Consultation on Electricity Distribution Use of System Charging Modification Proposals - Reactive Power Charges

We are pleased to have the opportunity to comment on Ofgem's Reactive Power Charges consultation of 1 December 2005.

We are concerned because the proposed methodology for kVArh charges over recovers the incremental costs incurred from poor Power Factor (PF) loads. This is due to two separate factors:

1. Costs are also recovered through kVA Availability charges; and

2. The incorrect calculation of the impact of an increment of poor PF load on the distribution system.

When the electricity industry introduced Availability Charges around 1983 they were intended to cover the local distribution system cost, comprising the network at the voltage of connection, the transformation to it and 20% of the next higher voltage network cost. This left the remaining upstream system costs to be recovered through kWh charges.

Availability Charges based on kVA are able to recover the additional costs of poor PF whereas Availability Charges based on kW requirements cannot. Some DNOs have chosen to reflect the cost of poor PF on the upstream system by charging for excess kVArh consumed above the norm. Such an approach cannot be as cost reflective as a charge based on kVA demand.

The methodology outlined in the paper shows the proposed kVArh charges are calculated from total system costs, not just the upstream element. By charging both Availability and kVArh, the DNOs will overcharge their incremental costs by double counting.

Moreover, the kVArh charges have been calculated by assuming that the whole distribution system is operating at the poor PF level. In reality, any poor PF load will be superimposed on the existing system load that averages a PF of 0.95 or so. The incremental effect is, therefore, reduced meaning that the cost of poor PF is overstated.

The underlying reason for this reduced PF effect is the non-linear relationship between kVArh and cost. The table in United Utility's submission, reproduced in part below, shows this non-linearity.

Bands	0.95 to 0.9	0.9 to 0.85	0.85 to 0.8	0.8 to 0.75	0.75 to 0.7	0.7 to 0.65	0.65 to 0.6	0.6 to 0.55	0.55 to 0.5
p/kVArh	0.458	0.588	0.688	0.770	0.839	0.899	0.952	0.997	1.038

Additional network costs are incurred because of the extra capacity that has to be provided, but the need for extra capacity is reduced when mixed with the non-industrial load. For example, an industrial load of 0.8 PF, mixed 50/50% with non-industrial load of 0.95 PF results in an overall PF of 0.88

The capacity needed for a 0.8 PF load is 20% greater than if the PF were 0.95. However, the capacity needed for a 0.88 PF load is only 14% greater that at 0.95. The extra 6% is indicative of the way in which the proposed methodology overcharges.

The double-counting from charging both kVA Availability and kVArh could be reduced if not eliminated by charging only the kW component of Availability for those customers who are subject to kVArh charges.