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Dear Colleague,

**Decision letter on Electricity Distribution Use of System Charging Modification Proposals: Central Networks West – Reactive Power Charges**

On 1 December 2005 Ofgem[1] published a consultation letter[2] which invited responses in relation to proposals by Central Networks West (CN) [3] and United Utilities (UU)[4] to modify (or introduce in the case of CN) their reactive power UoS charges. These proposed UoS charging modifications are intended to take effect from 1st April 2006.

Having carefully considered the proposals made by CN and responses to the consultation we have decided to veto CN's proposals in relation to reactive power charges.

This letter reports on the views of respondents to Ofgem's consultation and sets out the reasons for the Authority's decision. A glossary of terms used in this decision letter is provided in Annex 1.

*Respondents' views – Ofgem consultation*

We received thirteen responses to the consultation: four from DNOs, four from generators / organisations representing the interests of generators, one from an IDNO, one from National Grid and three from other interested parties.

The responses generally agreed that excessive demand for reactive power increases network costs by requiring an increase in network capacity and by increasing losses on the network.

[1] Ofgem is the office of the Authority. The terms 'Ofgem' and 'Authority' are used interchangeably in this letter
[2] Consultation on Electricity Distribution Use of System Charging Modification Proposals: Central Networks and United Utilities – Reactive Power Charges, 260/05
[3] Central Networks propose to introduce reactive power use of system charges for the first time. These charges will be levied on customers whose average power factor falls below 0.95. The charges will only apply to CN's demand customers.
[4] United Utilities propose to amend the threshold at which their reactive power UoS charges take effect to a power factor of 0.95 from 0.9. This change is intended to bring the threshold into line with the assumption that is made in their charging model that average network power factor is 0.95. The charges will apply to both UU's demand and generation customers.

Responses were divided in their opinion on the cost reflectivity of CN and UU's proposals. Six of the responses (including all of the DNOs) indicated that CN and UU's proposal to levy a kVArh charge in addition to existing capacity charges was reflective of the increased capacity related costs that reactive power imposed on the network. Four of the respondents do not consider either proposal to be cost reflective. Two respondents thought that the proposals were not cost reflective because they believe that the proposed charges would result in double counting. This double counting would occur because a KVArh excess reactive power charge would be levied on top of a kVA based capacity charge. Another two respondents consider that the proposals are not cost reflective because they did not include a reward for appropriate generation of reactive power.

Another issue that divided opinion was whether reactive power charges should apply to generators. Four responses (including all three DNOs who commented on this issue) saw no problem with applying charges to generators for their consumption of reactive power. One of the responses received from generation interests agreed with reactive power charges for generators but indicated that the charging method applied to generators should be carefully considered.

A further four responses highlighted perceived problems with charging generators for each kVArh of reactive power that they import. Issues raised include comments that:

- During periods of real power import and real power export the consumption of reactive power by generators affected the network in a different manner. This has implications for charging in a cost reflective manner.
- Metering constraints may make it difficult to discern whether or not a generator is consuming reactive power units during a period of real power import or real power export.
- Generator operation may be restricted by the DNO, and may provide a service to DNOs by operating at a poor power factor.

One of the responses suggested that the issue of applying reactive power charges to generators merited a stand-alone consultation.

A majority of responses agreed that the demand for reactive power increased losses and hence increased network costs. However, the general opinion was these costs were second order, did not fall on DNOs and were difficult to take into account.

Some responses also expressed a desire to see consistency across DNOs in terms of reactive power charging, particularly in the long run. Many responses noted, however, that for the purposes of a decision on the proposed modifications put forward by CN and UU the focus should be on whether or not they allowed these DNOs to better facilitate their relevant objectives[5].

[5] The relevant objectives for both the connection and use of system charging methodologies, as contained in paragraph 3 of SLC4B and SLC4 of the distribution licence respectively are:

(a) that compliance with the use of system charging methodology facilities the discharge by the licensee of the obligations imposed on it under the Electricity Act 1989 and by this licence;

(b) that compliance with the use of system charging methodology facilitates competition in generation and supply of electricity, and does not restrict, distort, or prevent competition in the transmission or distribution of electricity;

(c) that compliance with the use of system charging methodology results in charges which reflect, as far as is reasonably practicable (taking account of implementation costs), the costs incurred by the licensee in its distribution business; and

that, so far as is consistent with sub-paragraphs (a), (b), and (c), the use of system charging methodology, as far as reasonably practicable, properly takes account of developments in the licensee's distribution business.

Other points made in responses to the consultation included the view of two respondents that reactive power charges should form part of the price controlled revenues of DNOs. Another respondent was concerned that whilst IDNOs could be liable for charges relating to excess demand for reactive power they would not be able to pass these on to their customers.

*Ofgem's view*

We have carefully considered CN's submission along with responses to the consultation. In coming to our decision we have considered how the proposed modification impacts on CN's ability to better achieve their relevant objectives and our wider statutory duties.

CN indicate that their proposed modification is more cost reflective than their existing arrangements. Their proposal recognises that excessive demand for reactive power leads to increased network costs because it requires the provision of additional capacity. We consider this argument to be valid, especially in the case of demand customers.

We also agree that the increase in network costs that is caused by reactive power is closely related to the amount of kVArs imported relative to the amount of kWs imported. In this context the rule proposed by CN to levy excessive reactive power charges on HH metered customers if their total kVArh exceeds 33% of their kWh in a given time period superficially appears cost reflective. The modifications propose that charges for excess reactive units consumed will be levied once a customer's average power factor falls below 0.95. This is consistent with the assumption of CN's charging model of an average network power factor of 0.95. The rules are therefore designed to capture additional costs created by demand for reactive power that will not be recovered by capacity charges.

Ofgem, however, shares the view expressed by some of the respondents to the consultation that levying a kVArh reactive power charge could lead to an element of double counting where kVA capacity charges are levied to recover the cost of providing network capacity. The method proposed for calculating reactive power charges by CN recognises that their 500MW incremental cost distribution reinforcement models (DRM) would indicate that if they were to assume that average network power factor is lower than the value of 0.95 that they currently assume then the cost of providing network capacity would increase. This increment in cost implied by the model arises from the fact that if the assumed power factor is reduced then this would suggest that the amount of network capacity provided in terms of kVA will increase for a given amount of capacity provided in terms of kW. The charging method proposed by CN aims to allocate this increment in cost suggested by their charging models to those users who have a poor power factor.

This approach to charging for reactive power does not take into account the manner in which capacity is currently charged for. Users normally pay an availability charge in units of kVA/month at the level of their authorised supply capacity. A customer (customer A) with a power factor of 0.8 will require a higher kVA in order to deliver a given load (for example 100 kW) than a customer with a power factor of 0.95 (customer B). In these circumstances customer A will have a higher ASC and consequently pay a greater level of availability charges than customer B does for the same level of kWs. This is appropriate and reflects the greater cost that customer A places upon the network as a result of their lower power factor.

If the proposed modification were to be approved Ofgem envisages that it is possible that two customers who have the same ASC and who have the same impact on the system pay different amounts of capacity related charges. Such a scenario would occur if the two customers had different power factors because the customer with the lower power factor would pay for reactive power units demanded on top of the kVA based capacity

charge. The analysis produced by CN has not demonstrated that this is reflective of the costs imposed on the system by users.

Ofgem understands from correspondence with CN that not all capacity related costs of the network are recovered via the kVA based capacity or availability charge. A proportion of network costs are recovered using a kWh unit charge. If this is the case then there will be some degree of under recovery of costs from users with a low power factor. This will occur because users with a low power factor will be allocated capacity related costs on the basis of the kWhs they demand rather than the kVAhs that they consume. As a result a customer with a low power factor would pay a lower level of capacity related costs than a customer with the same capacity and the same level of demand in terms of kVAh but with a higher power factor.

However, this issue does not appear to have been given significant consideration in the information provided with their submission by CN and has not been quantified by either company in subsequent correspondence with Ofgem. The emphasis is on recovery of all additional capacity related costs associated with excessive demand for reactive power as opposed to those that are under recovered from kWh unit charges. This issue does not therefore provide a basis for approval of the proposed charging modifications.

*The Authority's decision*

We have concluded that the proposals put forward by CN has not been shown to better achieve the relevant objective that the UoS charging methodology results in charges that better reflect costs, which is the central thrust of their proposal. The proposed UoS charging modifications would send a signal to customers that would incentivise them to operate at closer to unitary power factor but in order to achieve this the charges introduce an element of double counting. We have stated in the past that it is desirable to incentivise users to operate at close to unitary power factor, however, this does not override the need to demonstrate that the charges are cost reflective. It is for these reasons that Ofgem has decided to veto the UoS charging modifications with respect to reactive power proposed by CN.

*Future considerations*

In light of the consultation responses and the discussion contained in this letter we would encourage further review by all DNOs of this area of charging in line with the requirement under standard condition 4 of the electricity distribution licence. Further consideration as to how reactive power charges might be applied (if at all) to generators is also merited.

Copies of this document are available on the Ofgem website under Electricity Distribution Charges (Modifications) area of work.

Please contact Mark Cox on 0207 901 7458 or Colette Schrier on 0207 901 7239 if you have any queries in relation to the issues raised in this letter.

Yours sincerely,

**Martin Crouch**
**Director, Distribution**

## Annex 1: Glossary of terms

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| ASC | Authorised Supply Capacity |
| DNO | Electricity Distribution Network Operator |
| IDNO | Independent Electricity Distribution network Operator |
| DRM | Distribution Reinforcement Model |
| HV | High Voltage as defined in the Distribution Code (greater than 1000V) |
| HH | Half Hourly metered customers |
| kVA | Kilovolt Amperes |
| kVAr | Kilovolt Amperes Reactive |
| kVArh | Kilovolt Amperes Reactive hour |
| kWh | Kilo Watt hour |
| LV | Low voltage as defined in the Distribution Code (less than 1000V) |
| pf | Power factor |
| UoS | Use of System |