bid-Offer Acceptance** by specifying which **BM Unit** each **Power Park Module** forms part of. The **Power Park Module Availability Matrix** may have as many columns as are required to provide information on the different make and model for each type of **Power Park Unit** in a **Power Park Module** and as many rows as are required to provide information on the **Power Park Modules** within each **BM Unit**. The description is required to assist identification of the **Power Park Units** within the **Power Park Module** and correlation with data provided under the **Planning Code**.

Power Park Module Availability Matrix example form

BM Unit Name				
Power Park Module [unique identifier]				
POWER PARK UNIT AVAILABILITY	POWER PARK UNITS			
	Type A	Type B	Type C	Type D
Description (Make/Model)				
Number of units				
Power Park Module [unique identifier]				
POWER PARK UNIT AVAILABILITY	POWER PARK UNITS			
	Type A	Type B	Type C	Type D
Description (Make/Model)				
Number of units				

BC1.A.1.8.2 In the absence of the correct submission of a **Power Park Module Availability Matrix** the last submitted (or deemed submitted) **Power Park Module Availability Matrix** shall be taken to be the **Power Park Module Availability Matrix** submitted hereunder.

BC1.A.1.8.3 **NGET** will rely on the **Power Park Units**, **Power Park Modules** and **BM Units** specified in such **Power Park Module Availability Matrix** running as indicated in the **Power Park Module Availability Matrix** when it issues an instruction in respect of the ~~**Power Park Module BM Unit**~~;

BC1.A.1.8.4 Subject as provided in PC.A.3.2.4 any changes to any changes to **Power Park Module** or **BM Unit** configuration, or availability of **Power Park Units** which affects the information set out in the **Power Park Module Availability Matrix** must be notified immediately to **NGET** in accordance with the relevant provisions of **BC1**. Initial notification may be by telephone. In some circumstances, such as a significant re-configuration of a **Power Park Module** due to an unplanned outage, a revised **Power Park Module Availability Matrix** must be supplied on **NGET's** request.

< END OF BALANCING CODE NO. 1 >

Version: v2.0

Grid Code Offshore BMU Configuration Working Group (OBC) Terms of Reference

Governance

1. The OBC WG is established by Grid Code Review Panel (GCRP).
2. The group shall formally report to the GCRP.

Membership

3. Membership will be invited from the Grid Code standard distribution list with the addition of;
 - Known offshore wind farm developers;
 - Elexon rep
 - Ofgem rep
 - SO-TO Code Committee (STC Committee) rep.

Meeting Administration

4. The frequency of OBC WG meetings shall be defined as necessary by the OBC WG chair to meet the scope and objectives of the work being undertaken at that time.
5. National Grid will provide technical secretary resource to the OBC WG and handle administrative arrangements such as venue, agenda and minutes.
6. The OBC WG will have a dedicated section under the Grid Code part of National Grid's website.

Scope

7. It was agreed at the 18th November 2010 Grid Code Review Panel meeting to establish a Grid Code Working Group to establish the information that should be provided to NGET to enable it to manage the Transmission System given that BMU Configurations can change as a consequence of BSC modifications P237 and P240.
8. A change in the way that a BMU is configured can affect transmission network flows, voltage performance and fault levels. It can also affect the way the transmission network can be re-configured.
9. The need to consider the information required to manage the transmission system as BMU configurations change initially became apparent in the context of Offshore Transmission and Offshore BMUs. The Working Group will consider the applicability of any new requirements to both Onshore and Offshore BMUs.

Deliverables

10. The Working Group will:

- Determine the current obligations for the provision of relevant operational data by offshore Power Park Modules.
- Determine the operational information required by the NETS System Operator in order to operate the NETS in an economic and efficient manner.
- Consequently, determine what additional information is required and when and determine the form by which it shall be presented. The Working Group should be mindful not just of the current offshore configurations but those anticipated for the future. Develop the Grid Code requirements to implement any changes identified.
- A Working Group report will be delivered with the findings, a summary of discussions and final recommendations (including proposed revisions to the Grid Code).

Timescales

11. The Working Group will produce a Working Group report outlining its analysis, findings and recommendations which will be submitted to the Grid Code Review Panel at the meeting in January 2012.