



Possible Issues with P240 Solution

Meeting Name	Offshore BMU Configuration Working Group
Meeting Date	18 October 2011
Purpose of paper	For Discussion
Summary	This paper identifies two possible issues with the definition of 'Switching Group' introduced into the Balancing and Settlement Code (BSC) by Modification Proposal P240.

1. Introduction

- 1.1 The Offshore BMU Configuration Working Group has been established by the Grid Code Review Panel to consider whether the current Grid Code reporting obligations provide the System Operator with sufficient information to manage the system in cases where wind turbines are moving between BM Units (as permitted by BSC Modification Proposal P240¹).
- 1.2 At its first meeting (on 8 September 2011) the Offshore BMU Configuration Working Group expressed concern that the BSC definition of Switching Group (introduced by Modification Proposal P240) lacked clarity. John Lucas (for ELEXON) acknowledged that this concern had been raised previously in discussing certain registrations with National Grid; and agreed to circulate a note discussing possible issues.
- 1.3 Since the meeting we have reviewed the P240 legal text, both against the example configurations considered by the P240 Working Group, and against the more complex examples currently under consideration by the Offshore BMU Configuration Working Group.

2. Summary of Findings

- 2.1 There appear to be two possible issues with the P240 definition of Switching Group:
 - 2.1.1 **Issue 1** - The BSC is not entirely clear on whether the Power Park Modules (PPMs) in a single BM Unit can belong to different Switching Groups². Section 5 below provides an example of this. This is not a material issue, because the registration process for BM Units in Switching Groups (defined in BSC

¹ [BSC Modification P240](#) ('Switching Plant and Apparatus between BM Units') was approved by Ofgem on 20 January 2010, and implemented on 27 January 2010.

² This may be because the P240 legal text was drafted prior to the approval of [BSC Modification P237](#) ('Standard BM Unit Configuration for Offshore Power Park Module'), which was approved by Ofgem on 13 November 2009, and implemented on 20 November 2009. Under the pre-P237 baseline (unless the Panel agreed a non-standard configuration) each PPM formed a single BM Unit, and therefore this issue did not arise.



Procedure BSCP15, (*BM Unit Registration*) helps to clarify any ambiguity. Nonetheless, we believe that the legal text could be clarified to address this issue.

- 2.1.2 **Issue 2** – Paragraph K3.1.4B of the P240 legal text requires that the Plant and Apparatus in a PPM must be capable of running in any of the BM Units in the Switching Group to which the PPM belongs. This requirement helped clarify how to register Switching Groups for the example configurations considered by the P240 Group. However, it is too restrictive for the more complex configurations now being considered by the Offshore BMU Configuration Working Group, and may in some cases prevent the intended benefits of P240 from being realised. Section 6 below provides examples of this.
- 2.2 Sections 4, 5 and 6 of this paper illustrate these issues using examples from the P240 Modification Report, and from the current work of the Offshore BMU Configuration Working Group. Section 8 describes some additional operational issues relating to registration of complex wind farms that may be of interest to the group.

3. BSC Modification P240

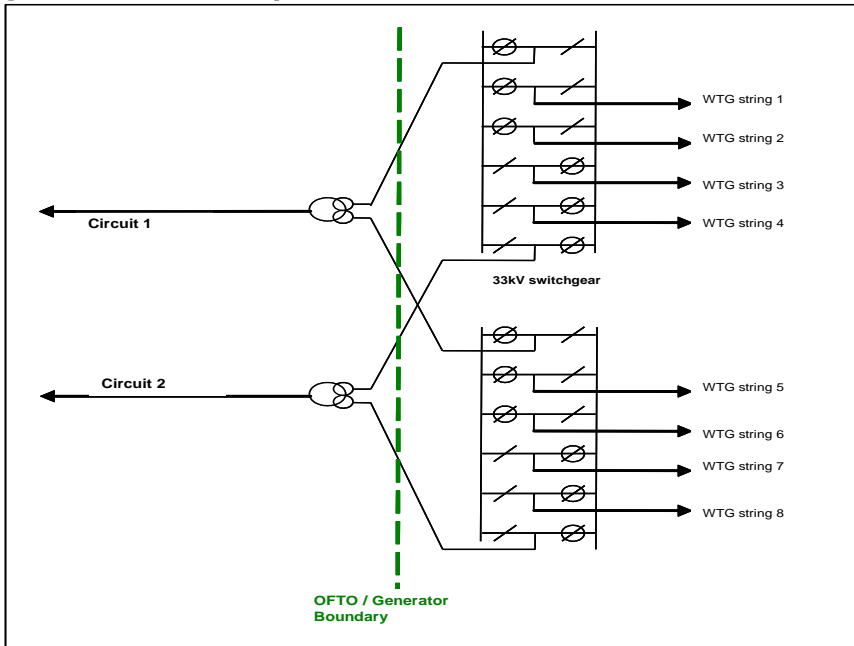
- 3.1 Before the approval of Modification P240, the Plant and Apparatus in a BM Unit was fixed at the point of registration. The BSC did not allow Plant and Apparatus to move between BM Units (even if doing so would have no impact on settlement). P240 recognised that certain wind farms had been designed to allow flexible switching of Power Park Strings, by allowing Plant and Apparatus in Power Park Modules to be switched between BM Units.
- 3.2 The concept of a 'Switching Group' was introduced into the legal text by Modification P240 in order to maintain some control and visibility of what switching is taking place. Plant and Apparatus is only allowed to switch between BM Units if those BM Units have been registered as belonging to a 'Switching Group'. Note that the registration data relating to Switching Groups is in effect provided for information only, as Switching Group details are not used by settlement systems.

4. P240 Example 1 (with four BM Units)

- 4.1 The first example from the P240 Modification Report³ was as shown in Figure 1 overleaf:

³ See Attachment A ('Additional Information') to the final Modification Report, available from the [ELEXON website](#).

Figure 1 – P240 Example 1



Example 1

- Four BM Units, each with two WTG strings (or potentially two BM Units with four turbines each if P237 approved);
- Switchgear can change which turbine strings are in which BM Unit

- 4.2 Unfortunately the Modification Report does not explicitly identify the Power Park Modules or Switching Groups. However, the intent seems reasonably clear:
- 4.2.1 The report refers to four BM Units, each of which must have corresponded (under the pre-P237 baseline) to a single PPM. The Modification Group therefore seems to have assumed that the Power Park Strings connected to each of the four Boundary Points would have formed a Power Park Module (and hence a BM Unit). For example, with the switches set as shown in the diagram, the BM Units would be as follows:
- WTG strings 1 and 2 form a PPM/BMU ('BM Unit A');
 - WTG strings 3 and 4 form a PPM/BMU ('BM Unit B');
 - WTG strings 5 and 6 form a PPM/BMU ('BM Unit C'); and
 - WTG strings 7 and 8 form a PPM/BMU ('BM Unit D').
- 4.2.2 Changing the switch settings would allow Power Park Strings to move between BM Units A and B, or between BM Units C and D (but not from A or B to C or D, or vice versa). The P240 legal text would therefore require BM Units A and B to be treated as one Switching Group, and BM Units C and D to be treated as another (in accordance with K3.1.4B, which requires that "Plant and Apparatus can be selected to run in any of the BM Units belonging to that Switching Group").
- 4.3 In summary, we do not believe that there are any issues with this example. The P240 legal text does not place any unnecessary constraints on how the switches are operated, and it is clear how Switching Groups should be registered.



5. P240 Example 1 (with two BM Units)

5.1 Although Modification P237 had not been approved at the time, the P240 Modification Report did acknowledge that P237 would allow the above example to be treated as two BM Units rather than four (i.e. one BM Unit per transformer). For example, with the switches set as shown in the diagram, the BM Units would be as follows:

- WTG strings 1 and 2 form a PPM ('PPM1'); WTG strings 5 and 6 form a PPM ('PPM3'); and together they form a BMU ('BM Unit A'); and
- WTG strings 3 and 4 form a PPM ('PPM2'); WTG strings 7 and 8 form a PPM ('PPM4'); and together they form a BMU ('BM Unit B').

5.2 Unfortunately, because there are now multiple PPMs in each BM Unit, we believe it may be possible to interpret the P240 legal text in two different ways:

- One interpretation is that **BM Units** are assigned to Switching Groups. Under this interpretation the two BM Units have to be assigned to a single Switching Group (as Plant and Apparatus can be switched between them).
- Another possible interpretation is that **PPMs** are assigned to Switching Groups (with the possibility of different PPMs within the same BM Unit being assigned to different Switching Groups). This would allow PPM1 and PPM2 to form one Switching Group, and PPM3 and PPM4 to form another.

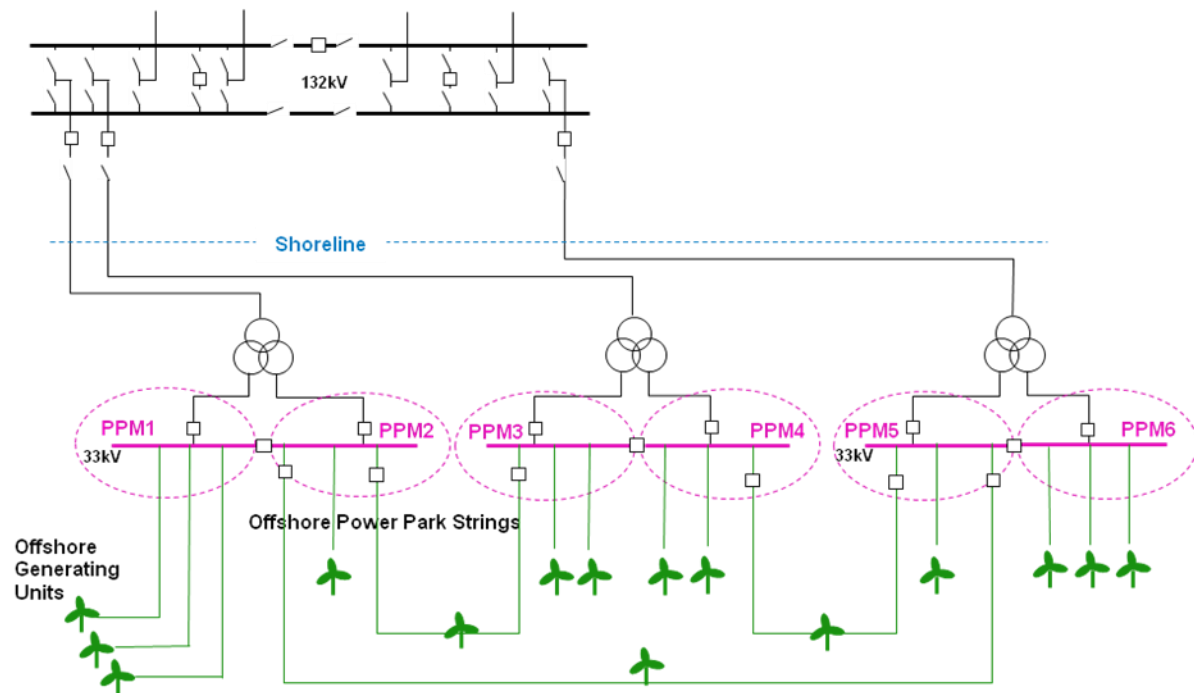
5.3 We believe that the first interpretation was the intended one. PPMs are not registered under the BSC, so there is no mechanism for Parties to register PPMs to Switching Groups; and the registration requirements in BSC paragraph K3.2.3 and BSCP15 clearly indicate that each BM Unit (not each PPM) is intended to belong to a single Switching Group. However, we acknowledge that some aspects of the P240 legal text are not as clear on this point as they could be. For example:

- K3.1.4A defines a Switching Group as "a combination of Power Park Modules" (although it does then go on to refer to BM Units "belonging to that Switching Group"); and
- K3.1.4D states that a PPM "may not belong to more than one Switching Group at any given time", apparently leaving open the possibility that a single BM Unit could belong to more than one Switching Group.

5.4 We believe that there may be an argument for amending these paragraphs to clarify that a BM Unit can only be registered to a single Switching Group.

6. A More Complex Example

6.1 The following configuration is a simplified version of one currently being considered by the Offshore BMU Configuration Working Group⁴:



6.2 In this example, busbar switches can be closed to join PPM1 to PPM2; or PPM3 to PPM4; or PPM5 to PPM6. This does not in itself involve any switching of Plant and Apparatus between PPMs or BM Units. However, there are also 'loop' connections that allow turbines to be switched between PPM2 and PPM3; PPM2 and PPM5; or PPM4 and PPM5.

6.3 One registration option for this site would be to register six BM Units (one per PPM). However, the K3.1.4B requirement that "Power Park Modules may belong to a Switching Group on the basis that Plant and Apparatus can be selected to run in any of the BM Units belonging to that Switching Group" would then make it impossible to define appropriate Switching Groups. For example, PPM2 would need to be in the same Switching Group as PPM3 and PPM5; but PPM3 cannot be in the same Switching Group as PPM5 because Plant and Apparatus in PPM3 cannot be switched into PPM5.

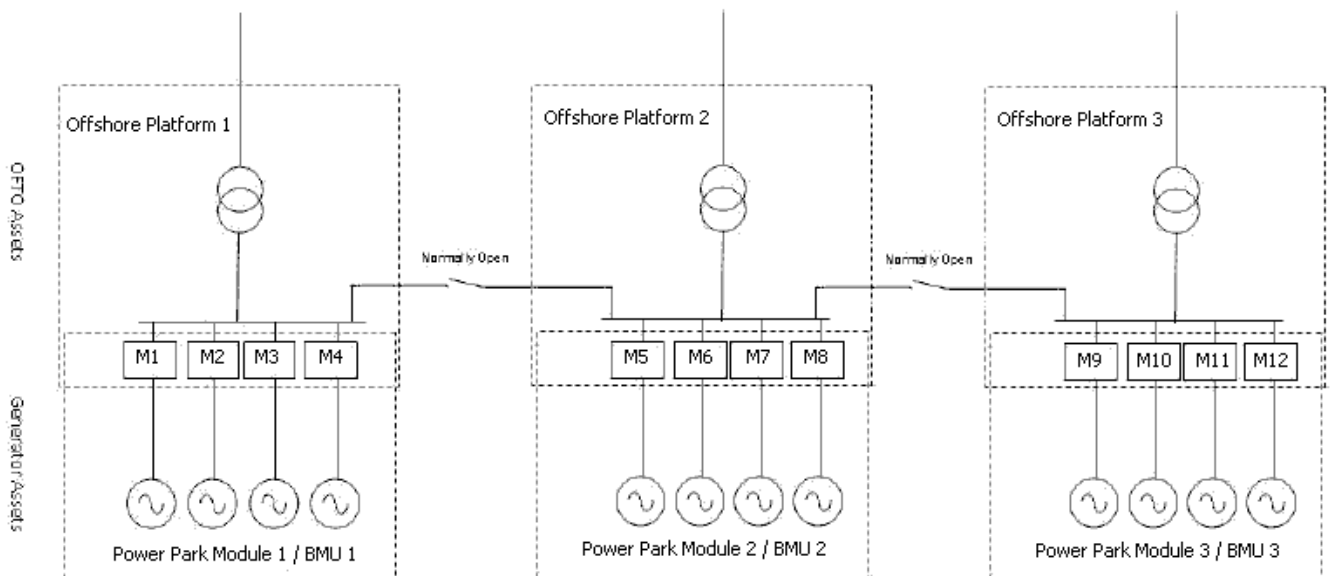
6.4 Another option would be to register three BM Units, as permitted by Modification P237:

- PPM1 and PPM2 form a BM Unit ('BM Unit A');
- PPM3 and PPM4 form a BM Unit ('BM Unit B'); and

⁴ The presentation containing the original example is available on the [National Grid website](#). For the purposes of this paper I have simplified the 'loop' connections between PPMs, in order to reveal more clearly the underlying issue.

- PPM5 and PPM6 form a BM Unit ('BM Unit C');

- 6.5 However, the three-BMU configuration would still not allow Switching Groups to be defined in a manner consistent with K3.1.4B. It still remains the case that PPM2 would need to be in the same Switching Group as PPM3 and PPM5; but PPM3 cannot be in the same Switching Group as PPM5 because Plant and Apparatus in PPM3 cannot be switched into BM Unit C.
- 6.6 In summary, paragraph K3.1.4B is inconsistent with any configuration in which a BM Unit can exchange Plant and Apparatus with two other BM Units; but those two BM Units cannot exchange Plant and Apparatus with each other. Here is another example, based on one in BSCP75 ('Registration of Meter Aggregation Rules For Volume Allocation Units'), but amended to have three offshore platforms rather than two:



- 6.7 There does not appear to be any reason why the BSC should prevent such configurations, and we do not believe that the P240 Modification Group intended to exclude them. They were simply not considered at the time.

7. How Could These Issues Be Resolved?

- 7.1 Issue 1 and issue 2 would both require changes to Section K of the BSC to resolve. Issue 1 is the more straightforward, and would probably require minor wording changes to K3.1.4A and K3.1.4D (to clarify that it is a BM Unit comprised of one or more Power Park Modules that can be registered as belonging to a Switching Group, rather than the individual Power Park Modules it contains).
- 7.2 Issue 2 would require an amendment to the constraint in paragraph K3.1.4B

Power Park Modules may belong to a Switching Group on the basis that Plant and Apparatus can be selected to run in any of the BM Units belonging to that Switching Group.



- 7.3 We believe the intent of K3.1.4B was to avoid Switching Groups being registered unnecessarily. If K3.1.4B was not there, Parties could combine two BM Units into a Switching Group, even if they were entirely unconnected (with no ability to switch Plant and Apparatus between them). This would undermine the intended purpose of Switching Group registrations.
- 7.4 However, K3.1.4B goes too far by preventing any configuration in which a BM Unit can exchange Plant and Apparatus with two other BM Units; but those two BM Units cannot exchange Plant and Apparatus with each other. We believe it needs to be replaced by a weaker and more appropriate constraint. The exact form this takes would need to be considered by a Modification Group, but one possible approach would be to define a Switching Group as a collection of BM Units that satisfies three conditions:
- Each BM Unit in the Switching Group can exchange Plant and Apparatus with one or more other BM Units in the Switching Group;
 - No BM Unit in the Switching Group can exchange Plant and Apparatus with BM Units outside the Switching Group; and
 - No smaller collection of BM Units meets the above conditions. (This last condition prevents unconnected Switching Groups from being consolidated unnecessarily).
- 7.5 We invite the Offshore BMU Configuration Working Group to consider Issue 1 and Issue 2, and reach a view on whether changes to the BSC are appropriate. If the Group believes that they are, we will bring the issue to the attention of the Imbalance Settlement Group (which is the BSC Panel Committee with delegated authority to consider BM Unit registration issues). However, it should be noted that the ISG has no power to resolve these issues – that would require a BSC Party to raise a Modification Proposal.

8. Other Operational Issues

- 8.1 In addition to the issues described above, operational experience has revealed the following issues which may be of relevance to the Working Group.
- 8.2 **Transmission Company Approval of Aggregation Rules:** P240 allows a Lead Party to pre register different sets of Aggregation Rules, corresponding to the different operating configurations of the BM Units in the Switching Group⁵. National Grid has suggested that they would like to 'approve' the pre-registered Aggregation Rules, to ensure they match what has been agreed with the Lead Party in the Bilateral Connection Agreement. Currently BSC Procedure BSCP75 ('Registration of Meter Aggregation Rules For Volume Allocation Units') does not include any provision for this, so we cannot share the Aggregation Rules with National Grid unless the Lead Party agrees.

⁵ Obviously this only applies if different operating configurations require different Aggregation Rules, which may or may not be the case, depending on the BM Unit configuration, and where the Metering Equipment is installed.

- 8.3 BSCP75 could be changed to allow National Grid to approve the Aggregation Rules associated with each operating configuration through a Change Proposal, raised in accordance with BSC Procedure BSCP40 ('Change Management'). However, we suggest that any such Change Proposal should be considered in the context of other recommendations emerging from this Working Group (e.g. any new Grid Code process for pre-registration of operating configurations). We therefore propose that this issue be placed on hold until this Working Group has made its recommendations to the GCRP.
- 8.4 **Status of pre-P240 BM Units:** We believe that P240 does apply to BM Units registered prior to the approval of the Modification (i.e. such BM Units can now, where appropriate, form a Switching Group). However, we are currently considering whether changes to BSCP15 or BSCP75 would help to clarify this.
- 8.5 **Differing Regimes Onshore and Offshore:** While Modification P240 applies to both Onshore Power Park Modules and Offshore Power Park Modules, the related Modifications P237 and P238 ('Removal of the requirement to Meter each Boundary Point for Offshore Power Park Modules') apply offshore only. The Ofgem decision letters for P237 and P238 suggested that the arguments for applying these Modifications offshore could also apply onshore. However, this would require new Modification Proposal(s) to be raised.

9. Recommendations

- 9.1 We invite the Offshore BMU Configuration Working Group to:
- a) **AGREE that ELEXON should bring Issues 1 and 2 (as defined in this paper) to the attention of the relevant BSC Panel Committee (i.e. the Imbalance Settlement Group);**
 - b) **NOTE that resolving these issues would require a BSC Party to raise a Modification Proposal (in accordance with Section F of the BSC).**



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