Modification proposal:	**Balancing and Settlement Code (BSC) P224: Reactive Power flows associated with Exemptable Generating Plant (P224)**		
Decision:	The Authority[1] has decided to reject this proposal		
Target audience:	National Grid Electricity Transmission Plc (NGET), Parties to the BSC and other interested parties		
Date of publication:	17 October 2008	Implementation Date:	n/a

Background to the modification proposal

The BSC currently defines 'Import' and 'Export' to describe power flows between parties on electricity networks which are measured (metered) at Boundary Points but it does not define 'Active' and 'Reactive' power flows[2] which relate to those Import and Export flows.

A BSC Issues Group (Issue 24) considered how reactive power is treated in the BSC and concluded that the failure to recognise reactive power in the BSC acted as a constraint on the appropriate allocation of, and appropriate charging for, reactive power flows by Distribution Network Operators (DNOs). This constraint created an increased risk of potential misallocation of, and anomalous charging for, reactive power at particular sites ('shared sites') connected to the electricity distribution networks.

A shared site is typically one where a demand customer and an Exemptable Generating Plant (such as embedded wind power generation) share a site with a common metered Boundary Point connected to the DNO network. The party responsible for the Exemptable Generating Plant may or may not be the same customer as, or have contracted to have its energy settled by the same Supplier as, the demand customer.

As far as a DNO is concerned, all reactive power flows for the purposes of Distribution Use of System (DUoS) charging are measured at the common metered Boundary Point for a single customer (see Figure 1 below). Because of the metering in place at the common Boundary Point, for some shared sites the demand customer (Import) may be held responsible for the reactive power flows caused by operation of the Exemptable Generating Plant (Export) at the site.

[1] The terms 'the Authority', 'Ofgem' and 'we' are used interchangeably in this document. Ofgem is the Office of the Gas and Electricity Markets Authority.
[2] Electrical power consists of 'Active' power, which is used to power an electrical system (such as a grid network), and 'Reactive' power, which is associated with 'Active' power but can reduce its capacity to flow power around that electrical system efficiently. Some network operators charge for excessive 'Reactive' power as it creates inefficiencies in the operation of their networks.

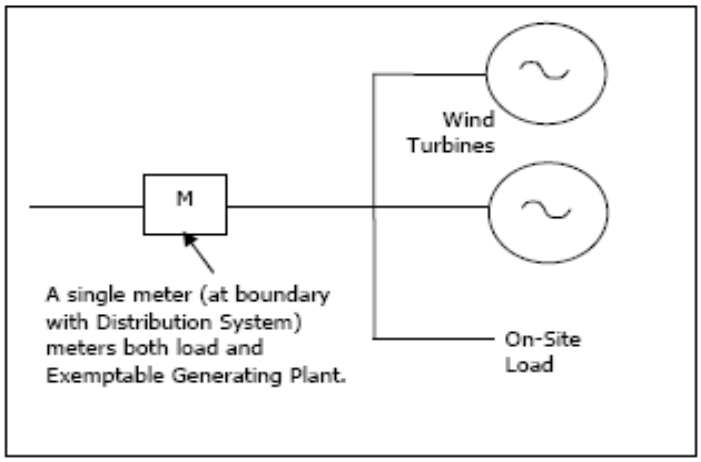

Figure 1: Example of a 'shared site'

The modification proposal

P224 was raised with the aim of allocating responsibility for reactive power flows more appropriately and accurately between the Import and Export parties at shared sites. The proposal seeks to expand the BSC definitions of Import and Export to include Active Import and Active Export and their related reactive power flows. It also seeks to clearly allocate responsibility for related reactive power (Active Import related Reactive power to the Import party and Active Export related Reactive power to the Active Export party).

These changes will not have implications for settlement of energy under the BSC. However, they could potentially result in the application of more cost reflective DUoS charges between generation and demand customers that operate at a shared site.

There would be practical implications arising from the proposed changes for allocation of metered energy at shared sites.

Currently, at a shared site, four meter registers are used: active import, active export, reactive import and reactive export. The BSC currently prescribes that active exports are allocated to the generator (the "Export Party") and active imports to the demand customer (the "Import Party"). However, while the BSC requires the Import Party to be allocated reactive import, it allows either the Import Party or the Export Party to be allocated the reactive export (though, in practice, this is allocated to the Import Party).

The proposal would allow an adjustment to be made to metering software on site so that the two reactive power meter registers record the reactive power flows associated with the relevant active power flows. While active power would be treated as at present, reactive power imports and exports would be treated differently. The Export Party would be allocated all reactive power usage when the site is exporting active power and the Import Party would be allocated all reactive power usage whenever the site is importing active power.

The proposal recognises that the risk of inappropriate and inaccurate allocation of reactive power, and associated costs, may increase significantly should there be a step change in the connection of distributed generation in future years.

BSC Panel[3] recommendation

The draft Modification Report, and the responses to it, were considered by the BSC Panel at its meeting on 11 September 2008. The Panel unanimously recommended that the proposed Modification be made. The Panel considered that the proposal better facilitates BSC Applicable Objectives b) and c)[4]. The Panel's view was that the primary benefits of the proposal lie under Applicable Objective c). The anticipated improvement under Applicable Objective b) was regarded as less substantial. The Panel's views can be found in full in the Final Modification Report (FMR).

The Authority's decision

The Authority has carefully considered the issues raised by the proposal and the FMR dated 12 September 2008. The Authority has also carefully considered and taken into account the responses to Elexon's[5] consultation on the proposal which are attached to the FMR[6].

The Authority has concluded that implementation of the modification proposal will not better facilitate the achievement of the Applicable Objectives of the BSC[7] and therefore does not direct that it be implemented.

Reasons for the Authority's decision

The Authority recognises that more accurate and appropriate allocation of reactive power flows between parties at shared sites would provide, in principle, a significant improvement for customers, their suppliers and the DNOs. There would be benefits in terms of greater cost reflectivity in DUoS charges which would feed through to appropriate charges for suppliers and their customers. This would assist in promoting competition between suppliers for customers at shared sites. Customers, particularly those operating Exemptable Generating Plant, would obtain a greater degree of certainty regarding their costs and would be able to more effectively compete to provide reactive power services. There are also potential benefits in the reduction of reactive power impact on grid operation, increasing network efficiency.

However, the Authority has concerns that these benefits have not been sufficiently proved in this case. In particular:

1. The use of a very small sample of affected shared sites to quantify the costs and benefits of the proposal raises questions about the degree to which the proposed

[3] The BSC Panel is established and constituted pursuant and in accordance with Section B of the BSC.

[4] The BSC Applicable Objectives are:
- Objective (a) – the efficient discharge by the Transmission Company of the obligations imposed upon it under the Transmission Licence;
- Objective (b) – the efficient, economic and co-ordinated operation by the Transmission Company of the GB Transmission System;
- Objective (c) – the promotion of effective competition in the generation and supply of electricity, and (so far as consistent therewith) promoting such competition in the sale and purchase of electricity; and
- Objective (d) – the promotion of efficiency in the implementation and administration of the balancing and settlement arrangements.

[5] The role and powers, functions and responsibilities of Elexon are set out in Section C of the BSC.

[6] BSC modification proposals, modification reports and representations can be viewed on the Elexon website at www.elexon.co.uk

[7] As set out in Standard Condition C3(3) of NGET's Transmission Licence, see: http://epr.ofgem.gov.uk/document_fetch.php?documentid=4151

solution will materially reduce costs to Import Parties and the extent to which costs may rise for Export Parties at shared sites; and

2. the analysis does not provide sufficient evidence that arbitrary and incorrect allocation of reactive power will not continue to occur at a material number of shared sites should the proposal be implemented.

Whilst further information was requested by Ofgem during the assessment process regarding the analysis, the concerns identified in this letter were not remedied through this process.

Cost/benefit analysis of the P224 solution

During the assessment of the proposal, the modification group considered how the proposal may affect a sample of shared sites where reactive power misallocation was an issue. Detailed analysis was undertaken of the impact at seven sites consisting of four with landfill gas generation, one with hydroelectric generation and two with wind generation. The data from these sites was applied to extrapolate how reactive power would be allocated to Import and Export Parties under the current arrangements and how the allocation may change under the proposal. Based on those calculations, a charging impact was derived to compare the materiality in cost/benefit terms of implementing the proposal.

DNOs provided information on the number of shared sites in their network areas which may be affected by the issue of misallocation of reactive power. In total, 492 sites were identified where there would be a potential impact (for the vast majority) in terms of reactive power allocation and charging, and (for all) on maximum demand/capacity charging if the proposal were to be implemented. In either case, there would be a significant reduction in reactive power charges to the Import Party and a very modest increase in charges for the Export Party.

We are concerned about this analysis on two counts:

- Only seven sites were used to provide the detailed analysis out of a potential total of 492 affected shared sites identified by DNOs. This represents just over 1% of affected sites. The use of such a small sample raises questions over the validity of the analysis undertaken to support a conclusion that the proposed solution is appropriate. In addition, as the use of the data from the seven sites was then applied to further extrapolate the impact of a step change in distributed generation, this also raises further questions over the validity of the cost/benefit analysis;

- no examples of process industry sites were used in the detailed analysis. These are sites where combined heat and power plants are often located and there would have been a further benefit in using a wider range of types of shared site to examine the potential impact of the proposed solution.

While we note that the modification group carried out the analysis on the seven sites in a detailed and thorough manner, we are concerned about the size of the sample used and the narrow range of sites studied. We consider that this raises doubts about whether the

proposed solution provides, in a material way, sufficient evidence that a more accurate and appropriate allocation of reactive power would occur at shared sites and whether the costs and benefits are appropriately stated.

During the assessment process, Ofgem sought further clarification from the modification group about whether the proposed solution provides, in a material way, a more appropriate and accurate allocation of reactive power at shared sites. Ofgem highlighted the example of a shared site where the on-site generator operates with equipment that enables it to minimise its reactive power flows but where the on-site load does not have the equivalent capability. Depending on the mix of generation and load on site, the Export party may be allocated reactive power associated with Import whenever there is an Active Export, which would not be appropriate or accurate using the proposed solution.

The modification group provided further information and acknowledged and agreed with Ofgem's concerns that the proposed solution would not provide an appropriate and accurate allocation in all cases of a shared site. One particular example which was noted would be the case of a shared site where load and generation size is roughly the same. However, while stating that the likelihood of this situation arising was limited, the modification group did not quantify the materiality of the cases where an inappropriate and inaccurate allocation may occur.

The modification group did suggest that the parties at the site could take action to avoid arbitrary reactive power allocation and charges. We consider that there remains a further gap in the analysis of the material impact of the proposed solution which ought to be addressed.

Consideration of P224 under the BSC Applicable Objectives

We note that the modification group and the Panel considered that both Applicable Objectives b) and c) were better met by the proposal compared to the current baseline. We address the arguments raised under each Applicable Objective, although the rationale for the Panel's recommendation was mainly under Objective c).

Objective (c) – the promotion of effective competition in the generation and supply of electricity, and (so far as consistent therewith) promoting such competition in the sale and purchase of electricity

The modification group considered, and the Panel agreed, that the proposed solution does provide a more appropriate and accurate allocation of reactive power flows compared to the current baseline. We note that some Panel members did feel that the materiality and benefits of the proposed solution may well be overstated and may well be more modest than has been claimed by the modification group analysis.

We recognise that, should there be sufficient evidence that the true costs and benefits of the proposed solution are stated with a greater degree of accuracy, there would be other potential benefits arising from the proposal. We accept that the modification group's analysis and the Panel's recommendation has helped to identify these other potential benefits under Objective c) – more appropriate and accurate reactive power DUoS charges would assist in the removal of barriers to entry for the provision of, and facilitating of competition in, reactive power services. Suppliers would have the ability to compete more effectively for customers at shared sites from a position of knowing that the allocation of reactive power flows and charges was both appropriate and accurate.

However, we consider that, on the basis of the evidence provided in assessing the proposal , the modification group and the Panel have not demonstrated that the proposed solution does achieve a more appropriate and accurate allocation of reactive power at shared sites. There remains a risk, the materiality of which remains unproven, that the proposed solution will result in continuing arbitrary allocation of reactive power across parties at shared sites. We note that one response to the Report phase consultation which did not support the proposal highlights this same concern.

We agree that the inappropriate and inaccurate allocation of reactive power flows would mean that the billing of DUoS charges based on that allocation would also not be appropriate or accurate. This could present a barrier to entry for generators who may wish to operate from shared sites in the future. Therefore, whilst the introduction of arrangements that accurately allocate and target the costs of reactive power should provide benefits to the extent that they are reflected in transparent and cost-reflective DUoS charges, due to our concerns about whether the materiality of the more accurate allocation of reactive power under the proposed solution has been proven, we cannot accept that the potential benefits of the proposal will be achieved.

Objective (b) – the efficient, economic and co-ordinated operation by the Transmission Company of the GB Transmission System

The Panel considered that by more accurately allocating reactive power usage, assuming that this is achieved by the proposal, and applying appropriate DUoS charges, the consumption of reactive power should reduce. This, in turn, would reduce reactive power flows on distribution networks and over time on the transmission system.

The Panel's view was that the better facilitation of Objective b) is less substantial and secondary to that for Objective c). We accept this view. For the proposal to better facilitate Objective b) there needs to be evidence that the proposal does, to a material extent, allocate reactive power more accurately across shared sites. Based on our views above, we do not believe that this has been proven to a material degree.

For the reasons discussed above, and in the light of our concerns relating to the proposed methodology and the extent of evidence provided to support the proposed solution, we have also concluded that the proposal does not better facilitate the achievement of Objective b).

Ofgem's further thoughts

We accept that there currently can be arbitrary allocation of reactive power at shared sites resulting in inaccurate allocation and charging. There are benefits in addressing this issue, particularly in view of the expected growth of distributed generation.

However, while the analysis provided for the proposal may, in certain circumstances, result in better, albeit not necessarily accurate, allocation of reactive power usage between the demand customer and the Exemptable Generating Plant customer, insufficient evidence has been presented that the proposal would, as a whole, better facilitate the Applicable Objectives compared to existing arrangements. It is important that sufficient evidence is available through the assessment of modifications to allow us to consider the costs and benefits of proposals fully. In particular, the materiality of the benefit remains unproved.

We would welcome further proposals which may assist in addressing the deficiencies highlighted in this decision.

Rachel Fletcher
Director, Distribution
Signed on behalf of the Authority and authorised for that purpose.