

What stage is this document in the process?

- 01 Initial Written Assessment
- 02 Definition Procedure
- ▶ 03 Assessment Procedure
- 04 Report Phase

## Stage 03: Assessment Report

# P266: Improving the allocation of Reactive Power flows between Import and Export Metering Systems

P266 seeks to resolve anomalies in the allocation of Reactive Power flows on sites where Import demand (supplied by a Licensed Supplier) and Export from Exemptable Generating Plant (e.g. embedded wind powered generators) share a common connection to the Distribution System.



Modification Group recommends approval of Modification P266



High Impact:  
Suppliers, Licence Exemptable Generators, Licensed Distribution System Operators, Half Hourly Data Collectors and SVA Half Hourly Meter Operator Agents



Medium Impact:  
BSC Procedures and Codes of Practice



Low Impact:  
MRA Data Transfer Catalogue

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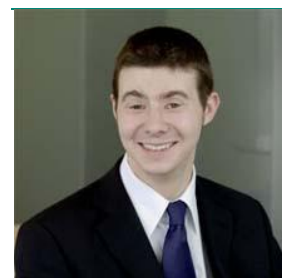


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**Any questions?**

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## About this document:

This is the P266 Assessment Report, which ELEXON will present to the Panel on 10 February 2011, on behalf of the P266 Modification Group. The Panel will consider the recommendations in this report and agree an initial view on whether or not P266 should be made.

There are 2 parts to this report. Part 1 (this document) provides details of the solution, impacts, costs, benefits and the potential implementation activities associated with this change. Part 2 (Attachment A) documents the details of the assessment of P266, sets out the discussions of the Modification Group resulting in this solution and recommendations and sets out analysis conducted by the Group.

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## Why change?

The BSC currently treats each flow of Reactive Energy as an 'Import' or 'Export' in its own right, independent of the associated flows of Active Energy. These flows are allocated to Parties in accordance with BSC Section K1.2.2. Reactive Power is not always allocated to the same Metering System as the associated Active Power.

This causes anomalous allocation of Reactive Power flows on sites where Import demand (supplied by a Licensed Supplier) and Export from Exemptable Generating Plant (e.g. embedded wind powered generators) share a common connection to the Distribution System. This leads to anomalous DUoS charges; under- or overcharging can occur (compared with charges that should have been incurred based on sites' actual activities).

## Solution

Revise the Code to allocate the Reactive Power to the Party responsible for the associated flow of Active Power (either Import or Export). The aim is to resolve anomalies in the allocation of Reactive Power flows, enabling more appropriate DUoS charging. Reactive Power allocation will be improved for sites with shared connections in Settlement Periods when the site Exports or where both Import and Export occur.

P266 would not be retrospective. The P266 solution would be mandatory only for new sites and sites with metering that undergoes a Material Change (as defined by the relevant CoP). However, the P266 solution could be employed voluntarily on existing sites.

## Impacts

P266 would have no impact on BSC systems or processes or on BSC Agents. ELEXON's estimated implementation cost is £4,800. We would make changes to BSCPs and CoPs, and would raise a DTC Change Proposal to effect changes to the DTC.

LDSO's DUoS billing processes may be impacted, and there would be impacts on HHDC and MOA processes and systems. Suppliers' Settlement and billing systems may be impacted. There would be a consequential impact on DUoS bills received by Suppliers and Exemptable Generators due to the change in Reactive Power allocation.

## Implementation

The Group's preliminary view is that P266 should be implemented on:

- 23 Feb 2012 if Approval is received from the Authority by 29 April 2011; or
- 28 June 2012 if Approval is received from the Authority by 2 September 2011.

## The Case for Change

The Group's unanimous initial view is that the Proposed Solution will better facilitate Applicable BSC Objectives (b), (c) and (d) as P266:

- Allows for appropriate cost signals to be sent to participants regarding Reactive Power, which will tend to ultimately facilitate efficient operation of the Transmission System (Objective (b));
- Rectifies the inappropriate allocation of Reactive Power and associated DUoS charges and thereby removes a barrier to participation in the market (Objective (c)); and
- Ensures consistency between the BSC and the CDCM (Objective (d)).

## Recommendations

The Group's unanimous recommendation is that P266 Proposed should be approved.

### Background

Electrical Power is composed of two components: **Active Power** and **Reactive Power**. Reactive Power decreases the capacity of a circuit to transmit Active Power; therefore an increase in Reactive Power results in a decrease in the efficiency of the transmission of Active Power by a circuit. Because of this, Licensed Distribution System Operators (LDSOs) employ a system of charging Parties for excessive flows of Reactive Power. These charges are intended to discourage production of Reactive Power, and thereby minimise the action needed to maintain efficiency of transmission.

Where a customer has on-site Generating Plant (and Import/Export metering to measure flows of electricity from that Generating Plant onto the Distribution System) their Supplier is required to register separate Metering Systems for **Import** and **Export**. Industry systems and agreements (including in particular the Master Registration Agreement (MRA)) do not allow a single Supplier Volume Allocation (SVA) Metering System to be used for both Import and Export.

The method used to allocate Reactive Power flows to Import or Export Metering Systems can significantly impact the customer's Distribution Use of System (DUoS) charges, because the methodology for calculating DUoS charges specifies charges for each **MPAN**, not for each customer. Allocation of the Reactive Power between Metering Systems can therefore have a significant impact on the appropriateness of the DUoS charges levied on customers with on-site Generating Plant.

### Issue

The BSC currently treats each flow of Reactive Energy as an 'Import' or 'Export' in its own right, independent of the associated flows of Active Energy. These flows are then allocated to Parties (and hence the Metering Systems registered by those Parties) in accordance with the rules in K1.2.2, which do not always allow the Reactive Power to be allocated to the same Metering System as the associated Active Power. In particular, K1.2.2 states that responsibility for Reactive Import lies with 'the person who supplies electricity to those premises' (i.e. the Import Supplier). This applies irrespective of whether the Reactive Import arises from electricity supplied by the Supplier (i.e. demand with lagging **power factor**), or from electricity produced by a generator (i.e. Exemptable Generation with leading power factor).

In the Proposer's experience, this approach leads to disproportionately large flows of Reactive Power being allocated to some Import Metering Systems (e.g. those at wind farms where the installed generating capacity is large in comparison to the on-site demand). This leads to spurious charges for 'excess' Reactive Power and 'excess' Capacity being levied on those customers, even though their operation should have enabled them to stay within their agreed capacities and power factors. These charges do not reflect the customer's actual behaviour, and arise purely because the Reactive Power flows have been allocated to a different Metering System to the associated Active Power flows.

Anomalous allocation of Reactive Power can lead to either DUoS under- or overcharging (compared with the charges that should have been incurred to reflect customers' actual behaviour).



#### Electrical Power

**Active Power** is what is generally referred to when talking about 'electricity', and can be used to power electrical equipment.

**Reactive Power** is a phenomenon associated with the flow of electrical energy around a circuit (such as the Distribution System).



#### Metering Point Administration Number (MPAN)

A unique number relating to a Metering Point under the MRA (Supplier Volume Allocation equivalent of Metering System Identifier).



#### Power factor

Is the ratio of energy transported (kW) to network capacity used (kVA).

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## Related changes

**Modification Proposal P224** was raised by E.ON UK plc and followed consideration of the same issue as [Standing Modification Group Issue 24](#) 'Impact of BSC on Reactive Power Charging'. P224 was rejected by the Authority, because the evidence presented to the Authority was insufficient for it to establish whether the proposal would, as a whole, better facilitate the Applicable Objectives compared to the existing arrangements.

The P266 Proposer has delayed raising this Modification Proposal to see if the new rules for **Reactive Power charges** and Capacity Charges in the [Common Distribution Charging Methodology](#) (introduced in April 2010) satisfactorily mitigate the impact of this BSC defect. However, the Proposer has stated that he continues to receive invoices for what he considers to be spurious DUoS charges.

The P266 Proposer believes that this new method for allocating Reactive Power flows to Metering Systems will, on the whole, lead to more cost-reflective DUoS charges for sites with **Licence Exempt Generating Plant**. However, given Ofgem's stated concern that the P224 analysis did not demonstrate this adequately, the Proposer expected the Modification Group to take into account the impact on charges under the Common Distribution Charging Methodology (CDCM) for a variety of different types of generator, in order to verify that spurious allocation and charges arise under the current arrangements and that P266 would improve the situation.



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### Reactive Power Charges

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LDSO charge for Party operation (i.e. Supply or Generation) that results in associated Reactive Power in excess of an agreed value (billed in units of kVArh).



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### Exemptable Generating Plant

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Generating plant that are exempt from the requirement to hold an electricity licence to operate because their export capability is below a threshold (100MW in England and Wales).

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The P266 Modification Group unanimously agreed that the P266 Proposed solution should be identical to the P224 Proposed solution, that is:

- Amend paragraph **K1.1.4** of the BSC to clarify that an 'Import' or 'Export' of electricity includes both the flow at that Boundary Point at that instant. This ensures that Reactive Power flows are not separated (for purposes of reporting and billing) from the associated flows of Active Power;
- New **Section K** requirement to meter Reactive Power at times of Active Import ('Active Import Related Reactive Energy') separately from that at times of Active Export ('Active Export Related Reactive Energy'). This requirement may need to be subject to appropriate exceptions (e.g. existing sites that do not have the appropriate Metering Equipment, Non Half Hourly Metering Systems);
- New paragraph **K1.2.7** to specify where the Active Export Related Reactive Energy and Active Import Related Reactive Energy do not need to be measured separately:
  - (a) All NHH sites;
  - (b) All CVA-only sites;
  - (c) Non-mandatory HH sites where the relevant CoP specifies a different approach in relation to Reactive Energy. In particular, the Group agreed that Metering Systems with whole current metering (as opposed to measurement transformers) should be not be required to comply with the P266 metering requirements (and this would be identified as an exception in the relevant CoPs); and
  - (d) Sites where the version of the relevant CoP (or Metering Dispensation) pre-dates the implementation of P266

The decision to exclude whole current metering was intended to prevent any impact on the rollout of smart metering to Profile Classes 1-4, and to ensure consistency with Change Proposal [CP1298](#). This change was implemented in February 2010 and through BSCP514 2.3.2(f) placed a requirement on the MOA, "When installing or reconfiguring Half Hourly Metering Equipment that is operated by measurement transformers, the MOA shall configure the Metering Equipment to record Half Hourly demand values for both Reactive Import and Reactive Export (except where the Metering Equipment does not have this capability, and is not required to do so by the relevant Code of Practice)";

- The solution will be applied prospectively. P266 impacts Metering requirements, but compliance with the new requirements will not be retrospective with respect to the CoPs, and P266 will only be mandatory for existing sites when a Material Change is made to the metering on that site;
- In order to minimise impact on industry systems, no changes would be required to the Measurement Quantity Ids used to report Reactive Power. Lagging Reactive Power associated with Active Import and Leading Reactive Power associated with Active Export will continue to be reported as Measurement Quantity 'RI' (Reactive Import); while Leading Reactive Power associated with Active Import and Lagging Reactive Power associated with Active Export will continue to be reported as Measurement Quantity 'RE' (Reactive Export); and
- ELEXON would implement changes to **metering Codes of Practice** (CoPs) and BSCPs for P266 as part of a BSC Release and would raise a DTC CP to effect the changes to the DTC.



#### Modification P224

The [P224 Modification Report](#) for contains details of the proposed solution and the P224 Group's considerations.

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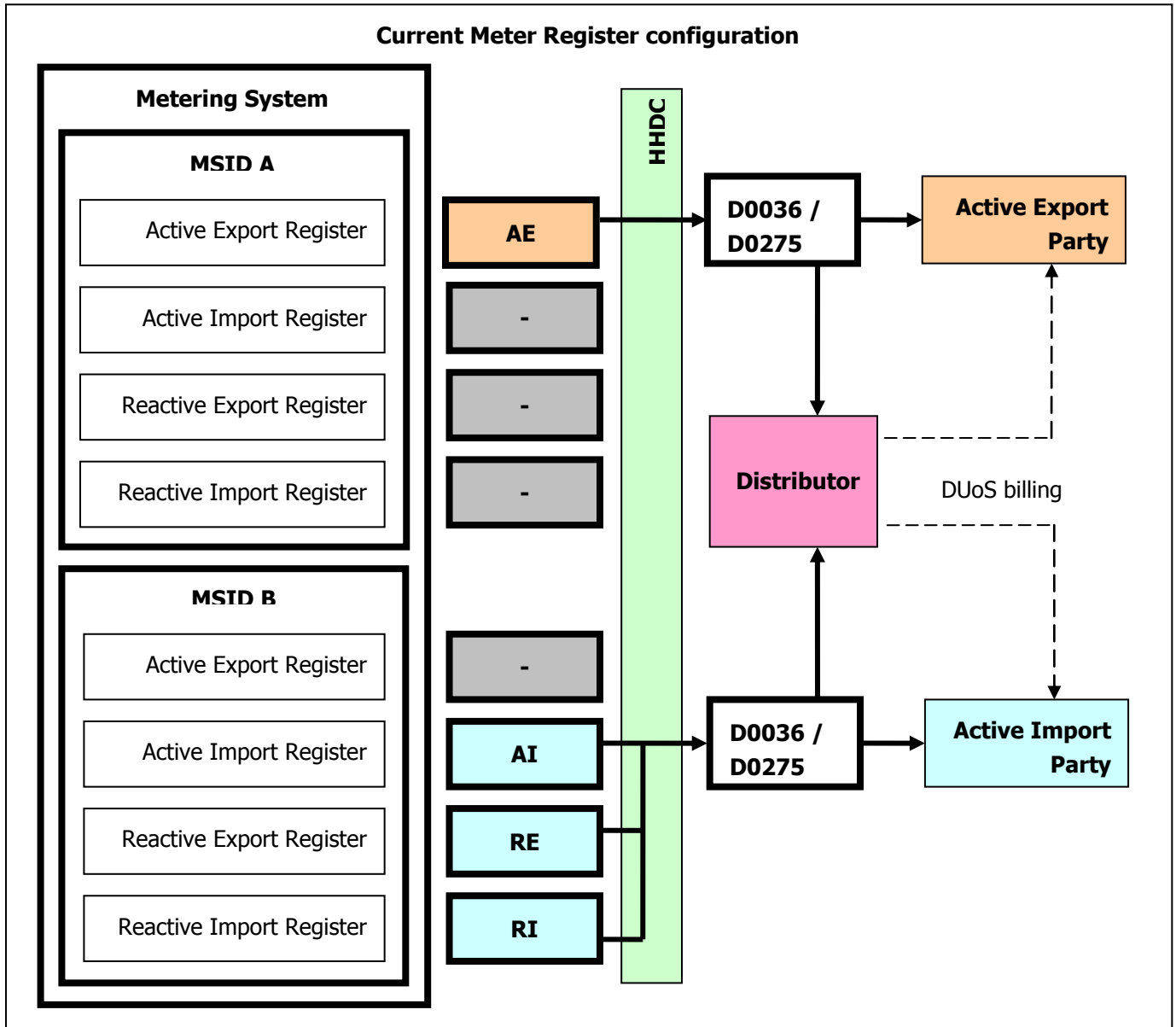
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Attachment A documents the more detailed views of the Group with respect to the impacts of P266 and considerations relating to Distributors' current solutions (referred to as workarounds in the P266 documentation) for applying the CDCM.

## Configuration of Meter Registers

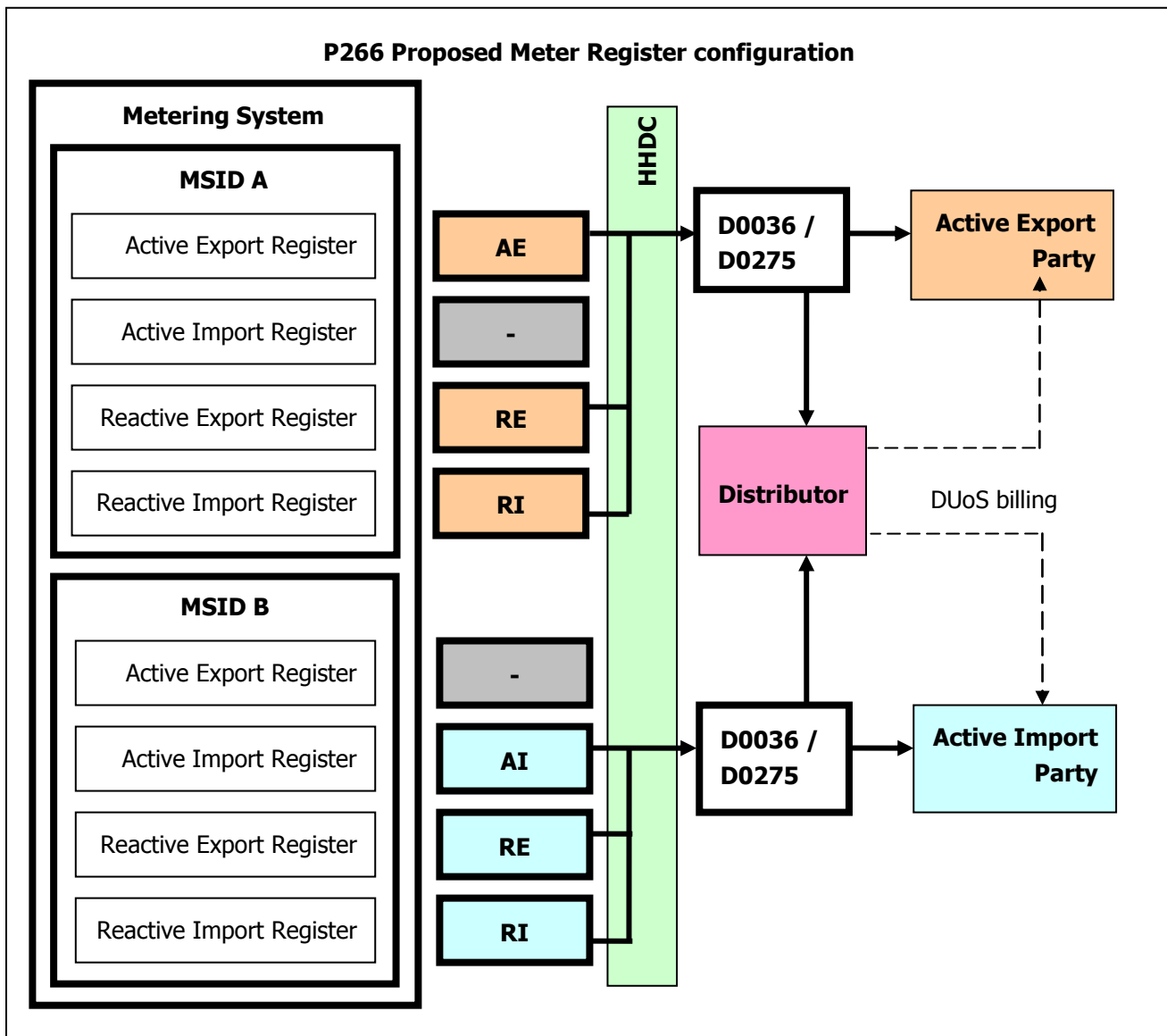
Currently four Measurement Quantity IDs are used for Meter Registers: Active Export (AE), Active Import (AI), Reactive Export (RE) and Reactive Import (RI). For shared Import/Export sites, the BSC prescribes that AE volumes are allocated to the Party associated with the Export of the site ('the Export Party') and AI volumes are allocated to the Party associated with the site's Import ('the Import Party').



**Figure 1: Current Meter Register configuration**

The current BSC baseline obliges the Import Party to be allocated the RI volumes for shared Import/Export sites, and permits either the Import Party or the Export Party to be allocated the RE volumes for such sites. In practice both the RE and RI volumes are normally allocated to the Import Party (irrespective of whether those Reactive Power flows are associated with Active Import or Active Export). These configurations of the Meter Registers are translated into the structure of the data flows from HHDCs (or as the case may be the CDCA) which report RE and RI volumes to the Party and the relevant Licensed Distribution System Operator (LDSO), as shown in figure 1.

Under the P266 Proposed solution (same as P224 Proposed solution), the Meter Register Measurement Quantity IDs would not be changed.



**Figure 2 P266 Proposed Meter Register configuration**

**For the avoidance of doubt:** if a site is exporting Active Energy, only the meter registers on MSID A (in the configuration illustrated in Fig. 2) will record Active Export flows and associated Reactive Power, and *no quantity will be measured by MSID B at that instant*. Conversely, if a site is importing Active Energy, only Active Import flows and associated Reactive Power flows will be recorded on MSID B, and *no quantity will be recorded on the MSID A meter registers at that instant*.

The proposed configuration of Meter Registers under P266 is illustrated in figure 2. Note that under P266 the existing Measurement Quantities will be used as follows:

- Measurement Quantity '**RI**' (Reactive Import) on the Export MSID for leading power flows associated with Active Export;
- Measurement Quantity '**RE**' (Reactive Export) on the Export MSID for lagging power flows associated with Active Export;
- Measurement Quantity '**RI**' (Reactive Import) on the Import MSID for lagging power flows associated with Active Import; and
- Measurement Quantity '**RE**' (Reactive Export) on the Import MSID for leading power flows associated with Active Import.

If registers are configured as intended and Meter software is appropriately amended then the Metering Systems of shared Import/Export sites can allocate Reactive Power to the appropriate MSID as determined by the allocation methodology of the P266 solution.



## Provision for alternative approaches to Reactive Power within CoPs within specific limits

The provisions of the P266 solution apply to shared Import/Export sites that are settled on a Half Hourly basis unless such a site meets both of the following criteria:

- Its use of Half Hourly metering is not mandatory (i.e. its Import is below the threshold for mandatory Half Hourly metering, currently 100kW, and its Export is below the microgeneration limit, currently set at 30kW); **and**
- There is specific provision for exception from the P266 provisions in the applicable metering CoP.

The Group agreed that P266 should not be applied to Metering Systems that use whole current metering. This will be achieved by including an appropriate provision in all of the CoPs relevant to elective Half Hourly metering.

The Group were primarily concerned with ensuring the solution did not create a potential barrier to competition by preventing the utilisation of future technology that may provide for small scale generation and Import, but not have any material issue relating to Reactive power allocation. The criteria detailed above are believed to accomplish this, as they allow the CoPs to be revised through the BSC Change Proposal process to accommodate any such technology, while maintaining an obligation on mandatory Half Hourly metered sites which cannot be changed by a CP.

## 4 Impacts & Costs

The ELEXON effort to implement P266 would be approximately 20 Man Days, equating to about £4,800.

Some Distributors would (or may be) significantly impacted by system changes required (or possibly required) to implement P266, but evaluation of the general impact on Distributors was not possible given the information provided. Other Distributors identified zero or minimal impact.

One HHDC identified substantial impact to upgrade their Half-Hourly data management system; other HHDC identified only minor required system changes and minimal impact.

MOAs would be impacted by meter replacement activities. One identified costs associated with processing MTDs associated with measurement quantities.

Most Suppliers would be impacted by possible changes to Settlement systems, costs passed on by Party Agents and possible costs to develop their billing systems, but no estimate of costs or lead times has been provided.

## 5 Implementation

The Group's preliminary view is that the Implementation Date of P266 should be **23 February 2012 (February 2012 Release)** if Approval is received from the Authority on or before 29 April 2011, or **28 June 2012 (June 2012 Release)** if Approval is received from the Authority after 29 April 2011 but on or before 2 September 2011.

We will deliver the changes to Code Subsidiary Documents as part of the same Release as the changes to the BSC. The DTC change will be aligned with the BSC Release.

Implementation of P266 will be prospective only. P266 Proposed would apply only to shared Import/Export sites which are newly registered or whose Metering Equipment undergoes a Material Change (as defined by the relevant CoP) following approval of P266. The Group believed that 'retrospective' implementation (i.e. requiring sites on existing sites, with metering registered under a previous version of the relevant CoP, to be subject to P266 where the site meets the P266 criteria) would be unduly onerous on participants and would be inconsistent with the usual approach to Metering CoP changes and requirements.

The Group believes that business drivers exist that will encourage Parties and Exemptable Generating Plant associated with existing shared Import/Export sites that are impacted by the P266 issue to voluntarily ensure that such sites are compliant with the P266 provisions.

## 6 Legal Text

Following a comment in a consultation response, the Group has made a minor amendment to the P266 Proposed Legal Text. After considering the drafting and seeking advice from ELEXON the Group agreed the Legal Text should be amended to ensure it captures the range of sites intended by the P266 solution. The updated legal text more correctly delivers the intent of the P266 solution, which has not changed from that which was issued for consultation. Attachment A details the Group's considerations and ELEXON's advice.

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The Group's initial views aligned with their final views, as set out below. The Group confirmed their initial recommended implementation approach and their initial views against the Applicable BSC Objectives after taking into consideration the responses to the P266 Assessment Procedure Consultation and their further considerations. The Group's initial and final discussions are detailed in Attachment A.

### Group's final views against the Applicable BSC Objectives

The **UNANIMOUS** view of the Modification Group was that Proposed Modification P266 **WOULD** better facilitate the achievement of Applicable BSC Objectives (b), (c) and (d) when compared to the current Code baseline, for the following reasons:

#### Applicable BSC Objective (b)

- Levying accurate and correctly targeted charges relating to Reactive Power tends to have a positive impact on the operation of the Transmission System, as appropriate cost signals are sent to Parties which encourages them to consider the most economic manner of operation; and
- If it is in Parties' economic interest to reduce the amount of Reactive Power they cause, this will tend to reduce the amount of Reactive Power on the Transmission System, which will reduce the actions National Grid is required to take to compensate for Reactive Power.

#### Applicable BSC Objective (c)

- Reactive Power would be allocated more appropriately and accurately to the Party actually responsible for them (or the MSID they should logically be assigned to), and therefore DUoS charges relating to Reactive Power will be more accurate and targeted correctly;
- More accurate DUoS charges relating to Reactive Power, and more correct targeting of charges to Parties actually responsible for Reactive Power flows, will facilitate competition;
- More appropriate allocation and metering of Reactive Power would facilitate potential creation of a competitive market in trading Reactive Power volumes;
- More appropriate allocation and metering of Reactive Power would facilitate a market for ancillary services for Exemptable Generating Plant, removing a potential barrier to the creation of new plant if Suppliers were reluctant to provide services due to inflated DUoS bills caused by inappropriate allocation of Reactive Power;
- The additional, more accurate data available would allow LDSOs not currently charging for Reactive Power to do so, and would facilitate competition in Distribution System operation to the benefit of Generators and Suppliers, thereby promoting competition among these participants and encouraging entry into the market; and
- Facilitate competition between Import Suppliers to Exemptable Generating Plant, as currently these plant are potentially restricted in their ability to switch Import Supplier due to reluctance by Suppliers to risk exposure to inflated DUoS bills.

#### Applicable BSC Objective (d)

- Provide consistency between the BSC and the CDCM.

The Group agreed that the Proposed Modification would have a neutral impact on Applicable BSC Objectives (a).

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## 8 Recommendations

The P266 Modification Group invites the Panel to:

- AGREE an initial recommendation that Proposed Modification P266 should be made;
- AGREE an initial Implementation Date for Proposed Modification P266 of 23 February 2012 if an Authority decision is received on or before 29 April 2011, or 28 June 2012 if the Authority decision is received after 29 April 2011 but on or before 2 September 2011;
- AGREE the draft legal text for Proposed Modification P266;
- AGREE that Modification Proposal P266 be submitted to the Report Phase; and
- AGREE that ELEXON should issue P266 draft Modification Report for consultation and submit results to the Panel to consider at its meeting on 10 March 2011.

## 9 Further Information

More information is available in:

### Attachment **A**: Detailed Assessment

This information includes:

- Costs and impacts;
- Modification Group discussions; and
- Modification Group membership.

### Attachment **B**: Legal Text Proposed

### Attachment **C**: P266 Model

All consultation and impact assessment responses can be found on the [P266 page](#) of the ELEXON website.



**Stage 03: Attachment A: Detailed Assessment for P266**

# P266: Improving the allocation of Reactive Power flows between Import and Export Metering Systems

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**About this document:**

This is Attachment A to the P266 Assessment Report. This attachment provides additional detail, including details of the Modification Group’s discussions.

What stage is this document in the process?

- 01 Initial Written Assessment
- 02 Definition Procedure
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- 04 Report Phase



**Any questions?**

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# 1 Terms of Reference

## P266 Terms of Reference

The P266 Modification Group have been formed from members of the Volume Allocation Standing Modification Group (VASMG), Settlement Standing Modification Group (SSMG) and Distributor representatives. The Group have considered the following items:

Ref	
01	Development and confirmation of the P266 solution
02	Confirm the assumptions and impacts under P224 are still valid
03	Identify and quantify benefits/disadvantages of P266 against the Applicable BSC Objectives
04	Ensure the evidence/data obtained is sufficient for the Modification Group to: <ul style="list-style-type: none"><li>• Consider a various types of sites and fully assess whether the P266 solution would cause problems for other types of sites</li><li>• In particular, consider those sites with significant demand and generation where (even at times of net generation) the demand could be causing the Reactive Energy flows</li><li>• Perform assessment to use appropriate (and adequate numbers of) examples of shared sites in determining the cost-benefit of the solution</li></ul>
05	Identify if there are any potential impacts on the CDCM
06	Any alternative solutions (Ref 02 – 04 need to be taken into consideration)

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## 2 Impact of P266 on Different Customer Types

On 16 November 2010 the P266 Modification Group agreed (by teleconference) that ELEXON should perform some initial analysis of the impact of P266 on different types of customers. This note describes the analysis that we performed.

### Recap of Relevant CDCM Provisions

The structure of DUoS charges is specified in the Common Distribution Charging Methodology (CDCM, in Annex 16 of the [DCUSA](#)). Reactive Power data (for a Half Hourly customer with on-site generation) affects three separate charges:

- The **Import Capacity Charge** (which is a p/kVA/day charge). The chargeable capacity will be increased to match the peak value of actual capacity, defined as:

$$\text{Import Demand} = 2 \times \sqrt{AI^2 + \max(RI, RE)^2}$$

where AI is the metered Active Import; and RI and RE are the metered Reactive Import and Reactive Export "occurring at times of kWh Import". See CDCM paragraphs 155 – 158.

- The **Import Reactive Power Charge** (which is a p/kVArh charge). The chargeable units in each half hour are:

$$\text{Chargeable kVArh} = \max\left(\max(RI, RE) - \left(\sqrt{\left(\frac{1}{0.95^2} - 1\right)} \times AI\right), 0\right)$$

where AI is the metered Active Import; and RI and RE are the metered Reactive Import and Reactive Export "occurring at times of kWh Import". See CDCM paragraphs 163 – 168.

- The **Export Reactive Power Charge** (which is a p/kVArh charge). The chargeable units in each half hour are:

$$\text{Chargeable kVArh} = \max\left(\max(RI, RE) - \left(\sqrt{\left(\frac{1}{0.95^2} - 1\right)} \times AE\right), 0\right)$$

where AE is the metered Active Export; and RI and RE are the metered Reactive Import and Reactive Export "occurring at times of kWh Export". See CDCM paragraphs 169 – 172.

Under the CDCM an Export Capacity is calculated for information but not charged. It therefore has no impact on P266, or the issues underlying P266, so is not considered further in this Assessment Report.

The calculation of the Export Reactive Power Charge is potentially problematic, in that the Metering System with the AE data does not have any Reactive Power data (due to the current industry rules for allocation of Reactive Power flows). Distributors have different interpretations of how to overcome this issue:

- Workaround 1: Some Distributors calculate the Export Reactive Power Charge using Reactive Power data from the Import Metering System (in Settlement Periods that have Active Export but no Active Import). We have referred to this approach as 'Workaround 1' in P266 documentation.
- Workaround 2: Some Distributors do not believe this is appropriate, and do not use data supplied to them on the Import Metering System to calculate Export charges.

They may assume zero values for Reactive Power on the Export Metering System, or apply a default power factor of 0.95, but in either case no Reactive Power charges will be applied to the Export Metering System. We have referred to this approach as 'Workaround 2' in P266 documentation.

## Approach Taken to the Analysis

As agreed with the Modification Group, this analysis has been based on a theoretical categorisation of customers, rather than analysis of actual data from specific sites. For the purposes of this analysis, we have considered that customers can be categorised based on the following characteristics:

- Whether their generation capacity is significantly larger than their demand, of a comparable size to their demand, or significantly smaller than their demand;
- Whether or not their demand creates significant Reactive Power flows (i.e. demand power factor close to 1.0 or not close to 1.0);
- Whether or not their generation creates significant Reactive Power flows (i.e. generation power factor close to 1.0 or not close to 1.0).

Taking all possible combinations of these three factors give twelve groups of customers to consider. For each group, we have compared the total charges payable by the customer under both interpretations of the current baseline, and the P266 solution.

The decision to focus on total charges (rather than the allocation of charges between Metering Systems or Suppliers) is consistent with the approach suggested by Ofgem.



## Details of Spreadsheet Model

In order to perform the analysis, we have developed a spreadsheet model which (given a minute-by-minute profile of Active Power and the relevant Power Factors) calculates Import Capacity, Export Capacity, chargeable Import Reactive Power and chargeable Reactive Power (under both interpretations of the current baseline and under the P266 Proposal).

This spreadsheet model is attached (P266\_Model.xls). It contains twelve separate worksheets, each one containing the same model, but for a different hypothetical customer. The following table shows which worksheets are relevant to each category of customer:

Customer Type			Relevant Worksheets (from P266_Model.xls)	
Generation Capacity	Demand PF	Generation PF		
Larger than demand	Close to 1.0	Close to 1.0	No examples provided – reactive power flows are small, so charging issues will not be significant.	
		Not close to 1.0	The <u>Large Generation 1</u> worksheet provides an example in which the generation occurs for the whole Settlement Period (and therefore the boundary meter records AE but no AI).  The <u>Large Generation 2</u> worksheet provides an example in which the generation occurs for part of the Settlement Period (and therefore the boundary meter records both AE and AI).	
	Not close to 1.0	Close to 1.0	The <u>Large Generation 3</u> worksheet provides an example in which the generation occurs for part of the Settlement Period (and therefore the boundary meter records both AE and AI).	
		Not close to 1.0	The <u>Large Generation 4</u> worksheet provides an example in which the generation occurs for part of the Settlement Period (and therefore the boundary meter records both AE and AI).	
	Comparable to demand	Close to 1.0	Close to 1.0	No examples provided – reactive power flows are small, so charging issues will not be significant.
			Not close to 1.0	The <u>Comparable Size 1</u> worksheet provides an example with only AI at the boundary.  The <u>Comparable Size 2</u> worksheet provides an example with both AE and AI at the boundary.
Not close to 1.0		Close to 1.0	The <u>Comparable Size 3</u> worksheet provides an example with both AE and AI at the boundary.	
		Not close to 1.0	The <u>Comparable Size 4</u> worksheet provides an example with both AE and AI at the boundary.	

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Customer Type			Relevant Worksheets (from P266_Model.xls)
Generation Capacity	Demand PF	Generation PF	
Smaller than demand	Close to 1.0	Close to 1.0	No examples provided – reactive power flows are small, so charging issues will not be significant.
		Not close to 1.0	The <u>Small Generation 1</u> worksheet provides an example in which the demand occurs for the whole Settlement Period (and therefore the boundary meter records AI but no AE).  The <u>Small Generation 2</u> worksheet provides an example in which the generation occurs for part of the Settlement Period (and therefore the boundary meter records both AE and AI).
	Not close to 1.0	Close to 1.0	The <u>Small Generation 3</u> worksheet provides an example in which the generation occurs for part of the Settlement Period (and therefore the boundary meter records both AE and AI).
		Not close to 1.0	The <u>Small Generation 4</u> worksheet provides an example in which the generation occurs for part of the Settlement Period (and therefore the boundary meter records both AE and AI).

## Impact of P266 on Each Category of Customer

The following table summarises the findings for each group of customer (based on the analysis in the attached spreadsheets). Particular issues (i.e. aspects of charging that may not be cost-reflective) are highlighted in red.

Customer Type			Total Charges		
Generation Capacity	Demand PF	Generation PF	Current Baseline (with 'Work around 1' i.e. reallocation of data from Import to Export)	Current Baseline (with 'Work around 2' i.e. default data for Export charges)	P266 Solution
Larger than demand	Close to 1.0	Close to 1.0	Reactive power flows small, so no significant P266-related issues.		
		Not close to 1.0	Where the generation runs for the whole period (see <a href="#">Large Generation 1</a> worksheet) the total charges are accurate.  <b>Where the generation runs for only part of the period (see <a href="#">Large Generation 2</a> worksheet), so that AI and AE are both metered at the boundary, work around 1 does not charge for Reactive Power at all.</b>	<b>Export Reactive Power charges are based on a default power factor (not the metered Reactive Power data).</b>  <b>Any Reactive Power flows in a half hour with both AI and AE will affect the Import Capacity Charge (regardless of whether it happens at a time of Import or a time of Export). This potentially leads to over-charging of Capacity Charges associated with Reactive Power. See Large Generation 2 worksheet for an example.</b>	Total charges are accurate.
	Not close to 1.0	Close to 1.0	See <a href="#">Large Generation 3</a> worksheet for an example. Issues appear to be similar to <a href="#">Large Generation 2</a> worksheet (see above).		
		Not close to 1.0	See <a href="#">Large Generation 4</a> worksheet for an example. Issues appear to be similar to <a href="#">Large Generation 2</a> worksheet (see above).		
Comparable	Close to	Close to 1.0	Reactive power flows small, so no significant charging issues.		

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Customer Type			Total Charges		
Generation Capacity	Demand PF	Generation PF	Current Baseline (with 'Work around 1' i.e. reallocation of data from Import to Export)	Current Baseline (with 'Work around 2' i.e. default data for Export charges)	P266 Solution
to demand	1.0	Not close to 1.0	Netting of kWh from demand and generation decreases capacity charges but increases chargeable Reactive Power.  <b>Where the site both Imports and Exports Active Power during the period, work around 1 does not charge for Reactive Power at all.</b>	Netting of kWh from demand and generation decreases capacity charges but increases chargeable Reactive Power.  <b>Export Reactive Power charges are based on a default power factor.  Reactive Power flows in a half hour with both AI and AE are all charged to Import.</b>	Netting of kWh from demand and generation decreases capacity charges but increases chargeable Reactive Power.
	Not close to 1.0	Close to 1.0	See <a href="#">Comparable Size 3</a> worksheet for an example. Issues appear to be similar to <a href="#">Comparable Size 2</a> worksheet (see above).		
		Not close to 1.0	See <a href="#">Comparable Size 4</a> worksheet for an example. Issues appear to be similar to <a href="#">Comparable Size 2</a> worksheet (see above).		
Smaller than	Close to	Close to 1.0	Reactive power flows small, so no significant charging issues.		

Customer Type			Total Charges		
Generation Capacity	Demand PF	Generation PF	Current Baseline (with 'Work around 1' i.e. reallocation of data from Import to Export)	Current Baseline (with 'Work around 2' i.e. default data for Export charges)	P266 Solution
demand	1.0	Not close to 1.0	<p>Where the demand runs for the whole period (see <u>Small Generation 1</u> worksheet) the total charges are accurate.</p> <p><b>Where the demand runs for only part of the period (see <u>Small Generation 2</u> worksheet), so that AI and AE are both metered at the boundary, work around 1 does not charge for Reactive Power at all.</b></p>	<p><b>Export Reactive Power charges are based on a default power factor of 0.95 (not the metered Reactive Power data).</b></p> <p><b>Any Reactive Power flows in a half hour with both AI and AE will affect the Import Capacity Charge (regardless of whether it happens at a time of Import or a time of Export). This potentially leads to over-charging of Capacity Charges associated with Reactive Power. See <u>Small Generation 2</u> worksheet for an example.</b></p>	Total charges are accurate.
	Not close to 1.0	Close to 1.0	See <u>Small Generation 3</u> worksheet for an example. Issues appear to be similar to <u>Small Generation 2</u> worksheet (see above).		
		Not close to 1.0	See <u>Small Generation 4</u> worksheet for an example. Issues appear to be similar to <u>Small Generation 2</u> worksheet (see above).		

## Summary

The key findings of the analysis can be summarised as follows:

- Both the current baseline and P266 lead to lower capacity charges than separate metering of demand and generation (because of netting of demand and generation used on-site). This would not appear to be an issue – it correctly reflects the fact that generation used on-site has not been distributed across the network.
- In the examples we analysed, both the current baseline and P266 lead to higher Reactive Power charges than separate metering of demand and generation. This is because there is on-site netting of the Active Power from demand and generation, but not (in the examples we analysed) on-site netting of Reactive Power. Again this does not appear to be an issue.
- Workaround 1 (under the current baseline) is not able to charge for Reactive Power flows in any half hour that has a mixture of Active Import and Active Export (as measured at the site boundary). Arguably this is unlikely to affect Capacity Charges (because the peak capacity for the month will probably appear in a period that does not have a mixture of Import and Export). However, it will lead to a systematic under-charging of Reactive Power units for some sites (particularly those where demand and generation are closely balanced, and therefore many half hours have both Import and Export).
- Workaround 2 (under the current baseline) leads to capacity charges for Exporting sites being calculated based on a default power factor of 0.95 or assuming zero Reactive Power, not the actual power factor. This is likely to cause particularly significant anomalies for sites with significant demand and significant generation, where the default power factor is applied to a net Import or Export value that may not be representative of the physical demand or generation capacity. However, this anomaly has no material effect because Export Capacity Charges are not levied under the CDCM (though they are calculated for information).
- Work around 2 (under the current baseline) leads to significant overcharging of capacity and reactive power in periods that have both Active Import and Active Export. In effect all of the Reactive Power flow is charged to the Import MPAN, including that at times of Export. Note that:
  - The effect on total charges is most pronounced for sites at which either Active Import or Active Export is non-zero, but small compared to the Reactive Power flows; and
  - The effect on Capacity Charges is particularly significant, because even a single Settlement Period with a mixture of Import and Export can potentially affect the Import Capacity for a whole month. It seems likely that this is the cause for (anecdotal reports of) wind farms with very excessive Import Capacity charges.

The analysis suggests that P266 addresses the issues with the current baseline, without (so far as we have been able to identify) introducing any new anomalies in the total charges levied

### 3 Modification Group's Initial Discussions

This section summarises the issues the Modification Group discussed in forming their initial unanimous view that P266 would better facilitate the Applicable BSC Objectives.

#### Do the current BSC rules for allocating Reactive Power lead to anomalous charges under the CDCM?

In the first P266 Modification Group meeting, the Group heard from the Proposer that the current BSC rules for allocating Reactive Power flows to Metering Systems continue to lead to spurious DUoS charges, despite the introduction of the CDCM<sup>1</sup>.

The Group spent some time discussing the reasons for this. They concluded that the current drafting of BSC [Section K](#) does not allow the provision of appropriate Reactive Power data to Distributors, which in turn prevents Distributors from satisfactorily implementing the requirements of the CDCM (i.e. workarounds can partially meet the CDCM requirements, but do not fulfil the intent of the CDCM). The Group agreed that amending Section K (as detailed in P266 solution) removes the inconsistency between the BSC and the CDCM, and would resolve the issue of spurious DUoS charges.

The inconsistency currently exists as the CDCM states:

- Charges for the Import Metering System can only be based on Reactive Power data for Settlement Periods where Active Import occurred<sup>2</sup>; and
- Charges for the Export Metering System can only be based on Reactive Power data for Settlement Periods where Active Export occurred<sup>3</sup>.

For example, paragraph 158 states that, for Import Capacity charges, "only kVArh Import and kVArh Export values occurring at times of kWh Import are used." The Group believe this is an explicit prohibition on allocating reactive power in periods of kWh Export to the Import Metering System for purposes of capacity charging. So, if Reactive Power units in periods of kWh Export are to be used in capacity charging at all, they must be allocated to the Export Metering System – which is what P266 proposes.

Similarly for the other three relevant paragraphs:

- Paragraph 162 requires that reactive power in periods of kWh Import must be allocated to the Import Metering System for purposes of capacity charging (if they are to be charged for at all);
- Paragraph 167 requires that reactive power in periods of kWh Export must be allocated to the Export Metering System for purposes of reactive power charging (if they are to be charged for at all); and
- Paragraph 171 requires that reactive power in periods of kWh Import must be allocated to the Import Metering System for purposes of reactive power charging (if they are to be charged for at all).

In each of these cases, the CDCM requires the same allocation of Reactive Power as that prescribed by P266. However, the current BSC rules do not support these requirements. Instead they allocate all Reactive Power data to the Import Metering System, regardless of whether Active Import or Active Export occurred in that Settlement Period.

<sup>1</sup> The CDCM is Schedule 16 of the Distribution Connection and Use of System Agreement (DCUSA), which is published on the [DCUSA website](#).

<sup>2</sup> This bullet is describing paragraphs 158 and 167 of the CDCM.

<sup>3</sup> This bullet is describing paragraphs 162 and 171 of the CDCM.

In order to meet their licence obligation to implement the CDCM, Distributors have had to find workarounds to this issue, which, in the Proposer’s view’ are leading to the spurious DUoS charges. The Group identified two workarounds that are being used.

**Work around 1 – Reallocate data to Export Metering System:**

Some Distributors use Reactive Power data for times of generation (i.e. Settlement Periods with Active Export but no Active Import) to calculate charges for the Export Metering System, even though it was provided to them on the Import Metering System.

**Work around 2 – Default Rules:**

Some Distributors apply default rules (e.g. assume a power factor of 0.95 or assume zero Reactive Power) for the Export Metering System. Given that the BSC (and current industry practice) do not allow Reactive Power data to be allocated to the Export Metering System, this means in effect that all Reactive Power charges for Export Metering Systems are calculated on default data rather than actual data (even when actual Reactive Power data is available to the Supplier).

The Modification Group believed that there were issues with both of these workarounds:

- Distributors who implement workaround 1 are not able to charge for Reactive Power units in Settlement Periods that have both Active Import and Active Export, which potentially leads to non-cost reflective charges. In addition, work around 1 uses data from one Metering System to calculate charges for another Metering System (which may in some cases have been registered by a different Supplier). A number of Modification Group members felt that this was unsatisfactory, in that it prevented Suppliers from validating their charges, and may be inconsistent with the requirements of the DCUSA.
- Workaround 2 always uses default data (rather than actual meter readings) to calculate Reactive Power charges for the Export Metering System. Also, Reactive Power data for Settlement Periods that have both Active Import and Active Export is used to calculate Reactive Power and Capacity charges for the Import Metering System (leading to potential over-charging).

The table below summarises how Reactive Power charges are calculated under each workaround.

	<b>Settlement Periods with Active Import only (i.e. AE = 0)</b>	<b>Settlement Periods with Active Export only (i.e. AI = 0)</b>	<b>Settlement Periods with Active Import and Active Export</b>
Work around 1	Reactive Power units charged to Import Metering System.  (no charging issues)	Reactive Power units charged to Export Metering System.  (no charging issues)	Reactive Power units not charged.  (misallocation and <b>undercharging</b> may occur)
Work around 2	Reactive Power units charged to Import Metering System.  (no charging issues)	Reactive Power units are not charged  (because calculated using a default power factor).	Reactive Power units charged to Import Metering System.  ( <b>overcharging</b> or <b>undercharging</b> on Reactive Power and Capacity Charges may occur)



Proposed P266 Solution	Reactive Power units charged to Import Metering System.  (total charge is cost reflective)	Reactive Power units charged to Export Metering System.  (total charge is cost reflective)	Reactive Power units charged to Import Metering System at times of Active Import, and Export Metering System at times of Active Export.  (total charge is cost reflective)
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In summary, the CDCM requires that DUoS charges for Export Metering Systems are based on data from Settlement Periods where Export occurred. However, BSC rules (under Section K) do not separate Import and Export Reactive Power data, this prevents Distributors from receiving the metered data they would need to implement the CDCM requirement in a satisfactory way. The result is Distributors are forced into workarounds that lead to what many regard as spurious DUoS charges.

In addition, the rules for allocating Reactive Power flows in BSC Section K are not only inconsistent with the CDCM, but are also inconsistent with BSC Section L5.2.4, which requires that Suppliers should provide Distributors with the metering data required to calculate charges.

The Group believe that the P266 solution would remove the inconsistency between the BSC and the CDCM, facilitate the satisfactory implementation of the CDCM by removing the workarounds that are causing spurious DUoS charges, and allow Suppliers to fulfil their obligations under the DCUSA and BSC Section L5.2.4 by providing Distributors with data for charging purposes.

## Impact of P266 on Different Types of Customer

The Modification Group spent some time discussing what analysis should be carried out to establish the impact of P266 on different types of customer. The initial conclusion of the Group, which included Ofgem representation, is that it is not necessary to analyse data from a sample of actual customers under P266, but that a theoretical analysis of the impact on different customer types would be appropriate and sufficient.

In discussing these issues, the Group was mindful that P266 is based upon previous [Modification Proposal P224](#). The CDCM did not exist when P224 was raised. As such one of the areas of debate under P224 was whether, in principle, it was appropriate for Reactive Power data from Settlement Periods where Export occurred to be assigned to Export Metering Systems. The P224 Group undertook data analysis to see if it supported their view that this was the appropriate method. Ultimately P224 was rejected by Ofgem; part of the reason being is that a 'very small' sample of sites had been used in the analysis<sup>4</sup>.

In the time between the P224 rejection and the raising of P266, the CDCM has been drafted, approved and implemented. As noted above, the CDCM contains the principle (and relevant requirements) that it is appropriate for Reactive Power flows at times of Export to be assigned to the Export Metering System. Since this principle has been enshrined in the CDCM, it is no longer appropriate for a Group under the BSC to consider it, and any discussion on the appropriateness of the underlying principle should be progressed through the CDCM change process (i.e. DCMF and DCUSA), not the BSC process.

When P266 was raised, both the Panel and ELEXON were keen to ensure that Ofgem did not reject P266 on similar grounds to P224 i.e. that there was not sufficient sample size in

<sup>4</sup> You can find a copy of the Ofgem Decision letter for P224 [here](#).

the analysis that was conducted. As such the Panel asked the P266 Group to repeat the P224 analysis, but using a suitable number of sites. What was not considered at the time was that, as noted above, the appropriateness of the underlying principle is no longer a BSC issue.

The P266 Modification Group has therefore decided that analysis of data from specific customers is not needed to support the progression of this Modification. However, in order to ensure that Ofgem has sufficient information on which to make a decision, the Group concluded that it would be appropriate to analyse the impact of the P266 solution for a number of hypothetical customer scenarios. This analysis was intended to illustrate the impact on charges of moving from the status quo to P266 (across all shared sites and for individual site types).

### Scenarios developed

ELEXON agreed to develop the scenarios and provide a high level summary of the impacted sites categorised in terms of:

- whether their generation capacity is:
  - a) significantly larger than their demand;
  - b) of a comparable size to their demand; or
  - c) significantly smaller than their demand;
- whether or not their demand creates significant Reactive Power flows i.e. demand power factor is:
  - a) close to 1.0; or
  - b) not close to 1.0;
- whether or not their generation creates significant Reactive Power flows i.e. generation power factor is:
  - a) close to 1.0; or
  - b) not close to 1.0.

The Group noted that Ofgem believed that the categorization would help them to better understand the impacts on charging. The Modification Group agreed that ELEXON should undertake this initial analysis work, which takes the form of a summary document accompanied by a spreadsheet model (see Attachment C) that calculates Reactive Power and Capacity charges for twelve (hypothetical but realistic) customers.

### Possible Issues where Two Customers Share a Single Distribution Connection

The Group had its third meeting on 14<sup>th</sup> December 2010, via teleconference, to discuss the results of the analysis. Based on the analysis carried out, the Group concluded that P266 would give a more appropriate allocation of Reactive Power (and hence enable more appropriate Reactive Power and Capacity charges) than the current baseline. In particular:

1. It would allow cost-reflective charges to be calculated for Settlement Periods with both Active Import and Active Export (unlike either work around 1 or work around 2 under the current baseline); and
2. It would address other issues with the current workarounds i.e. the use of data provided by one Supplier to calculate charges for another Supplier (under workaround 1), and the use of default data in place of actual metered data (under workaround 2).

However, the Ofgem representative then posed the question of whether P266 could lead to misallocation of charges between a generator and a demand customer (if it were possible for these two parties to share a single connection to the distribution system).

### Is it Possible for Two Legal Entities to Share a Single Connection?

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The Modification Group unanimously agreed that Distribution System Operators can only enter into a connection agreement with a single legal entity for a given connection (even where the Import and Export at the site are traded separately, through different Suppliers). However, the Group were not unanimously agreed on whether it was possible (at least in principle) for the connecting party to enter into an agreement with a third party (e.g. an on-site generator) allowing them to contract with a Supplier (so that the Import Supplier and Export Supplier have different customers, one of whom pays Import charges, and the other Export charges). Some members of the Group believed that there was nothing to prevent this, while others argued that such an arrangement was not envisaged under industry Licences or Codes, and could not arise.

### **If the Situation Can Arise, Are P266 Charges Appropriate?**

The Modification Group did not reach a unanimous view on whether the allocation of Reactive Power required by P266 would remain appropriate if the situation did arise where different parties are charged (by their respective Suppliers) for Import Charges and Export Charges.

The potential concern (as raised in the P224 decision letter) is that one of the parties might be allocated (and charged for) Reactive Power flows caused by the other Party. For example, if the site was Exporting Active Power, the generator party might be charged for Reactive Power caused by the demand.

A majority of the Modification Group believed that, even if this situation did arise, the allocation of Reactive Power required by P266 would remain appropriate. By entering into an agreement to share the single connection to the Distribution System, the parties must accept responsibility to manage and take responsibility for the interaction of demand and generation. Such an agreement could (if the parties so wished) include provisions for the demand customer to reimburse the generator for any Export Reactive Power charges attributable to demand (or vice versa).

The Group noted that other options open to the demand and generation customer would include:

1. Arranging for the demand customer and generator to have separate connections to the Distribution System; or
2. Treating the site as a licence exempt distribution system, and contracting with a Licensed Distributor to provide registration services. This allows the customer and the generator to have separate Metering Systems without needing separate connections to the Distribution System.



### Consultation Responses

12 responses were received to the P266 Assessment Procedure Consultation. Respondents were a mix of Distributors, Suppliers, Generators (including renewable generation), Exemptable Generators and Party Agents. All respondents but one supported P266, though some views of respondents that supported P266 differed on some points.

#### Response from SmartestEnergy Limited

One respondent, SmartestEnergy Limited (a Supplier/Consolidator), did not support P266. Smartest believed that there was no problem with the current arrangements, that any perceived problems could be resolved by maintaining the current Code arrangements and aligning the CDCM with them, that P266 would have an impact on them which would be inappropriate because it would be to accommodate a Distribution charge and did not believe that P266 would better facilitate the Applicable BSC Objectives.

Smartest discussed their response with the Group at the final P266 Modification Group meeting. The Group believed that Smartest may have misunderstood the issues associated with P266. Smartest noted the Group's explanation but maintained that the impact on them due to passing DUoS charges from Distributors through to customers was unnecessary and inappropriate (though they did not identify associated implementation costs or lead times), and exposed them to risk (after paying Distributors they may have difficulty recouping funds from customers). They were unhappy that they would receive Reactive Power bills associated with Exports, and believed it should be possible to resolve charging anomalies via bilateral agreements between customer and Supplier(s) on Import/Export sites.

The Group believed that Smartest should already receive Export Reactive Power bills as a result of the CDCM. However, though the CDCM was implemented on 1 April 2010, derogations were in place until 1 October 2010, therefore the first bill would likely have been received in November 2010. The Group accepted that Smartest remained opposed to P266 and believed it would impact them, but believed that they had misunderstood the issues associated with P266 and possibly overestimated the impact of P266 on them. The Group did not believe that amending the CDCM was a viable potential solution.

#### Potential Alternative Solutions

Ten respondents confirmed they did not believe there was any alternative solution the Group should consider. Smartest suggested changing the CDCM, as noted above, but the Group did not believe this was viable since the CDCM drives the charging methodologies.

CE Electric suggested that there might potentially be an alternate solution based on the calculations employed rather than physical changes to metering. They suggested that such a solution would see Reactive Power assigned to the correct measurement quantity using calculations rather than physically changing meter register configurations, but noted that this would require changes to the DCUSA and the recently implemented CDCM. The Group did not see this as a viable alternative because the solution was not explained beyond the suggestion that calculations should be used rather than changes to physical meter arrangements, and the suggestion that the DCUSA and CDCM would also need to be changed were unlikely to be feasible since the CDCM drives the charging methodologies.

## Impact on Distributors

Six Distributors responded. Two identified impacts, one a potential impact depending on the detail of the solution, and three identified zero or minimal impact.

Respondents identifying no impact stated that this was because their systems are already able to handle the data that will result from the P266 metering arrangement. One attributed this to the work they had conducted to achieve compliance with the CDCM. Another respondent noted that part of the reason that they would incur minimal impact in implementing P266 is that the proposed implementation date of P266 would broadly align with implementation of the Extra High Voltage Distribution Charging Methodology (EDCM), expected to be on 1 April 2012.

One respondent identified a potential impact if the D0275 for a specific MPAN contains more than one RI or RE measurement quantity record within that meter record, stating that this would incur development costs (estimated to be over £50,000) to process the extra measurement quantity identifiers. However, the Group questioned this and believed that existing systems should be able to support this. No other Distributor identified an impact due to processing D0275 information.

Scottish Power noted that system changes would be required to their DUoS Billing Application to unwind the association of Import and Export MPAN. They believed this may be fairly complex, but were not able to estimate costs or timescales.

Electricity North West noted that P266 would have a major impact (and cost) because their billing systems and procedures were changed to align with the CDCM. ENW had clarified that this was due to re-working systems that had recently been modified as a result of the CDCM. The Group were surprised by this, because they believed that compliance with the CDCM should decrease the impact because such systems should be able to receive P266-type data.

## Impact on HHDCs

Three HHDCs responded and all three identified impacts. Two believed that minor system changes would be required and the impact would therefore be minimal.

RWEnpower identified impacts due to additional investigation and validation work by the HHDC (as a result of meter reconfigurations by the MOA) and upgrading and testing of their core Half-Hourly data management system to process the new AE/RI/RE combination to the Export party. They estimated costs of around £60,000 with an 18 month lead time. The Group acknowledged that there could be an impact if the current combination was 'hard-coded' into the system, but believed the necessary work would take significantly less time than the 18 months estimated.

## Impact on MOAs

Three MOAs responded and all three identified impacts. All three identified impacts due to meter replacement activities; one also suggested that Suppliers should pay for such work. The Group agreed that the Supplier or customer should bear the cost of meter replacement or reconfiguration, but this should be agreed between Suppliers and customers taking into account the particular relationship with the MOA. A respondent identified that there would be costs associated with processing Meter Technical Details (MTDs) associated with measurement quantities. The Group noted this, but believed that the cost would be significant but not excessive.

## Impact on Suppliers

Four Suppliers responded; three identified impacts, one would not be impacted. The latter stated that their existing systems are capable of receiving D0036 and D0275 flows amended in line with P266. None of the impacted Suppliers identified costs or lead times for work required.

One of the impacted Suppliers was Smartest, whose response is covered above. The other Suppliers identified possible changes to Settlement systems, costs passed on by Party Agents and, most significantly, possible costs to develop their billing systems. The Group noted this, but believed such costs were unlikely to be excessive.

## Implementation Approach

Nine respondents supported the proposed implementation approach for P266. Two respondents noted that they believed P266 should be implemented as soon as possible to that the benefits can begin to be realised as soon as possible. One supported the approach, but suggested that implementation in the June 2012 Release would better coordinate with implementation of the EDCM (expected on 1 April 2012). The Group noted this, but felt that the two prospective implementation dates were already sufficiently aligned to deliver efficiency benefits via coordinated implementation (see comment in Distributor impact section relating to SSE response).

One respondent, who supported the implementation approach, suggested that benefits could be realised earlier if P266 was implemented such that Suppliers and Agents (if willing and able) are permitted to adopt the P266 metering configuration, on request of the customer, earlier than the date of mandatory introduction of P266 arrangements. They believed this would enable earlier realisation of benefits. The proposed implementation date would then function as a backstop, by which point all participants would need to be able to support P266.

The Group supported the aim of trying to realise benefits earlier, but believed that this approach could cause confusion and that problems would result from the interaction of different participants at different stages of implementing P266. They therefore agreed not to develop or progress this approach.

Smartest Energy did not support the proposed implementation approach, but did not provide a rationale.

RWEnpower suggested that a later implementation date for P266 should be considered because their Party Agent identified an 18 month lead time for P266 implementation. However since RWEnpower was the only respondent to identify a lead time of this magnitude (and this was the only lead time greater than the proposed P266 implementation lead time) the Group did not believe this was sufficient reason to justify delaying implementation of P266 and the realisation of its associated benefits.

The Group therefore unanimously supported its initial proposed implementation approach for P266.

## Information and Views on Possible Issues where Two Customers Share a Connection

The Group used the consultation to request information to help it consider the possibility that there could be issues where two customers share a single connection to the distribution system.

Nine respondents believed the Import bill and the Export bill could be paid by different legal entities. A Group member did note that the question of legal entities was not truly relevant because it did not matter whether the connected customer or another Party received a charge, or both the Import and Export charges; it was the manner in which Reactive Power is allocated to meter registers that determines whether charges are anomalous, no matter who receives them.

Only one respondent believed that they could identify circumstances where billing as per P266 would result in inappropriate charges for separate legal entities at a shared site. Scottish Power believed this would result where there are separate Suppliers for Import and Export. However the Group did not believe this situation caused an issue in itself; as noted above anomalies in Import/Export allocation and charging can arise regardless of whether different Suppliers are responsible for the Import and Export of a site. Ofgem agree that a site having separate Import/Export Suppliers does not cause an issue.

However, Ofgem maintains the view that, under P266, the activities of one Party can impact on the charges incurred by another Party in respect of energy volumes, Reactive Power and Capacity charges. That is, where separate Parties pay the demand and generation bills for a site, Reactive Power can be caused by one but result in a charge for the other. This can occur if the activities of the generation Party cause Reactive Power when the site as a whole is importing, and vice versa, if the demand Party causes Reactive Power when the site as a whole is exporting. Thus far it has not been possible to produce a material example of this effect, either in reality (analysis is limited by the lack of Reactive Power data for different Parties on a site) or in theory.

In line with their answers to earlier questions, respondents provided little solid information on how often such circumstances would be likely to arise (now and in the future). Scottish Power stated that the circumstances they had identified occur frequently, but the Group agreed this was meaningless because such circumstances (separate Suppliers for Import and Export) did not cause any issue.

UK Power Networks believed such circumstances would be limited, and stated that it is not possible to answer definitively given the answer depends so much on the behaviour of a given customer and their actions or inactions where they otherwise can or could have taken steps to optimise their premises' electricity usage, including those of the third party it invites to share its premises. A Group member drew attention to their comment that it would appear discriminatory to consider that the inability of the connected customer and its commercial invited third party generator to co-operate requires any different approach than that of a connected customer who manages consumption and production of its own electrical energy and fails to do so to the same extent.

The consultation asked whether participants believed that different metering arrangements might give more appropriate charges in such circumstances, meaning more appropriate than P266. Seven respondents answered no to this question.

Two respondents believed there were different arrangements, but did not identify them, however these two respondents were also the only two who had identified alternative solutions they believed the Group should consider. Their responses to these questions are therefore consistent, and the Group inferred that the different options they would suggest are the alternative solutions they had proposed in response to an earlier question, and which the Group had discounted.

One other respondent, Baywind Energy Co-operative Ltd, also believed that different metering arrangements might give more appropriate charges. Their suggestion was to

return to the approach of not charging for Reactive Power, but they were not aware of any metering-based or other solution that they believed would be superior to P266.

### Other Mitigation of Inappropriate Charges

Only two respondents were aware of other options to mitigate any inappropriate charges; CE Electric reiterated their suggested alternative solution, while RWEnpower noted that they believed that if P226 did introduce inappropriate charging for some types of 'shared' site, this could be identified and a suitable workaround put in place.

Ofgem suggested that Suppliers and/or Distributors might take steps to ensure that operating on shared Import/Export sites are aware that the activities of one Party can affect the charges of the other due to the issue underlying P266. The Group considered that such Parties would be aware of this.

### Applicable BSC Objectives

11 of the 12 respondents believed that Proposed Modification P266 would help to achieve the Applicable BSC Objectives. These respondents generally expressed support for the Group's initial views in this area. One respondent identified support particularly against Objective (c).

One respondent, Smartest Energy, did not believe that Proposed Modification P266 would help to achieve the Applicable BSC Objectives. They believed that the current arrangements are the most efficient.

### Legal Text

One respondent commented on the P266 legal text, particularly paragraph K1.2.7 of the text. The respondent disagreed with the use of the word 'or' in 1.2.7(c)(i) of the text.

They noted that page 10 of the consultation document explicitly states 'import is below 100kW **and** export below 30kW', while the legal text uses the word 'or'. The respondent believed that this could lead to unexpected outcomes when threshold exclusions are applied using the rule, which could potentially lead to systems which should be covered by P266 not being included. They therefore believed the 'or' should be replaced by 'and'.

The respondent also felt a stated threshold should be used in section 1.2.7(c)(ii), to remove any doubt over the threshold. The Group noted this suggestion but agreed that since 'Small Scale Third Party Generating Plant' is a defined Code term it was appropriate to apply it without a threshold.

The Group considered these suggestions and sought advice from ELEXON. A Group member believed the use of 'or' could potentially exclude some sites that P266 is intended to capture. ELEXON agreed that the use of 'or' was more limiting than was the intent of P266. However, we also identified that retaining the wording of 1.2.7(c)(ii) would limit the exclusion only those Metering Systems with no Small Scale Third Party Generating Plant (i.e. not Metering Systems below the Small Scale Third Party Generating Plant Limit, which would include Metering Systems with no generation).

We therefore proposed that the wording of K1.2.7 be amended to clarify the intent of the drafting, i.e. that P266 metering should only be mandatory for sites that are above one or both of the thresholds for mandatory Half Hourly metering (i.e. 100kW for Import, and the Small Scale Third Party Generating Plant Limit for Export). The following two changes were made to achieve this:

- The 'or' between K1.2.7(c)(i) and (ii) was changed to an 'and', as a site must be below both thresholds to avoid mandatory P266 metering; and



- The wording of K1.2.7(c)(ii) was amended to clarify that a customer with no Generating Plant at all should be treated as below the threshold for Export.

The amended K1.2.7(c) now reads:

- (c) where a Metering System:*
- (i) is not a 100kW Metering System in relation to Imports; and*
- (ii) does not exceed the Small Scale Third Party Generating Plant Limit in relation to Exports,*
- and the requirements set out in the relevant Code of Practice in relation thereto provide otherwise; and*

The Group agreed that the Legal Text should be amended in line with ELEXON's advice so it more correctly delivers the intent of the P266 solution. The Legal Text attached to the Assessment Report is therefore updated from that previously consulted upon.

The P266 Proposed Legal Text can be found in Attachment B.

## **Possible issue of potential discrimination due to implementation approach**

During the P266 Assessment Consultation, Ofgem raised the possibility that the proposed 'non-retrospective' implementation approach of P266 could lead to discrimination between existing customers and those that join the market after P266 is introduced.

It is proposed that P266 is not retrospective and is implemented in line with the approach for changes to the Metering Codes of Practice (CoPs). This means that only metering systems newly registered at a site (i.e. usually new customers) and metering systems that undergo a 'material change' (as defined by the CoPs) after P266 is implemented would be required to use a P266 metering arrangement. A P266 arrangement could be used on other sites but would not be mandatory.

Under the current metering arrangements and charging workarounds some customers are charged less than they would be charged under P266. Ofgem's concern was that because P266 is not retrospective (and as explained above this means it will not apply automatically to existing sites), customers being charged less under the existing arrangements will not be compelled to change their arrangements (and would be unlikely to do so voluntarily) and will therefore, for some time at least, have an advantage over customers that connect after P266 has been introduced.

Assessment of Modification P224 concluded that customers affected by the issue were being overcharged and would therefore seek to move to the P224 arrangements (the same as the proposed P266 solution) to improve their situation. The P224 Modification Group therefore concluded that the charging arrangements would provide a natural incentive for existing customers to voluntarily move to the new metering arrangements. Ofgem wanted to ensure that the P266 Group had considered whether this is still the case, especially given the introduction of the CDCM and application of the two charging workarounds since P224 was assessed, and that the Group conducts any analysis it considers necessary to support its assessment.

## **Analysis**

The Group undertook analysis to investigate the difference in Reactive Power allocation and applied charges for some existing sites under the two methodologies currently employed (workarounds 1 and 2) and under P266. This was done by applying the workarounds and P266 to data sets from shared Import/Export sites and comparing the

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results produced by the different methodologies. The breakdown of the proportion of each type of period (Export only, Import only, etc) and the proportion of Reactive Power that falls under each type of period are shown in the table below. Discussion of the results follows, including reference to the predicted impact on charges.

The CDCM charges apply to the maximum of RI and RE; this is what is referred to against 'Reactive Power' in the table. Under the CDCM Export Capacity is calculated for information, but is not charged for.

Period Type	Proportion of Periods	Proportion of Reactive Power
Export (AE>0, AI=0)	64.6%	75.5%
Import (AI>0, AE=0)	23.8%	20.0%
'Crossover' (AI>0, AE>0)	11.5%	4.5%
Inactive (AI=AE=0)	0.2%	0.0%

### Export only periods

Approximately 65% of the Settlement Periods in the sample were Export only (i.e. AE greater than zero and no AI). In these periods workaround 1 and P266 produce the same allocation of Reactive Power and therefore the same charges. However, workaround 2 does not charge for excess Reactive Power, and will therefore under-charge some customers.

The average under-charge under workaround 2 (averaging across all 14 customers in the sample, including those with no under-charging, and then scaling up to a whole year) is approximately £4,000 per annum per site. This calculation was based on an assumed charge of 0.3 p/kVArh. This charge was derived by averaging the tariffs for LV-connected customers from the 2010/11 charging statements of the three Distributors who had provided data.

No Export Capacity Charges are applied under the CDCM, so effects on capacity are not relevant for Export only periods.

### Import Only Periods

Approximately 25% of the Settlement Periods in the sample were Import only (i.e. AI greater than zero and no AE). The P266 solution and both workarounds deliver the same allocation of Reactive Power and calculation of charges for these periods.

### Crossover Periods

In 'crossover' periods both AE and AI are greater than zero. Approximately 10% of the Settlement Periods in the sample were crossover periods. This varied significantly from site to site, with some having none and others having up to 70%.

Workaround 1 does not charge for Reactive Power in crossover periods. In crossover periods, workaround 2 charges all Reactive Power to the Import MPAN. The average Reactive Power charge for crossover periods under workaround 2 (averaging across all 14 customers in the sample, including those with no crossover periods, and then scaling up to a whole year) was approximately £1600 per annum per site.

To assess the extra Import Capacity Charges accruing under workaround 2 (relative to Capacity Charges under workaround 1 which do not include Reactive Power) we compared the maximum kVA Import Capacity in these periods (taking into account the allocation of Reactive Power to the Import MPAN) with an estimate of the agreed Maximum Import

Capacity (derived by applying a default 0.95 power factor to the peak kWh Import observed for that site).

The resulting estimates of additional Import Capacity charged under workaround 2 (compared with workaround 1) were zero for about half of the sites, ranging up to a maximum of 5.4MW. Translated into monetary terms the values ranged from zero to £50,000 per annum, with an average (across all 14 customers in the sample) of approximately £5,000 per annum. This calculation was based on an assumed Import Capacity Charge of 2.5p/kVA/day. This charge was derived by averaging the tariffs for LV-connected customers from the 2010/11 charging statements of the three Distributors who had provided data.

This charge was derived by averaging the tariffs for LV-connected customers from the 2010/11 charging statements of the three Distributors who had provided data.

The metered data required to calculate the charges that would be applied under P266 is not available.

### **Summary of Analysis Results**

The analysis showed workaround 2 (which charges all Reactive Power to the Import MPAN) charging customers in the sample £6,600 per annum more on average for crossover periods than workaround 1 (which does not charge for Reactive Power in those periods).

The Modification Group believe that the majority of the charges under workaround 2 are not cost-reflective, and would not be levied under P266 (which charges Reactive Power to the Import MPAN only at times of Active Import). Unfortunately it is difficult to assess the precise impact of P266 on crossover periods, because the metered data required to calculate accurate charges is not available.

### **Conclusions on Ofgem's Concerns and the Implementation Approach**

The Group considered Ofgem's concerns and the supporting analysis. The Group acknowledged that some customers, i.e. those that are 'undercharged' as a result of the current arrangements, would benefit from retaining their current metering arrangement. Particularly, customers being charged by Distributors using the charging methodology referred to as 'Workaround 1' under P266 would incur greater (or at least equal) charges under P266 than those they receive for the same behaviour under the current arrangements. This is because P266 and Workaround 1 result in the same charges in periods of Export only or Import only, but Workaround 1 neglects Reactive Power for 'mixed' periods (i.e. both Import and Export occur), which means in such periods Workaround 1 cannot charge for Reactive Power units and ignores the contribution of Reactive Power to capacity.

However, the Group believed that this did not necessarily mean the proposed P266 implementation approach would be discriminatory. The Group believed it reflected the usual situation when a change is introduced to any set of arrangements, i.e. existing customers continue under the previous arrangements and new customers are subject to the new arrangements and any discrepancy is not discrimination but a reasonable result of the prevalent conditions at the time they began participating (or whatever other trigger mechanism is relevant as the case may be for a given change).

The Group believed that customers impacted by the P266 issue that were being charged under the Workaround 2 methodology would be suffering from excessive charges and would therefore be motivated to utilise the P266 arrangements voluntarily, as quickly as

possible, to resolve their issues with Reactive Power and Capacity charging. A minority of customers under Workaround 2 would therefore also not be incentivised to request the P266 solution on their own initiative. However, the Group believed that such customers would be a small minority.

The use of the two workarounds is still under consideration. Though this consideration is ongoing, and is certainly outside the scope of P266 in particular and the BSC in general, it may be useful to bear in mind when making any comparison between the P266 arrangements and the solutions (workarounds 1 and 2 in P266 documentation) already in place to deliver CDCM charging. In addition, the discussions of the Group and the results of the P266 consultation showed that all Distributors (regardless of which workaround they operate) support P266 because it would enable more accurate allocation of energy flows where six-register metering data is available.

The Group noted that there are obligations within the DCUSA that require Suppliers to provide data necessary for charging. Distributors may be better able to enforce this obligation if it is possible for them to ask Suppliers to install P266-compliant metering. This could provide a means for Distributors to promote use of P266 arrangements by Suppliers which would not otherwise seek to use the arrangements on their own initiative.

The Group noted as a clarification that at present there is not an Export capacity charge equivalent to how capacity is charged for Import. The Export capacity charge in the CDCM is set to zero, and there is instead a 'standing MPAN charge' for Export. How Export capacity is charged may be considered and changed in future, for example if Distribution System connected generators become prevalent.

The Group agreed that the proposed, completely non-retrospective approach for implementing P266 would not discriminate between existing and new customers and remains the best approach because:

- It aligns with the normal expectation of how changes are implemented to the BSC and to the Metering CoPs;
- It avoids imposing an overly onerous requirement to change metering requirements for sites that are not materially affected by the P266 issue;
- The vast majority of sites being charged under Workaround 2 will be incentivised to adopt the P266 arrangements voluntarily;
- The uptake of P266 metering arrangements can be managed more efficiently (as it is triggered by voluntary requests, installation of new metering, and material changes to existing meters) than if P266 metering arrangements were required to be in place for all relevant sites by the P266 implementation date; and
- Requiring P266 metering on all sites that meet the relevant criteria by the P266 implementation date would significantly increase the impact of implementation on participants, which would extend implementation timescales and/or significantly increase cost, delaying the delivery of benefits to participants who are materially, and in some cases critically, affected by the P266 issue.

## **Interaction with the EDCM**

One of the Group has been involved in the development of the EDCM, and provided a description of the currently proposed EDCM methodology and an explanation of the prospective interaction between P266 and the EDCM. This is in Section 7 of this document.

It is anticipated that the EDCM will be implemented on 1 April 2012 (subject to approval by the Authority). The EDCM will introduce common methods for Distributors charging customers on the higher voltages of their networks, in the same way the CDCM introduced a common method for Distributors charging customers on the lower voltages of networks.

The Group noted that the EDCM is not part of the present governance baseline, but that it should be introduced relatively soon, and at around the same time that it is proposed P266 would be implemented, if approved. Ofgem will have to consider any interaction between the two proposals when making a decision on them. The Group therefore agreed that it was appropriate that it should consider the interaction between P266 and the EDCM, and any impact they one have on one another, as much as it was able to based on the information available.

P266 does not apply to meters comprising only CVA Metering Systems (as there is no issue of charging anomalies associated with CVA only meters). However, the proposed EDCM will cover Extra High Voltage (EHV) customers with SVA registered meters, as well as a number of High Voltage sub-connected metering points. The Group believed that the application of P266 compliant metering to SVA customers that fall under the EDCM would not impede the application of the EDCM as currently proposed.

The Group believed two factors contribute to any effect P266 may have on customers that fall under the EDCM: charge setting and charge application (which is similar to the CDCM method). Given that the EDCM is not yet finalised, the Group was not aware of how Distributors would apply it, in contrast with the CDCM which is currently applied via the two workarounds; it is therefore not known how the EDCM might be accommodated using existing metering arrangements. The Group considered the explanation of the proposed EDCM methodology and noted the advice that the overall effect in most Distribution areas would be that Reactive Power charges for affected generation would be expected to increase while these charges for affected Import Parties would be expected to fall.

The Group concluded that, considering on the available information concerning the currently proposed EDCM, the effect of P266 on sites to which it applies that fall under the EDCM will be similar to its affect on sites that are charged under the CDCM. That is, P266 metering would enable more appropriate allocation of Reactive Power flows, leading to more reflective charging; the effect individual Import or Export Parties' charges may be that they increase or decrease (compared with what they would have been without P266 metering). This is in line with the effect of P266 on charging under the CDCM, and the Group did not consider that this would constitute discrimination between, or a particular disadvantage to, any classes or types of site or customer, but would be a consequence of improved allocation of Reactive Power flows.

The considerations of the potential interaction with the EDCM were not a major factor in the Group's consideration of P266 and its benefits (beyond the fact that they were satisfied there would be no detrimental effect) given that the EDCM is not part of the current governance baseline. Rather, the EDCM was considered, and the Group's discussions recorded, to assist Ofgem's decision making process and to confirm the Group's view that based on currently available information, there would be no detrimental interaction between P266 and the EDCM.

At Ofgem's request, the Group agreed to undertake analysis of sites which will fall under the EDCM and to which P266 would apply. Time constraints mean it is not possible to include the results of this analysis in this Assessment Report, but it will be attached to subsequent P266 documentation. As with the EDCM considerations detailed above, the Group did not place any weight on the prospective results of this analysis in determining

their view on the benefits of P266. The analysis will be in line with the analysis of shared sites already conducted, which investigated the differences between the volumes that would have been allocated, and the charges that would have resulted, under each workaround and under P266.

### **Consideration of expanding P266 to cover CVA EDCM Sites**

The Group agreed that it would not be possible at this time for it to consider expanding the P266 solution to encompass all Parties, sites and meters covered by the EDCM, i.e. CVA sites as well as SVA sites, which may already fall under P266. The Group did believe it was appropriate that they consider, to the extent it was possible for them to do so, the effect on Parties that will fall under the EDCM that are captured by the proposed P266 solution, i.e. SVA EDCM sites that meet the P266 criteria.

Furthermore, the Group did not believe it would be appropriate for it to consider expanding P266 to cover all sites that fall under the EDCM (i.e. CVA sites as well as SVA) because that the EDCM is not part of the current governance baseline. They agreed that it was also not necessary to do so because no issue of materially anomalous charging has yet been identified for any type of site besides those already captured by the P266 solution. The Group believed that it would be relatively straightforward (in terms of Code changes) for a future change to build on P266 by expanding the sites to which it applies, though differences in the way associated flows are processed would need to be considered.

### **Conclusions and Recommendations**

Taking into consideration the responses to the P266 Assessment Procedure Consultation and their further considerations, the Group confirmed their initial recommended implementation approach and their initial views against the Applicable BSC Objectives. The Group's final views are set out in the main Assessment Report document.

### ELEXON Implementation Costs

The estimated ELEXON implementation costs are shown in the table below:

	Implementation Cost <sup>5</sup>	Tolerance
ELEXON Implementation Resource Cost	20 man days (£4,800)	±10%

### Industry Implementation Costs

In response to the P266 Assessment Procedure consultation Distributors, HHDCs, MOAs and Suppliers all identified impacts on them as a result of implementing P266. However, there was little quantification of the impacts in terms of cost and timescales, and often the impacts varied across participants of the same type.

#### Distributor impact

Six Distributors responded to the consultation. Three identified zero or minimal impact because their systems are already able to handle the data that will result from the P266 metering arrangement and/or the proposed implementation date of P266 would broadly align with expected implementation of the EDCM on 1 April 2012.

One Distributor identified a potential development costs (estimated to be over £50,000) to process extra measurement quantity identifiers, though the Group noted that existing systems should be able to support this and no other Distributor identified this impact.

Two distributors identified system impacts to unwind the association of Import and Export MPAN within their DUoS Billing Application or re-work systems recently modified as a result of the CDCM, but neither was able to estimate costs or timescales.

#### HHDC impact

Three HHDCs responded to the consultation. Two identified minor system changes resulting in minimal impact. Another identified substantial impact to upgrade and test their Half-Hourly data management system to process the new AE/RI/RE combination to the Export party, and estimated costs of around £60,000 with an 18 month lead time (though the Group believed the necessary work would take less than 18 months).

#### MOA impact

Three MOAs responded to the consultation. All three identified impacts due to meter replacement activities; one identified costs associated with processing MTDs associated with measurement quantities.

#### Supplier impact

Four Suppliers responded to the consultation. One would not be impacted because their existing systems are capable of receiving D0036 and D0275 flows amended for P266.

Three Suppliers identified impacts, but none identified costs or lead times. One identified an impact due to receiving Reactive Power bills associated with Exports (though the Group believed they should already be receiving such bills following introduction of the CDCM); the others identified possible changes to Settlement systems, costs passed on by Party Agents and possible costs to develop their billing systems.

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<sup>5</sup> Note these are the estimated maximum costs associated with implementation of P266 in a scheduled BSC Release; costs associated with project management etc may be reduced if other changes which impact the same areas are implemented in the same Release.

## Impacts

### Impact on BSC Systems and processes

No impact.

### Impact on BSC Agent/Service Provider contractual arrangements

No impact.

### Impact on BSC Parties and Party Agents

P266 proposed solution may have impacts on LDSOs' (and Suppliers') DUoS billing processes. However, the majority, if not all, of the impacts on DUoS billing would be due to changes that LDSOs (and Suppliers) would voluntarily make to improve their billing processes to benefit from P266.

There would be potential impacts on HHDCs and MOAs, with process and system changes.

HHDCs would need to:

- Reconfigure meter registers by the MOA and receipt of notification of this via the D0268;
- Allocate six meter register quantities to the appropriate Party, particularly allocation of three quantities to the Export Party; and
- Produce amended D0036 and D0275 flows.

MOAs would need to:

- Install six meter registers; and
- Send D0268 flow to HHDC.

### Impact on Transmission Company

No impact.

### Impact on ELEXON

ELEXON would implement P266 as part of a BSC Release. ELEXON would make the changes to the Code, metering CoPs and BSCPs needed to effect the P266 solution. ELEXON would also provide support and guidance to Parties implementing P266 in their systems and processes, and would provide support regarding any audit changes due to the revised requirements.

ELEXON's operational working procedures would also need to be updated to reflect the revised requirements; monitoring of submission of MTDs may potentially be undertaken.

### Impact on Code

Code section	Potential impact
K	New and amended terminology, change to obligations.
L	Reference to Section K.
X-1	Changes to definitions.

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Impact on Code Subsidiary Documents	
CSD	Potential impact
BSCP20 'Registration of Metering Systems for Central Volume Allocation'	Consequential changes to requirements due to the changes to Code Provisions.
BSCP514 'SVA Meter Operations for Metering Systems Registered in SMRS'	Consequential changes to requirements due to the changes to Code Provisions.
BSCP502 'Half Hourly Data Collection for SVA Metering Systems Registered in SMRS'	Consequential changes to requirements due to the changes to Code Provisions.
BSCP601 'Metering Protocol Approval and Compliance Testing'	Consequential changes to requirements due to the changes to Code Provisions.
All Metering Code of Practices	Consequential changes to requirements due to the changes to Code Provisions.

Impact on Core Industry Documents and other documents
Potential impact on the DCUSA.

Impact on other Configurable Items
No impact.

Other Impacts
No impact.

## 6 Modification Group Membership

Member	Organisation	27/10/10	16/11/10	14/12/10	22/12/10	1/2/11
Colin Berry	ELEXON (Chairman)	✓	✓	✓	✓	✓
Bu-Ke Qian	ELEXON (Lead Analyst)	✓	✓	✓	✓	X
Dean Riddell	ELEXON (Lead Analyst)	-	-	-	-	✓
Martin Brandt	SSE (Proposer)	X	X	X	X	X
Peter Gray	SSE	✓	☎	☎	X	✓
Howard Gregory	Npower	✓	☎	☎	☎	✓
Matthew Hays-Stimson	UK Power Networks <sup>6</sup>	✓	☎	☎	☎	✓
Glenn Sheern	E.ON UK	✓	☎	☎	X	☎
Mike Smith	Western Power Distribution	✓	☎	☎	X	✓
Steve Dodd	Scottish Power	☎	☎	X	X	☎
Andrew Neves	Central Networks	X	X	X	X	X
Neil McKeown	Electralink	X	X	X	X	X
Tony McEntee	Electricity North West	X	X	☎	X	X
Attendee	Organisation					
Diane Mailer	ELEXON (Lawyer)	✓	✓	✓	✓	X
John Lucas	ELEXON (Design Authority)	✓	✓	✓	✓	✓
Donald Smith	Ofgem	☎	☎	☎	☎	✓
Gareth Evans	Ofgem	✓	X	X	X	X
Dominique Tilquin	SSE	X	☎	☎	☎	✓
Janice Thompson	Scottish Power	☎	X	X	X	X
Tariq Hakeem	National Grid	✓	X	X	X	X
Ben Nicaudie	Electralink	✓	☎	X	X	X
Tracey Pitcher	WPD	X	X	X	☎	X
Colin Prestwich	SmartestEnergy Ltd	-	-	-	-	☎ (part)

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<sup>6</sup> Formerly EDF Energy.

### Prospective EDCM methodology

This is a description of the currently proposed EDCM methodology and an explanation of the prospective interaction between P266 and the EDCM.

It must be noted that the EDCM is still under development, and is being considered by a DNO working group (Workstream B (Pricing Modelling), 'the WSB'). It is therefore possible that the EDCM methodology could change significantly between now and its implementation; this description represents only the current position. Under the EDCM proposals currently under consideration, charges for excess Reactive Power flows would apply to both Import and Export tariffs.

#### Import tariffs

For Import tariffs, the excess reactive charge (in p/kVAh) would be calculated as follows:

1. Calculate a notional Active Power Import unit rate (in p/kWh) for each demand customer. This is done by multiplying the site-specific super-red time band active power unit rate in p/kWh by the number of hours in the super-red time band, then dividing by the number of hours in the charging year. This is always greater than or equal to zero.
2. Multiply the notional Active Power Import unit rate (p/kWh) by the average ratio of the Reactive Power flow (kVA) to network lead (kVA) at network levels above the network level of connection.

#### Export tariffs

For Export tariffs, the excess reactive charge (in p/kVAh) would be calculated as follows:

1. Calculate an average Active Power unit rate (in p/kWh), by calculating the average active power import unit rate (in/kWh) for all demand customers (weighted by units consumed during super-red time band). Again, this number is always equal to or greater than zero.
2. Multiply the notional Active Power import unit rate (p/kWh) by the average ratio of the Reactive Power flow (kVA) to network lead (kVA) at network levels above the network level of connection.

#### Chargeable reactive units

The chargeable reactive units are calculated as in the CDCM; see formula in paragraph 164 (for import tariffs) and paragraph 168 (for export tariffs) of the CDCM methodology in Schedule 16 of the DCUSA. This formula is based on the Max(RI,RE) in each half hour period. In the case of Import tariffs, RI and RE are only considered when there is Active Import in the half hour. Similarly, in the case of Export tariffs, RI and RE are only considered when there is Active Export in the half hour. The chargeable reactive units are aggregated across all half hours in the charging period.

Import and Export tariffs associated with a site which operates subject to Grid Code requirements for generation will be exempt from the application of the Reactive Power charge. This reflects that the continuous operation of required voltage control apparatus could lead to Reactive Power flows.

Excess reactive charges will not apply to sites where there exists a connection agreement to permit Reactive Power flows outside of the standard unity to 0.95 lagging Power Factor range. Provision for alternative Power Factor ranges will be stated in the connection

agreement and will be made where the specifics of the network or connection has been so designed to meet the requirements of external industry codes, or where there are other network features that allow Power Factors outside the standard range.

## **Effect of P266**

Distributors are at present generally unable to charge for Reactive Power flows associated with the Export tariff of a mixed Import and Export site (except when there is some Active Import in the relevant half hour). With the introduction of P266 metering, it would be expected that many generators would start to be charged for Reactive Power units.

In most DNO areas, if there is some Active Import recorded in a half hour period, the Import tariff would pick up any Reactive Power charges more properly attributable to the associated Export tariff. With the introduction of P266 metering, these Reactive Power charges would no longer be applied to the Import tariff, but would apply instead to the Export tariff (only if there is Active Export during that half hour).

In summary, the Reactive Power charges for generation would be expected to increase in most Distribution areas. The Reactive Power charges for the Import tariffs of the average mixed Import and Export site would be expected to fall in most Distribution areas.

## P266 – PROPOSED LEGAL TEXT

### SECTION K: CLASSIFICATION AND REGISTRATION OF METERING SYSTEMS AND BM UNITS (Version 33)

*Amend paragraph 1.1.4 to read as follows:*

1.1.4 For the purposes of the Code:

- (a) in relation to the terms Export and Import, references to the Plant or Apparatus of a Party shall be treated as including:
  - (i) the premises of a Customer supplied by that Party;
  - (ii) Plant and Apparatus of a Third Party Generator for whose Exports that Party has elected to be responsible in accordance with paragraph 1.2.2(a)(ii)(2);
  - (iii) Plant or Apparatus (whether or not owned or operated by that Party), not forming part of the Total System, by which electricity is transported from the Total System to premises supplied by the Total System or (as the case may be) to the Total System from Generating Plant providing electricity to the Total System;
  - (iv) an Interconnector in relation to which that Party is an Interconnector User.
- (b) subject to paragraphs (c), (d), (e) and (ef), unless otherwise provided:
  - (i) "**Export**" means, in relation to a Party, a flow of electricity at any instant in time from any Plant or Apparatus (not comprising part of the Total System) of that Party to the Plant or Apparatus (comprising part of the Total System) of a Party;
  - (ii) "**Import**" means, in relation to a Party, a flow of electricity at any instant in time to any Plant or Apparatus (not comprising part of the Total System) of that Party from the Plant or Apparatus (comprising part of the Total System) of a Party;and Export and Import, as verbs, shall be construed accordingly;
- (c) any Export or Import is to be determined at a single Boundary Point;
- (d) for the purposes of paragraph (c), in relation to a Party any flow (under paragraph b(i) and (ii) respectively) which occurs at a Boundary Point:
  - (i) to or from Plant or Apparatus of that Party shall be considered to be a single Export or Import of that Party;
  - (ii) to or from the Plant or Apparatus of that Party shall be considered to be a separate Export or Import from any Export or Import of any other Party.
- (e) notwithstanding paragraphs (c) and (d):

- (i) the flow to or from each Generating Unit (where such Generating Unit individually constitutes or is capable of constituting a Licensable Generating Plant) and is not comprised in a CCGT Module and to or from the associated unit transformer of that Generating Unit (if any) shall be combined. Such combined flow shall be considered to be a single Export or Import and separate from any Export or Import of any other Plant or Apparatus; and
- (ii) the flow to or from a station transformer associated with a Licensable Generating Plant shall be considered to be a single Export or Import, and separate from any Export or Import of any other Plant or Apparatus.

(f) for the purposes of paragraph (b):

(i) an Export includes:

(1) "Active Export", which is a flow of Active Energy at any instant in time from any Plant or Apparatus (not comprising part of the Total System) of that Party to the Plant or Apparatus (comprising part of the Total System) of a Party; and

(2) "Active Export Related Reactive Energy", which is any flow of Reactive Energy which occurs at the same Boundary Point at the same instant of time as an Active Export.

and shall be treated as a single flow of electricity, the direction of such flow being the direction of flow of the Active Energy; and

(ii) an Import includes:

(1) "Active Import", which is a flow of Active Energy at any instant in time to any Plant or Apparatus (not comprising part of the Total System) of that Party from the Plant or Apparatus (comprising part of the Total System) of a Party; and

(2) "Active Import Related Reactive Energy", which is any flow of Reactive Energy which occurs at the same Boundary Point at the same instant of time as an Active Import.

and shall be treated as a single flow of electricity, the direction of such flow being the direction of flow of the Active Energy.

*Amend paragraph 1.2.1 to read as follows:*

## **1.2 Obligations of Parties in relation to Exports and Imports**

1.2.1 Subject to the further provisions of this Section K, the Party responsible (in accordance with paragraph 1.2.2 below) for any Exports or Imports of electricity at a Boundary Point shall:

- (a) install, maintain and operate or secure that there is installed, maintained and operated, subject to and in accordance with Section L, Metering Equipment by

which (over periods and otherwise in accordance with the further requirements of the Code) the quantities of such Exports and Imports separately can be measured, but subject to the provisions of [paragraph 1.2.6](#) and Section S8 as to Unmetered Supplies;

- (b) register the Metering System(s) which result or will result from installation of such Metering Equipment, in accordance with paragraph 2;
- (c) establish and register BM Unit(s) comprising the relevant Plant and Apparatus in accordance with paragraph 3;
- (d) assign each BM Unit to a Trading Unit established and registered in accordance with paragraph 4.

*Insert new paragraph 1.2.6 to read as follows:*

1.2.6 Subject to paragraph 1.2.7, for the purposes of the Code, the Party responsible (in accordance with this paragraph 1.2) for any Imports or Exports of electricity at a single Boundary Point shall ensure that any associated quantities of Active Export Related Reactive Energy and Active Import Related Reactive Energy are measured separately.

*Insert new paragraph 1.2.7 to read as follows:*

1.2.7 The provisions of paragraph 1.2.6 shall not apply in the following circumstances:

- (a) where the Metering Equipment is Non Half Hourly Metering Equipment, except as required by the relevant Codes of Practice;
- (b) where the Metering Equipment at a Boundary Point is comprised only in CVA Metering Systems, the Registrant of such Metering Systems shall not be required to measure separately Active Export Related Reactive Energy and Active Import Related Reactive Energy, except as required by the relevant Codes of Practice;
- (c) where a Metering System:
  - (i) is not a 100kW Metering System in relation to Imports; and
  - (ii) does not exceed the Small Scale Third Party Generating Plant Limit in relation to Exports,and the requirements set out in the relevant Code of Practice in relation thereto provide otherwise; and
- (d) the relevant Code of Practice or Metering Dispensation applicable to a Metering System existed prior to the Relevant Implementation Date,

provided that, for the purposes of this paragraph 1.2.7, the term "relevant Code of Practice" shall have the same meaning as set out in Section L3.2.2, subject to Section L paragraphs 3.2.5, 3.2.6 and 3.3.

## **SECTION L: METERING (Version 14)**

*Amend paragraph 1.1.1 to read as follows:*

1.1.1 This Section L sets out:

- (a) requirements for the installation, commissioning, operation and maintenance of Metering Equipment for the measurement of quantities of Active Energy and where relevant Reactive Energy (subject to Section K1.2.6); and
- (b) the functions of the TAA in connection with such Metering Equipment.

#### ANNEX X-1: GENERAL GLOSSARY (Version 51)

*Insert the following new terms into the general glossary in alphabetical order to read as follows:*

<b><u>"Active Export":</u></b>	<u>has the meaning given to that term in Section K1.1.4(f);</u>
<b><u>"Active Export Related Reactive Energy":</u></b>	<u>has the meaning given to that term in Section K1.1.4(f);</u>
<b><u>"Active Import":</u></b>	<u>has the meaning given to that term in Section K1.1.4(f);</u>
<b><u>"Active Import Related Reactive Energy":</u></b>	<u>has the meaning given to that term in Section K1.1.4(f);</u>
<b><u>"Small Scale Third Party Generating Plant Limit"</u></b>	<u>has the meaning given to that term in Table X-2 of Annex X-2;</u>

*Amend the definition of "reactive energy" in the general glossary to read as follows:*

<b>"Reactive Energy":</b>	means the integral with respect to time of Reactive Power <u>and for the purposes of the Code, is comprised of Active Export Related Reactive Energy and Active Import Related Reactive Energy;</u>
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