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Meeting name	BSC Panel
Date of meeting	10 May 2007
Paper title	Report on Issue 24 'Impact of BSC on Reactive Power Charging'
Purpose of paper	For Information
Synopsis	Issue 24 was raised to consider concerns that constraints imposed by the BSC result in anomalous DUoS charges in relation to Exemptable Generating Plant. The Issue 24 Group concluded that this is the case, and that a Modification should be raised to rectify this. The Group endorsed a solution to form the basis of such a Modification.

1 Introduction

1.1 Issue 24 'Impact of BSC on Reactive Power Charging' (Issue 24) was raised in order to explore concerns that Section K of the BSC prevents Parties other than licensed Suppliers from taking responsibility for Reactive Energy associated with Exemptable Generating Plant, resulting in anomalies in Distribution Use of System (DUoS) charging in relation to sites such as wind farms. The objective of Issue 24 was identification of changes to the BSC that would allow Parties to allocate Reactive Power flows in a manner they deem more appropriate.

2 Background

2.1 Exemptable Generating Plant may be operated by a generator who does not have to hold a Generation Licence and does not have to be a BSC Party - a 'License Exempt Generator' (LEG). If a LEG is not itself a BSC Party it must have a Party that acts on its behalf in order to Export electricity. Issues arise on shared sites (Figure 1) where a LEG (or a Party acting on its behalf) takes responsibility for Exports of electricity and a Supplier (i.e. a different Party to the LEG or Party acting on behalf of the LEG) takes responsibility for Imports of electricity at a common metered Boundary Point. In this case, ELEXON's legal advice (SVG64/07a) is that BSC Section K obliges the Supplier to be responsible for Reactive Import as well as Active Import, no matter whether the Active Power flow of the site is net Import (flow into) or net Export (flow out of).

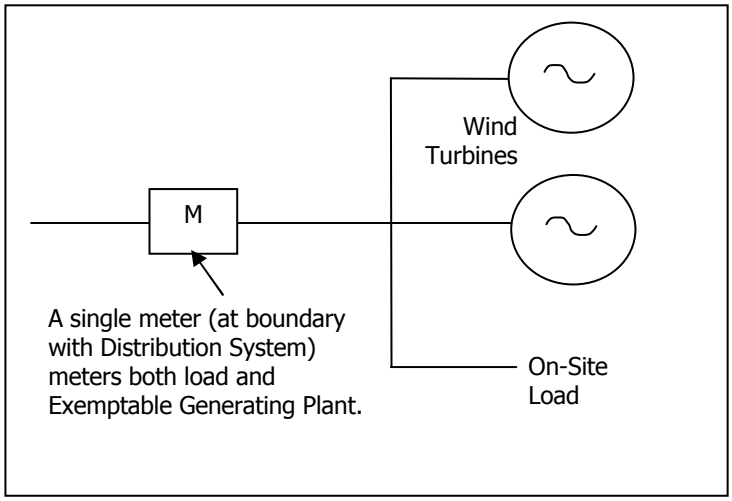

Figure 1: Example of a 'shared site'

2.2 The operation of Exemptable Generating Plant can lead to increased levels of Reactive Power. A particular concern in relation to shared sites is that operation of wind turbines can require large amounts of Reactive Import. Because of the BSC obligation described above, the Supplier of the shared site is assigned responsibility for this Reactive Import, as well as for the Active Import to the on-site load, whilst the LEG is responsible for Active Export. Consequently, the Supplier may be subject to charges due to Reactive Power requirements that it did not cause, and which may occur at times when the site is in fact exhibiting net Active Power Export. Some customers of Licensed Distribution System Operators (LDSO) are currently involved in court actions in order to try to resolve charging anomalies.

2.3 The correspondence between the terminology used to describe the relationship between Active Energy, Reactive Energy and Power Factor is explained in the Codes of Practice (CoPs) as shown below (Figure 2). Import and Export are the only terms currently recognised within the BSC. The relationship of the Active and Reactive components of 'electricity' to Import and Export of a Metering Point is defined as shown only in the CoPs, and not in the BSC itself.

Flow of Active Energy	Power Factor	Flow of Reactive Energy
Import	Lagging	Import
Import	Leading	Export
Export	Lagging	Export
Export	Leading	Import

Figure 2: Reactive Power terminology

3 Initial Proposed Solution

3.1 When the matter of responsibility for Reactive Power was first raised by Parties, and subsequently presented to the Supplier Volume Allocation Group (SVG - SVG62/08, SVG63/11 and SVG64/07) and the Imbalance Settlement Group (ISG - ISG62/04), it was proposed that the solution may be to allocate responsibility for Reactive Power flows as follows:

- All Reactive Power flows (i.e. Reactive Import and Reactive Export) that occur at times of net Active Import to be allocated to the Supplier responsible for that Active Import; and
- All Reactive Power flows (i.e. Reactive Import and Reactive Export) that occur at times of net Active Export to be allocated to the Party responsible for that Active Export.

3.2 The Group was concerned that it be established firstly that there was an issue to address, and secondly that the issue should be resolved in the BSC. Consideration of the solution proposal above formed the basis of the Issue 24 Group's initial discussions. The Group developed this proposed solution and issued a consultation to ascertain industry views on Issue 24 and this solution. ELEXON's legal advice confirmed that a Modification would be necessary for this approach. Some members of the Group felt that any anomalies in charging could, and should, be resolved by means of contractual arrangements between parties involved. The Group also agreed to approach the Department of Trade and Industry (DTI) in order to seek confirmation that implementation of this solution would be consistent with the Electricity Act.

4 DTI Advice

4.1 The DTI was approached (Attachment 1 - DTI Correspondence Summary) for confirmation as to whether the proposed solution would be consistent with the Electricity Act ('the Act'). The DTI were provided with an outline of Issue 24 and the proposed solution, and their advice was that the solution initially proposed was not consistent with the Act.

4.2 On the basis of the brief provided, the DTI considered that the key aspect of the enquiry was whether, given that the term 'electricity' is not defined in the Act, there is any basis for excluding reactive power from the scope of that term; the DTI stated that there was no basis for such exclusion. The DTI concluded 'that both "reactive power" and "active power" come within the scope of the term "electricity" as that term is commonly understood'. This implied that Reactive Power Import constitutes supply of electricity in an equivalent manner to Active Power Import, and that therefore a Supply Licence is required in order to assume responsibility for either of these quantities.

4.3 The DTI advised that in their view the initial proposed solution was inconsistent with the Act for these reasons. The DTI further advised that, in its view, the question of whether Active Power and Reactive Power together form a unified flow, or whether they constitute distinct flows of electricity, is a technical rather than a legal question. The DTI determined that regardless of the answer to this question, the initial proposed solution still involved the supply of one or more unlicensed flows of electricity, and that this matter would have to be taken up with Ofgem.

4.4 Ofgem confirmed that it could not provide an opinion on the perceived defect raised under the Issue until it is formally raised as a Modification. If Issue 24 enters the Modification process then Ofgem can provide input, for example via provisional thinking or in its determination of a Proposal.

5 Issue 24 Consultation

5.1 Parties were asked about the validity of the issue, where it should be resolved, and the details of a solution (Attachment 2a – Assessment Consultation document). The Group evaluated the views of respondents (Attachment 2b), though analysis, particularly relating to the initially proposed solution, was not exhaustive, because the DTI's advice had effectively ruled out this solution.

5.2 A large majority of respondents believed that the drafting of the Code causes an issue in relation to the metering of Reactive Power flows, that the issue should be resolved within the BSC (rather than through DUoS charging) and that the use of new Metering Equipment to facilitate new arrangements for metering of and responsibility for Reactive Power should be considered.

5.3 Respondents were closely split on the question of whether the Parties involved should be given the option to agree arrangements for the responsibility for Reactive Power flows at the boundary point, though there was agreement that if Parties are given this option there should be default arrangements for use in the event that parties cannot reach agreement. A large majority believed that the default arrangements for new shared sites and Meters should be those of the initial proposed solution. However, respondents were split over whether the existing arrangements should apply as the default for existing shared sites and Meters, a narrow majority believing that they should.

5.4 Opinion among respondents was divided on the question of where the details of any default arrangement should sit; a large majority supported their placement in the appropriate CoP, but other respondents favoured their inclusion, either additionally or solely, in a range of other

locations, including the BSC, Meter Operator Code of Practice Agreement (MOCoPA), Master Registration Agreement (MRA), BSC Procedures (BSCP) and the DUoS Connection Agreement. A narrow majority of respondents felt there were no impacts of the suggested solution not identified in the consultation document. A majority of respondents believed that there were no other solutions not identified that should be considered.

6 Group Discussion of Defect

6.1 The Group agreed that there is an issue that should be resolved under the BSC, because the current drafting of the BSC prescribes that Suppliers are responsible for Reactive Energy Import, though this import may be caused by an exporting generator. This appears to be an incorrect allocation of responsibility, with consequences for the accuracy of DUoS billing by LDSOs.

6.2 A minority of the Group initially argued that there is no issue to resolve under the BSC because Import Suppliers can charge for any Reactive Power Import caused by generators, thus the issue of anomalous DUoS billing could be resolved through contractual agreements between Suppliers and generators. However, a counterargument is that customers who cause Reactive Power Import are often reluctant to accept Reactive Power charges passed on by Suppliers. Also, this problem is not new - a Group member indicated that DUoS billing has been affected for several years (since circa 1998) by anomalous charging in relation to windfarms - and thus far has not been resolved through contracts. This is a largely latent problem that will become a material issue due to increased embedded generation.

6.3 The Group considered whether the issue could be dealt with through changes to charging, and specifically whether Ofgem's Structure of Charges work may provide a better means of resolution. However, the Ofgem Implementation Steering Group (ISG) carrying out this work determined that its subgroup on capacity charging should suspend work until Issue 24, and the Energy Networks Association (ENA) DNO Commercial Operations Group (COG) work on Developing Long Term Charging Arrangements, have progressed (Ofgem ISG minutes, 18 July 2006).

6.4 A solution involving changes to charging would cause issues around the transparency of charges and data; because reactive DUoS charges are currently visible to the Import Supplier but not the Export Party, a solution relying solely on changes to DUoS charging could create an issue because an Exporting Party would be unable to challenge Reactive Power bills based on metered Reactive Power. The LDSO may only provide data to the Party that is Registrant of a Metering System. This could be resolved by changing the drafting of the Code to require sharing of data, and in any case a Party with access to data is free to share this information as it wishes; however, the Group noted that this could lead to uncertainty around metering. Because different charging methods are used by LDSOs, national agreement would be required to permit charging in this manner. Without an obligation being placed on Parties, they could refuse to share data, resulting in Parties charged being unable to verify billing data. Responsibility for metering as set out in the BSC may also be an issue.

6.5 It should be noted that an LDSO has already tried several times in recent years to solve the problem by altering its charging methods, without satisfactory results. Another issue is that LDSOs may move from passive to active management of Reactive Power; instead of only charging for use of Reactive Power (i.e. low power factor) LDSOs may communicate to Parties how to operate to balance the system Reactive Energy, and charge them accordingly. If this transpired would be important to be able to bill effectively and transparently.

7 Group Endorsed Solution

7.1 Following the DTI's advice regarding the initially proposed solution, the Group agreed that it would not be appropriate to progress this approach any further. Some Group members proposed another solution, and presented a draft outline of the solution to the rest of the Group (Attachment 3 – Group Endorsed Solution). This solution would seek to change the BSC definitions of Import and Export by the addition of a paragraph to BSC Section K1.1.4. The aim is to clarify the relationship between Active Power and Reactive Power for the purposes of the BSC by adding clarification of directions of flow to the BSC definitions of Reactive Power. The Group approved the principle of the draft solution and endorsed its progression into the Modification process. A comparative summary of the solutions considered by the Group is provided in Attachment 4.

7.2 The proposed change as outlined does not prescribe allocation of Reactive Power, but it is intended that there would be consequential effects of this small change in the BSC. The proposed definition of the relationship between flows of electricity, Active Power and associated Reactive Power is intended to supersede the labels of Reactive Import and Reactive Export. This would make the treatment of Reactive Power for the purposes of the BSC unambiguous and enable more accurate and straightforward allocation of responsibility for it.

7.3 Under the Group endorsed solution, Reactive Power would be identified by its relationship to the Active Power flow, e.g. all Reactive Power associated with Active Power Import would be known as 'Active Import Related'. Further distinction may be made by reference to the Lagging or Leading nature of the Active Power quantity, e.g. 'Lagging Active Import Related'. This means that the conflict engendered with the Act by the initially considered solution, due to the proposal to allow allocation of responsibility for some Reactive Import to the Export Party, should no longer be an issue, because for the purposes of the BSC this quantity would be Leading Active Export Related.

7.4 Figure 3 shows the relation between the proposed BSC terminology and the allocation of Active and Reactive Power quantities to Meter Register (Channel) Identifiers. Using current BSC terminology, four possible combinations of power quantities may occur at any given instant:

- Active import (AI) with Reactive import (RI);
- Active import with Reactive export (RE);
- Active export (AE) with Reactive import; and
- Active export with Reactive export.

7.5 The approach will have a Metering System with six meter 'registers' or channels of data, three attributable to the 'Supplier' and three attributable to the 'generator'. In a 30 minute period the flow of power could encompass all of these four combinations, resulting in data being recorded on all six meter registers. It should be noted that in practice the meter itself must not necessarily designate channels visibly as AI/AE/RI/RE as this is done by the channel to quantity ID mapping of the D0268 'Half Hourly Meter Technical Details' flow. The configurer of the D0268 information must be aware of which 'channel' in a given meter records what quantity, and form the D0268 accordingly.

Responsible party		Supplier			Generator		
Proposed BSC terminology (i.e. based on active flow)		Active Import	Active Import related Reactive Power		Active Export	Active Export related Reactive Power	
Meter Register Identifier		AI Register	RI Register	RE Register	AE Register	RI Register	RE Register
Active Flow:	**Power Factor:**						
Active Import	Lagging	X	X	-			
Active Import	Leading	X	-	X			
Active Export	Lagging				X	-	X
Active Export	Leading				X	X	-

Figure 3: Relationship between Proposed Reactive Power terminology and Meter Register allocation

7.6 Though the definitions of Reactive Power quantities under the BSC would change as described, it is not proposed that the Measurement Quantity identifiers RE and RI should change. Retention of these identifiers would minimise system impact. The new quantities would be assigned to the available Meter registers and mapped to the relevant settlement quantity IDs.

7.7 Meters currently exist with the capability to measure Active Import, Export or both (with associated Reactive Import and Export) i.e. by utilising 3 or 6 registers. The Group also speculated that meter manufacturers would move toward developing new meters that allow Meter capabilities to be more effectively exploited by being more user-friendly and adaptable.

7.8 It is understood that though Metering equipment does exist which could fully support this approach, not all CoP approved Metering equipment available can be configured to record all the quantities. In particular a typical four register Half Hourly (HH) meter will record the Active and Reactive Power quantities into the four registers, but the Reactive values are recorded irrespective of the direction of the Active flow. However, for Import-only sites existing meters should suffice by default, because any Reactive power should be associated with the Active import recorded by the meter, even if this is not based per se on flow of active power by dint of programming. Therefore no configuration of existing meters on Import-only sites should be needed to satisfy the proposed allocation of quantities. Programming of meters should only be needed for sites that also have Active Power Export, where the direction of Active Power flow may vary and the allocation of data to registers depends on that direction. Existing Metering equipment on sites with both Active Import and Export, which is capable of functioning in this way, would require reconfiguration.

7.9 The Group discussed whether change would be prospective only, or whether change would be required to the meters of existing customers. It was felt that even if it were not mandatory for existing meters to change where necessary, the cost of replacing or adjusting meters would be negligible to those most affected by the issue. It is understood that whether change of meters is mandatory or voluntary, delay in implementing a solution would greatly increase the backlog of work needed. A Group member explained that of his company's customers, over 99.5% are Import only, have 3 register meters (Active, RE and RI) and would be unaffected; however the member could envisage the number of customers that would be affected increasing ten times or more (i.e. to around 5% or more) if progression of a solution is not promptly instigated.

7.10 It should be noted that the Metering CoPs are not retrospective, so the required changes would apply only going forward. This is to ensure that CoP changes do not make existing Metering Systems non-compliant, and to allow time for manufacturers to design and seek approval for products which meet the revised CoP. Thus change to CoPs will not impact CoP compliant Metering equipment already installed and working. Changing the CoP would therefore not lead to imposed resolution of existing customer issues; however, as noted, the Group expect that Parties already impacted will be interested in correcting the Metering of a limited number of extant sites voluntarily.

7.11 The Group felt that further development of the endorsed solution should include consideration of a threshold above which new requirements apply. Some members, noting that the issue is around sites where the Active Export and Import are HH metered, suggested that a 100kW de-minimis limit may be reasonable; another viewpoint within the Group was that the solution should not be limited to HH Metering Systems. It was noted that a 100kW threshold would be consistent with the new SI 1679 standard (see www.opsi.gov.uk) which allows any meter below 100kW approved within Europe to be used within the UK (any further constraint could be regarded as a 'local country restriction' and ruled illegal). However, consideration may also be given to reactive power associated with domestic size (i.e. ~2kW) wind turbines, etc.

7.12 Development of the endorsed solution might also consider the legal impact, regarding specifically whether large numbers of HH Metering Systems would be made non-compliant. Notwithstanding that Metering on Import only sites should be adequate from a technical perspective, consideration should be given to any separate legal ramifications.

7.13 It is anticipated that the change would not have a net impact on the income of LDSOs. The Group envisaged that though charges would be reduced for the relatively small number of customers currently affected by anomalously large charges, this would not result in significantly larger charges for other customers (i.e. to attempt to compensate for reduced revenue) because any such effect would be spread over the whole customer base.

7.14 It should be noted that as part of progression of this solution as a Modification Proposal, the outline solution endorsed by the Group would need to be fully considered by a Modification Group. Consideration would need to be given to the aspects of consistency with the Act and the impact of introducing changes to the Code to alter the definitions of Import and Export.

8 Conclusions

8.1 The Issue 24 Group concluded that the drafting of the BSC does lead to anomalies in DUoS charges relating to Reactive Power, and it is appropriate to implement a solution within the BSC. Furthermore, in the Group's opinion this issue adversely impacts the customer and is a genuine barrier to entry into the market. The Group agreed that though the materiality of this issue is not yet widely significant, it is likely to increase rapidly (with increasing embedded generation) and that therefore prompt progression of a solution through consideration of a Modification Proposal could greatly reduce its impact.

8.2 The Group noted the advice received form the DTI regarding Issue 24, and agreed that this advice means that it is inappropriate to pursue any further the solution proposed initially.

8.3 The Group agreed that a Modification Proposal should be raised consistent with the outline solution endorsed by the Group. The Group considered that such a solution would remove the inappropriate constraint imposed by the BSC and result in increased accuracy of DUoS charges relating to Reactive Power.

9 Recommendations

9.1 The Panel is invited to:

a) **NOTE** that the Issue 24 Group concluded that the BSC causes anomalous DUoS charges in relation to Reactive Power;

b) **NOTE** the further conclusions of the Issue 24 Group; and

c) **NOTE** that the Issue 24 Group agreed that a Modification Proposal should be raised to resolve Issue 24, and endorsed an outline solution that for use as the basis of a Modification.

Dean Riddell

Change Assessment Analyst

List of attachments

1. Attachment 1 - DTI Correspondence Summary
2. Attachment 2a - Assessment Consultation document
3. Attachment 2b - Consultation Responses
4. Attachment 3 - Group Endorsed Solution
5. Attachment 4 – Summary of Solutions

Issue Group Details

Member	**Organisation**	**04/07/06**	**3/10/06**	**27/03/07**
Katie Wilkinson	ELEXON (Chairman)	√	√	√
Dean Riddell	ELEXON (Lead Analyst)	√	√	√
Barbara Vest	Proposer (Gaz de France)	√	X	X
James Evans	British Energy	√	X	X
Phil Russell	Independent Consultant	√	X	X
Rosie McGlynn	E.ON	√	√	X
Tim Roberts	Scottish Power	X	√	√
Jonathan Purdy	EDF Networks	√	X	X
Douglas Alexander	Scottish Power	X	X	X
Steve Dodd	Scottish Power	√	X	X

Attendee	**Organisation**	**04/07/06**	**3/10/06**	**27/03/07**
Richard O'Malley/Melanie Henry	ELEXON (Lawyer)	√	X	X
Andy Manning	Npower	√	X	X
Andrew Neves	Central Networks	√	X	√
Mark Knight	Scottish and Southern	√	X	X
John Lucas	ELEXON	√	√	√
Jon Spence	ELEXON	√	X	X
Richard Harrison	Npower	X	√	X
Alan Hunston	E.ON	X	√	X
Edward Coleman	E.ON	X	√	X
Angus MacLeod	AMO (Scottish Power)	X	√	X
Tony Davey	Scottish and Southern	X	X	X
Matthew Hays Stimson	EdF Energy	√	√	√
Martin Brandt	Scottish and Southern	X	X	√