Stage 03: Attachment A: Detailed Assessment for P238

What stage is this document in the process?

01 Initial Written Assessment

02 Definition Procedure

03 Assessment Procedure

04 Report Phase

P238: Removal of the requirement to Meter each Boundary Point for Offshore Power Park Modules

Contents

About this document:

This is Attachment A to the Assessment Consultation. This attachment provides additional detail, including details of the Modification Group's discussions.

1 Background

What is a Power Park Module?

The term **Power Park Module** relates to Generators who use an Intermittent Power Source. The Grid Code defines an Intermittent Power Source as being 'the primary source of power for a Generating Unit that cannot be considered as controllable (e.g. wind, wave or solar)'. A wind turbine generator is therefore one example of an intermittent Generating Unit.

The new regime for Offshore Transmission came into effect ('Go Active') on 24 June 2009, and is expected to 'Go Live' in June 2010. As part of Go Active, changes to the industry codes (including the Grid Code and the Balancing and Settlement Code) were made by the Secretary of State to support the intended Offshore arrangements.

As a result, the Grid Code now makes a distinction between Onshore Power Park Modules and Offshore Power Park Modules. The new Grid Code definitions are:

- **Onshore Power Park Module** – A collection of Onshore Generating Units (registered as a Power Park Module under the PC[1]) that are powered by an Intermittent Power Source, joined together by a System with a single electrical point of connection to the Onshore Transmission System (or User System if Embedded). The connection to the Onshore Transmission System (or User System if Embedded) may include a DC Converter.
- **Offshore Power Park Module** – A collection of one or more Offshore Power Park Strings (registered as a Power Park Module under the PC). There is no limit to the number of Power Park Strings within the Power Park Module, so long as they either:
  - Connect to the same busbar[2] which cannot be electrically split; or
  - Connect to a collection of directly electrically connected busbars of the same nominal voltage and are configured in accordance with the operating arrangements set out in the relevant Bilateral Agreement.

The BSC continues to refer generically to Power Park Modules. It cross-refers to the Grid Code's definition of this term, which makes the distinction between Onshore and Offshore.

The Grid Code's definition of Offshore Power Park Module also introduces the following new term:

- **Offshore Power Park String** - a collection of Offshore Generating Units that are powered by an Intermittent Power Source, joined together by cables forming part of a User System with a single point of connection to an Offshore Transmission System. The connection to an Offshore Transmission System may include a DC Converter.

The new definition of an Offshore Power Park Module differs from that for Onshore, in that it requires these Offshore Power Park Strings to be connected to the same busbar or to a set of connected busbars.

Where can I find full technical definitions of these terms?

You can find the full BSC definitions of Power Park Module, Generating Unit and BM Unit in Annex X-1 and Section K3.

All Grid Code definitions are contained in the Grid Code Glossary and Definitions.

[1] Planning Code (part of the Grid Code).

[2] A busbar is a system of conductors in which the power from the Generating Units is collected for transmission.

What changes are being progressed from Issue 37?

The P238 solution developed through discussions within the Issue 37 Group. The Panel raised Issue 37 to consider whether the current requirements for metering and BM Unit configurations are suitably flexible to accommodate the changing designs for generation, in particular for new offshore generation build.

The Issue Group recommended 4 changes to the BSC, which have all since been raised as Modification Proposals. Table 1 below summarises each issue and the Issue Group's proposed solution. It also gives the corresponding Modification Proposal numbers for reference.

Three of the Issue 37 changes impact Offshore generators. While there are individual benefits associated with each of these changes, the Issue Group considered that the combined benefits of all 3 together will be greater. If all the changes are approved, there will therefore be efficiency benefits in implementing them in parallel.

Table 1 – Proposed changes arising from Issue 37

Issue 37 – Proposed Changes	
Modification	Description of change
P237 - Standard BM Unit configuration for Offshore Power Park Modules	To allow Parties the option of having a single (or reduced number of BMUs), subject to Transmission Company agreement, to reduce costs and administration.
P238 - Removal of the requirement to Meter each Boundary Point for Offshore Power Park Modules	To allow Parties to treat all Exports from (or Imports to) a Balancing Mechanism Unit comprising Offshore Power Park Modules as a single Export (or Import). The Party must ensure appropriate compensation is applied to meter readings to account for losses between the location of the metering and the commercial boundary.
P240 - Switching Plant and Apparatus between BM Units	To allow Parties to switch output between BM Units (without the need to re-register the BMU) to resolve issues such as loss of connection or partial plant failure.
P241 - Relaxation of Requirement to Separately Meter Licensable Generating Units	To remove the requirement to separately Meter the flows to each Generating Unit within a Combined Cycle Gas Turbine (CCGT) Module with a single Boundary Point. Many sites only meter the net output at the CCGT Module's single Boundary Point, so they would be non-compliant with the BSC.

2 Terms of Reference

The P238 Modification Group consists of members of the Settlement Standing Modification Group (SSMG), supplemented with:

- Members of the Issue 37 Group; and
- The Transmission Company's expertise on the Grid Code requirements for intermittent generators.

Section 4 contains full details of the Group's membership.

Table 2 shows the areas which the Group has considered in accordance with its Terms of Reference, and where you can find its discussions of each area.

Table 2 – P238 Assessment Procedure Terms of Reference

Area of Terms of Reference	Group's conclusion	See:
Does the identified issue only affect offshore, and not onshore, Power Park Modules?	Yes, the specific issue which P238 identifies is limited to Offshore. The solution will therefore not disadvantage onshore intermittent Generators.	Attachment A Section 3
What changes are required to Section K and what legal drafting is required?	The legal text for Section K changes will be drafted in parallel with this consultation.	Attachment A Section 3
How the CoPs need to be changed and what CoP drafting is required?	The Group agreed that the drafting of the CoP changes should be carried out in parallel with this consultation.	Attachment A Section 3
Which CoPs are affected?	The Group believes that Codes of Practice 1, 2 and 3 will be affected by the proposed changes. However, there may be merit in changing the list of Defined Metering Points in CoP5 and 10 for consistency.	Main Document Section 3
Does P238 impact any BSC Agents?	The Group is undertaking an impact assessment in parallel with this consultation, to establish the extent of any impact. The Group expects that any associated costs will not be significant.	Main Document Section 4
What are the specific benefits of P238?	P238 on its own will reduce the amount and cost of Metering Equipment required to determine flows across Boundary Points at offshore Power Park Modules. It will also reduce the associated administrative burden of registering metering related information and data collection requirements). P238 will	Attachment A Section 3

Who is the SSMG?

A standing group of industry experts, who the Panel has appointed to consider potential BSC changes in a number of subject areas – including BM Unit related issues.

	deliver additional benefits in combination with P237 and P240. See the Group's worked examples for details of these benefits.	

Does P238 only affect offshore intermittent Generators?

The Group considered that P238 only affects offshore intermittent Generators as the issue arises from the Grid Code definition of Offshore Power Park Module allowing Generating Units that connect to the Transmission System at more than one Boundary Point to form a single PPM. This then means that metered data will need to be aggregated up to a BM Unit level. Other types of Generating Plant are not affected by this issue. In particular, the Grid Code definition of Onshore Power Park Module does not allow Generating Plant that connects at more than one Boundary Point to form a single PPM.

Does P238 only affect offshore intermittent Generators?

The Group believes that the P238 does only affect offshore intermittent Generator because it seeks to address issues caused by the new Offshore Transmission Regime and changes to the definition of what constitutes a Power Park Module.

Changes to Section K and the Codes of Practice

The Group agreed that changes to Section K and the Codes of Practice should be developed in parallel with the assessment consultation.

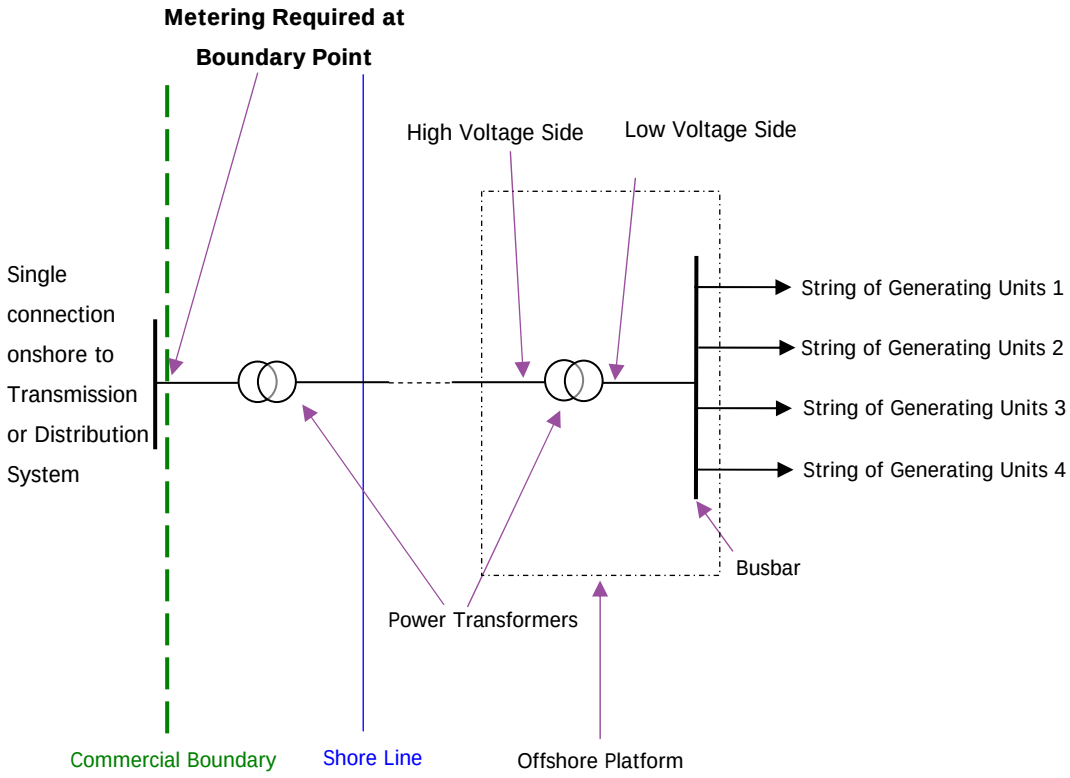
The Group also agreed that the redlining for the Codes of Practice should be developed on the basis that, for offshore intermittent Generators, the Defined Metering Points will be at the commercial boundary (the point(s) of connection of the Generator's assets to the Offshore Transmission System) but that the Codes of Practice will allow for flexibility about where the Actual Metering Point(s) will be on the platform. Provisions will be included for not requiring a Metering Dispensation for this non-compliance with the Codes of Practice. This would be subject to applying any necessary compensation to meter readings where the Actual Metering Point(s) is (are) not at the Defined Metering Point(s).

Examples of metering locations – current and with P238

The BSC currently requires metering to be installed at each point of connection to the Transmission System (or a Distribution System) in order to determine the Export and/or Import flows at each Boundary Point.

Example 1 – Before the Offshore Transmission Regime

Prior to the Offshore Transmission Regime Settlement metering would normally be installed onshore at the point at which an offshore intermittent Generator's assets connected to the Transmission System or a Distribution System. The Grid Code definition of Power Park Module at the time meant that each connection onshore would represent a single Power Park Module. P191 'Revised definition of Balancing Mechanism Unit to include Power Park Module' introduced the term Power Park Module into the BSC and this allowed for a Power Park Module to be considered to satisfy the requirements to form a single Balancing Mechanism (BM) Unit (Section K3.1.4). By installing Settlement metering at that single Boundary Point it was possible to determine BM Unit volumes of energy using a minimum amount of metering. This example is illustrated in the diagram below.



Example 1

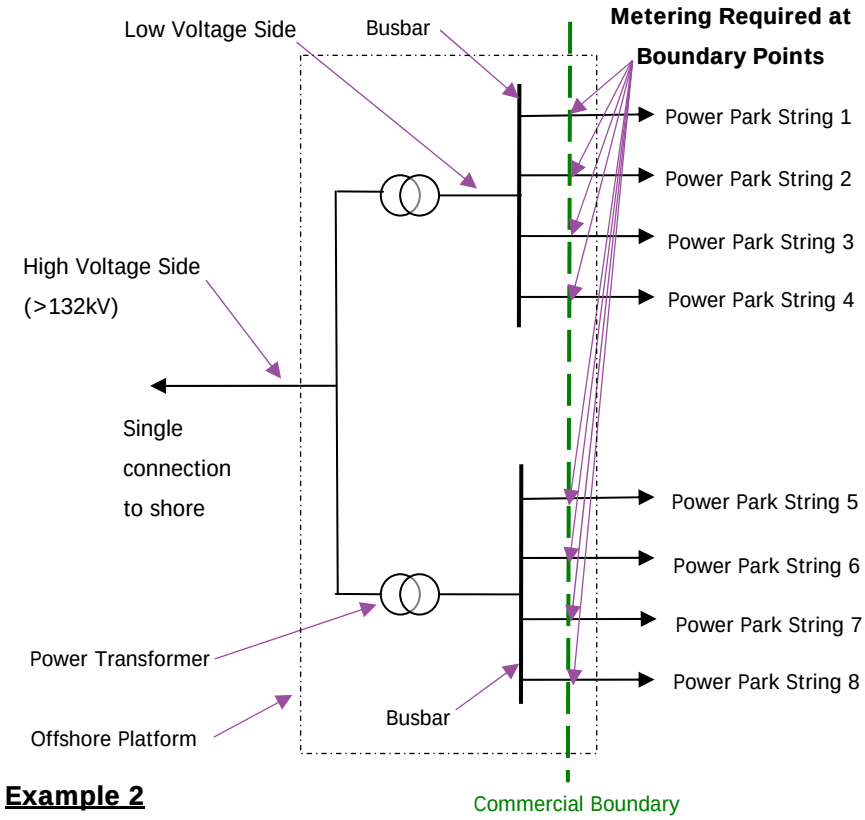
Example 2 – Under the new Offshore Transmission Regime (without P238)

Under the new Offshore Transmission Regime the BSC still requires the individual flows at Boundary Points to be determined via metering, so Settlement metering would have to be installed at the point at which an offshore intermittent Generator's assets connected to the offshore Transmission System (i.e. the ownership boundary on the offshore platform).

It is immediately obvious from the diagram below that more metering would be required in such cases because the number of Boundary Points at which flows need to be determined has increased from 1 onshore, to 8 offshore (in this example). So, even though changes were made to the Grid Code to allow multiple connections to a single busbar being considered as a PPM, and hence a single BM Unit, the BSC would still require metering at each Boundary Point. The effect of this would mean that the metered data would have to be aggregated up to a BM Unit level.

What is a Power Transformer?

A Power Transformer is a device used to transfer energy from one circuit to another, which may be at different voltage levels.



Example 2

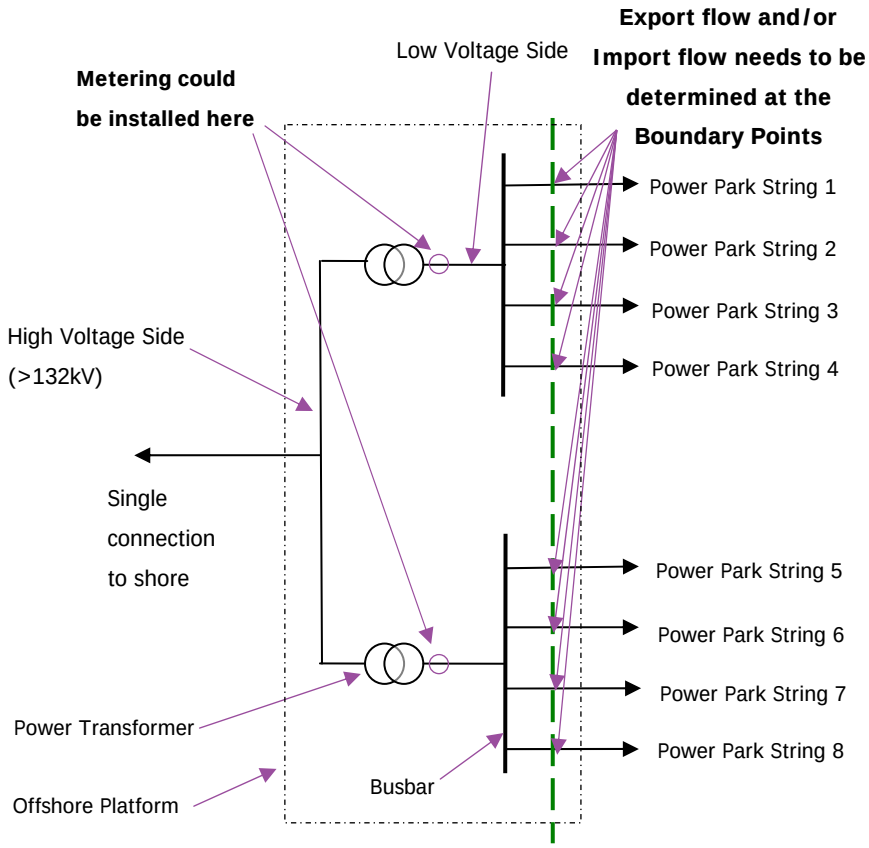
Impact of P238 and other related changes

Under P238 changes would be made to Section K to allow the flows to or from BM Units comprising Offshore Park Modules to be considered as a single Export or Import. Changes to the Codes of Practice would allow metering to be installed anywhere on the offshore platform in order to determine the aggregated energy flowing across the commercial boundary (with appropriate compensation) without the need for a Metering Dispensation for the metering not being at the commercial boundary.

The Group considered three different scenarios for where metering could be installed on the offshore platform and still determine the aggregated energy across the commercial boundary.

Example 3 – Metering on each LV side of Platform Power Transformers (with P238)

The first scenario would be to place the metering on the LV sides of the offshore platform power transformers:



Benefits of P238

By installing metering on the LV sides of the offshore platform power transformers the total energy flowing across each set of four commercial Boundary Points could be determined in aggregate and, under the Grid Code definition of Offshore Power Park Module[3] and BSC standard BM Unit rules, Parties could register 2 BM Units.

This would:

- Reduce the amount of Metering Equipment (and associated costs) required;
- Reduce the space and amount of ancillary equipment required on the offshore platform for Metering Equipment;
- Reduce the complexity of the Aggregation Rules and the amount of metered data to be collected and stored (by the CDCA);
- Potentially reduce the number of Outstations the CDCA has to dial; and
- Remove the requirement to seek a Metering Dispensation;

[3] The definition of Offshore Power Park Module impacts the number of BM Units that Parties can register without going through the non-standard BM Unit application route allowed for in Section K3 'Configuration and Registration of BM Units'.

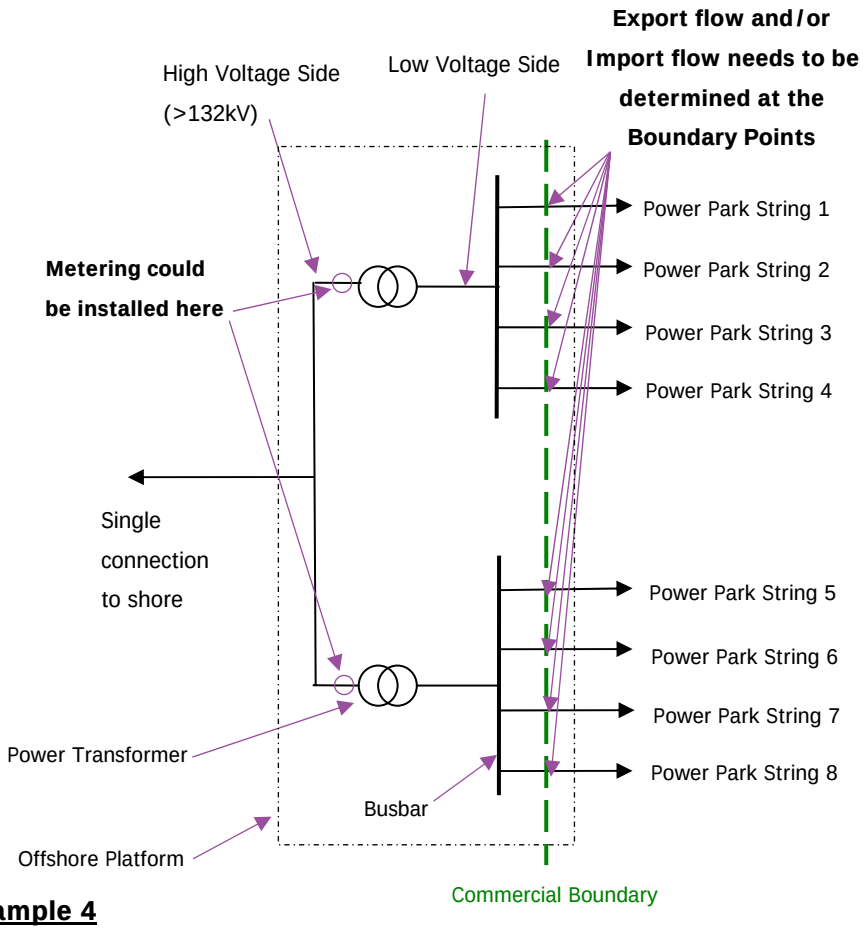
A further benefit could be achieved by applying for a non-standard BM Unit configuration which, if approved by the BSC Panel, would allow for a single BM Unit to be registered - metered data would require aggregation.

Benefits of P238 with P237

P237 is seeking to allow flexibility in respect of BM Unit configurations as a result of impact that the recent changes will have on offshore intermittent generation. Using P237 (if approved) a Party could avoid the need to apply for a non-standard 'single' BM Unit configuration and simply register a single BM Unit – metered data would require aggregation.

Example 4 – Metering on each HV side of Platform Power Transformers (with P238)

The second scenario the group considered was to place the metering on the HV sides of the offshore platform power transformers:



Example 4

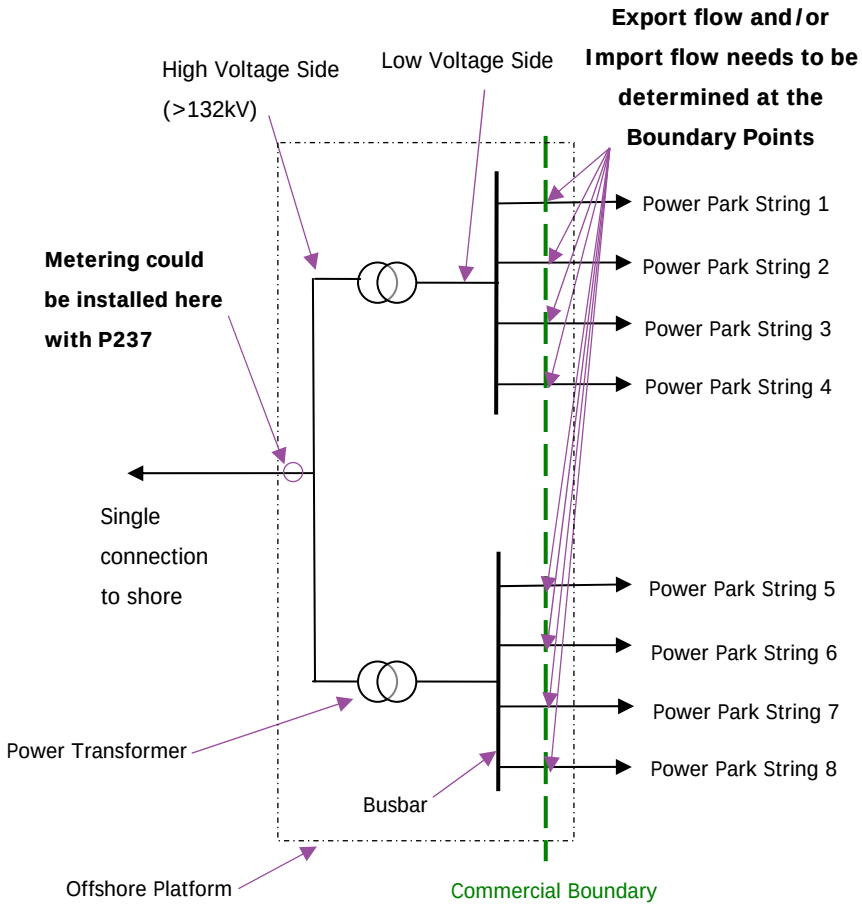
Again, by installing metering on the HV sides of the offshore platform power transformers the total energy flowing across the each set of four commercial Boundary Points could be determined in aggregate and, under the Grid Code definition of Offshore Power Park Module and BSC rules, Parties could register 2 BM Units. The option of applying for a non-standard 'single' BM Unit configuration, or via the P237 solution (if approved), would still be open – metered data would need to be aggregated to a BM Unit level.

Benefits

This scenario would delivery similar benefits to Example 3, however metering costs could be marginally higher because of the higher voltages involved (132kV voltage transformers for the Meters may be more expensive than 33kV ones) and more space may be required around the metering positions on the platform for safety reasons.

Example 5 – Metering on commoned HV side of Platform Power Transformers (with P238)

The third option the group considered would be viable via a non-standard 'single' BM Unit configuration application or in conjunction with P237, if it was approved. Either way, P238 would allow for metering to be installed on the commoned HV side of the offshore power transformers and eliminate the need for aggregating metered data:



Example 5

Benefits of P238

P238 could deliver further benefits in conjunction with a non-standard BM Unit application by allowing metering costs to be reduced still further.

Benefits of P238 with P237

If P237 was approved then the need for a non-standard BM Unit application could be avoided and a single BM Unit registered with no need to aggregate metered data[4].

Benefits of P238 with P237 and P240

The Group also agreed that P238 could deliver benefits in conjunction with P240, as well as P237, but felt that until P240 was fully discussed it was difficult to quantify the inter-relation of the Modification Proposals.

Metering and Operational Costs

The Group agreed that P238 would deliver savings in metering and operational costs. The Group felt that there would be savings in the number of Meters and measurement transformers (current and voltage transformers) required and the costs required for Meter calibrations and fault repairs.

The Group did note that the cost of installing a 'higher' Code of Practice Meter would be marginal compared to a 'lower' Code of Practice Meter but that the cost of measurement transformers increases more rapidly with higher voltages and accuracy classes.

Some cost estimates show the effect of where and how many metering points there are on the offshore platform:

If we take an offshore wind farm with the same configuration as in Example 1 and with each string of wind turbines producing up to 20MW of export:

CoP/Voltage	CoP2 (132kV)	CoP2 (33kV)	CoP2 (33kV)
Location of Metering	Offshore HV side	Offshore LV side	Offshore LV each string circuit
Number of Circuits (multiplication factor)	1	1	4
Meter pair (Main + Check) and ancillary equipment per circuit	£1,500	£1,500	£1,500
Measurement Transformers per circuit	£130,000	£40,000	£40,000
Maintenance Costs per Meter pair per year[5]	£600	£600	£600
Total	**£132,100**	**£42,100**	**£168,400**

What are Measurement Transformers?

Measurement transformers are devices that are used to provide Meters with current and voltage signals that are a proportional factor of the actual current flowing in, and voltage of, the circuit being measured. Meters that are 'fed' these signal use multiplication factors to reverse these proportional factors in order to calculate the actual energy flowing in the circuit. e.g. A current transformer may transform an actual circuit current of 2,000 Amps down to 1 Amp, and a voltage transformer may transform an actual voltage of 132,000 Volts down to 110 Volts, to feed the Meter.

[4] Aggregation rules would still need to be submitted because they still define the relationship between the Export flow and the Import flow.

[5] These costs do not include the additional cost of having to get to the offshore platform.

From this example it is apparent that, whilst savings can be made in costs for measurement transformers by metering at the LV side of the offshore platform transformer, the number of strings that need to be metered is a significant contributing factor to the overall cost of metering and maintenance.

As a second example, if we take a wind farm with a configuration similar to that given in Example 2, 3, 4 and 5 and with each string of wind turbines producing up to 20MW of export, the costs might look like this:

CoP/Voltage	CoP1 (132kV)	CoP2 (132kV)	CoP2 (33kV)	CoP2 (33kV)
Location of Metering	Offshore HV (commoned) side	Offshore HV side of transformers	Offshore LV side of transformers	Offshore LV each string circuit
Number of Circuits (multiplication factor)	1	2	2	8
Meter pair (main + check) and ancillary equipment per circuit	£5,000	£1,500	£1,500	£1,500
Measurement Transformers per circuit	£130,000	£130,000	£40,000	£40,000
Maintenance Costs per Meter pair per year	£600	£600	£600	£600
Total	**£135,600**	**£264,200**	**£84,200**	**£336,800**

Again the calculation indicates that metering each string on the LV side of the offshore platform contributes to a significant increase in the overall cost of metering despite the lower cost for each set of measurement transformers.

Consultation Question - Metering and operating costs

The Group felt it would be useful, as part of the assessment of P238, to quantify the benefits that P238 could deliver in terms of savings in metering and operational costs and would like respondents to provide input.

Please provide an estimate of the saving in metering and operational costs that P238 could deliver to your organisation over the existing requirements.

The Group invites you to give your views using the response form in Attachment B.

4 Timetable & Responsibilities

Table 3 – P238 timetable and related changes

Date	Assessment activity
28/04/09	ISG discusses issues with Offshore metering and BM Units
14/05/09	Panel raises Issue 37
03/06/09	Issue 37 Group holds its first meeting
23/06/09	Issue 37 Group holds its second and final meeting
26/06/09	Centrica raises P237 and P238
09/07/09	ELEXON presents the Issue 37 report to the Panel
09/07/09	ELEXON presents the P237 and P238 IWAs to the Panel / Panel submits P237 and P238 to the Assessment Procedure
17/07/09	Modification Group holds its first meeting for P237 and P238
21/07/09	RWE Npower raises P240 and P241
28/08/09	ELEXON issues the P237 and P238 Assessment Consultation Documents for industry consultation, and for impact assessment by BSC Agents and the Transmission Company
11/08/09	Participants return Assessment Consultation responses / BSC Agents and the Transmission Company return impact assessments
13/08/09	ELEXON presents P240 and P241 IWAs to the Panel
14/08/09	Modification Group holds its second meeting for P237 and P238
04/09/09	ELEXON submits the Group's P237 and P238 Assessment Reports to the Panel
10/09/09	ELEXON presents the Group's P237 and P238 Assessment Reports to the Panel

Table 4 – Estimated P238 progression costs up to an Authority decision

Meeting cost	External legal/ expert cost	BSC Agent impact assessment cost	ELEXON resource
£500[6]	£0	£7,000	c.43 man days, equating to c.£12k

Where can I find other P238 documents?

Visit the P238 page of ELEXON's website here.

[6] This has reduced from the £750 estimate in the IWA, as only 2 rather than 3 meetings will be needed.

Table 5 – P238 Modification Group attendance

Member	Organisation	17/07/09
David Jones	ELEXON (Chair)	Y
Mike Smith	ELEXON (Lead Analyst)	Y
Chris Stewart	Centrica (Proposer)	Y
Ian Pashley	National Grid	Y
Gary Henderson	SAIC	Y
Esther Sutton	E.ON UK	Y
Andy Colley	SSE	Y
Fiona Irwin	Great Gabbard Offshore Winds Limited	Y
Ed Marr	RWE Npower	Y
Attendee	**Organisation**	**17/07/09**
John Lucas	ELEXON (Technical Support)	Y
Natalie Pike	ELEXON (Lawyer)	Y
Yvonne Naughton	Ofgem	Y