A common approach to reactive power charging

Background

The Supplier community reported at the ISG on 27 September 2005 that:

"For those DNOs that charge for Reactive Power the approach is broadly consistent. However, the threshold at which Reactive units become chargeable (generally expressed as a percentage of the active units) varies across DNOs. If this is justified, then the derivation of each threshold could be part of the Charging Methodology; if not, this could be standardised."

Summary of billing arrangements

In response to these issues the DNO community conducted a detailed survey to compare and contrast their approaches to reactive power charging. The result of this survey is attached as an appendix to this paper.

It is clear from the survey that there are differences in approach and, following discussion between the DNOs, it was agreed that this is a complex area where there is no prospect of a 'quick win' in terms of a common approach for the interim arrangements period. However the DNOs did agree that a common approach is desirable for the longer term, and it is proposed that the cross-industry working group currently looking at capacity charging issues should also assist in the development of a common approach to reactive power charges.

	Central Networks	SP Manweb/SP Distribution	WPD	EDF Energy Networks (EPN, LPN, SPN)	CE Electric for NEDL & YEDL	United Utilities	Southern Electric Power Distribution plc	Scottish-Hydro Electric Power Distribution Ltd
	Andrew Neves	Claire Campbell	Simon Yeo	Oliver Day	Andy Jenkins	Simon Brooke/Frank Welsh		
Question	**Response**	**Response**	**Response**	**Response**	**Response**	**Response**	**Response**	**Response**
Does your company charge for reactive power (Y/N)	No (but have proposed the following for April 2006)	Yes	Yes	Yes	No	Yes, but only for excess reactive power.	No	No
If no, do you have plans to introduce charges?	Yes		-		Yes - sometime during 2006			
Which of the following classes of customers does it charge (or plan to charge) for reactive power:								
NHH dom demand? (Y/N)	No	No	No	No	No	No		
NHH small non dom demand? (Y/N)	No	No	No	No	No	Yes, where reactive power metering is fitted.		
NHH Medium non dom demand? (Y/N)	No	Only for NHH HVN customers (SP Manweb only)	No	No	No	Yes, where reactive power metering is fitted.		
HH large non dom demand? (Y/N)	Yes	Yes	Yes	Yes	Yes	Yes		
NHH generation? (Y/N)	No	No	No	No	No	Yes, where reactive power metering is fitted.		
HH generation? (Y/N)	No	Yes	No	Yes	Yes	Yes		
Do your charges apply only to power factors worse then a set threshold? (Y/N)	Yes	Yes	Yes	Yes	Yes	Yes		
If so, what is that threshold?	PF < 0.95 (lead or lag)	Charges are levied when importing real power when the average net power factor in a month is worse than 0.95 (lagging). Charges are also levied when exporting real power when the average net power factor in a month is worse than 0.95 (leading)	PF <0.9 (lag)	33% and 90%	To be decided - probably 0.95	In 2005/6 it is 0.9. If our modification proposal is accepted, in 2006/7 it will be 0.95. UU only charges for the excess reactive power consumed beyond this threshold.		
How do you operate your threshold	Charges apply where total kVArh are greater than 33% of total kWh in any charging period (month)	Import charges are determined by Active Import (kWh) in not equal to 0 and Active Export (kWh) equals 0. Then Excess in the Charge Period (month) is calculated for each half hour where (Reactive Import (kVArh) - Reactive Export (kVArh)) - (0.33 x Active Import (kWh)). Sum the results for each half hour in the Charge Period (month), where the answer is positive then the excess should be charged as Excess Reactive kVArh x charge rate. Export charges are determined by Active Export (kWh) in not equal to 0 and Active Import (kWh) equals 0. Then Excess in the Charge Period (month) is calculated for each half hour where (Reactive Import (kVArh) - Reactive Export (kVArh)) - (0.33 x Active Export (kWh)). Sum the results for each half hour in the Charge Period (month), where the answer is positive then the excess should be charged as Excess Reactive kVArh x	Charges apply where total kVArh are greater than 50% of total kWh in any charging period (month)	1st charge applies for units between 33%-90% then 2nd charge applies on units after 90%.	To be decided	The threshold of a 0.95 power factor equates to 33% of kWh, and this calculation is used to evaluate the excess reactive power consumption.		

		charge rate.						
How are your charges expressed?	Pence per kVArh	Pence per kVArh	Pence per kVArh	p/kVArh of excess reactive units	Don't have any at the moment, but would be in pence/kVArh	pence/kVArh		
Which data flow is used to bill for reactive power (e.g. D0275)	D0275	D36 flow	D0275 but currently changing to d0036	D0275	Billing system currently uses D0275	D0275		
Do you use the 'Reactive import' data? (Y/N)	Yes	Yes	Yes	Yes (Import)	To be decided	Yes		
Do you use the 'Reactive export' data? (Y/N)	Yes	Yes	No	No	To be decided	Yes		
Do you charge for kVArh lag ('Reactive Import')? (Y/N)	Yes	Yes, for periods of real power import	Yes	Yes (Import)	To be decided	Yes, but only when associated with active import		
Do you charge for kVArh lead ('Reactive Export')? (Y/N)	Yes	Yes, for periods of real power export	No	No	To be decided	No (not yet). Yes (after 1/4/06), but only when associated with active export.		
If you charge for both lead and lag, how do you arrive at the total kVArh	Simply add kVArh (lead) and kVArh (lag) together (both as positive numbers), and charge for the total amount of kVArh in the charging period (month)	SP charge the import and export side separately	-	Not taken together.	To be decided	Not taken together.		
What do you do if you don't receive any reactive data fore a site?	Assume unity power factor (i.e. no reactive charges)	Assume unity power factor (i.e. no reactive charges)	If none is received then the assumption is that the power factor will not be <0.9 i.e. no kVArh is billed	Estimate based on 0.9p.f.	To be decided	No estimation is made. Bills are only produced on the receipt of metered information.		
For each particular customer group, do you charge for reactive power at the same rate at all times? (Y/N)	Yes	Yes	Yes	Yes	To be decided	Yes		
If you have different rates at different times please describe how these are applied	N/A	N/A	N/A			n/a		
Any other comments not picked up in the above questions?	N/A	N/A	None	None		The key to reactive power charging is what the calculation is and the frequency with which it is done. The correct method for half-hourly customers is to calculated the excess element every half-hour of a billing period and then sum the values for a total in the billing period. This is not possible iwth non-hlaf hourly customer and the meter advances (over a billing period) of the kWh and kVArh values are compared to calculate the excess reactive power charge.		