Further question on Oxera cost benefit analysis for Transmission Losses Modification Proposals

ELEXON received a helpdesk call from a Party regarding the cost benefit analysis for Transmission Losses Modification Proposals. The question was forwarded to Oxera and the Oxera response has been sent back to the Party. In the interests of transparency the question and answer are enclosed for industry information.

Question summary:

I am seeking clarification on a particular part of the analysis, in summary:

The July 2006 Oxera report has a row in tables like 3.17 entitled 'Value of Savings in Losses (£m)' and the September 2006 report has a row in similar tables like 3.10 entitled 'Value of Losses (£m)'. There are also rows in the same tables entitled 'value of energy produced £m' (July 2006) and "Value of total energy sold (£m)' (September 2006). What are the components of the values in these rows?

Do the final rows in the tables entitled 'value of losses' or similar represent differences in the total cost of energy produced between 'with' and 'without' zonal schemes in the modelled snapshots?
Or is the calculation based on the volume saving in losses and the assumed market price of energy at the modelled snapshots?
Please could you provide indication of whether these questions (detailed as 3 numbered points below) can be addressed. Any other comments or explanation provided by Oxera would be welcome.

Question Detail:

Oxera's cost-benefit analyses of zonal loss charging and scaled zonal loss charging gave values for the estimated 'savings in losses'. The July 06 report referred to annual 'Value of Savings in Losses (£m)', for example in section 3.5.4 Table 3.17. The September 06 report referred to annual 'Value of Losses (£m)', for example in section 3.7.2 Table 3.10. These values were key to the overall cost benefit conclusions of the Oxera reports. I have some uncertainty over exactly how these values were determined and therefore exactly what they represent. I had supposed that they represented the saving in total generation costs, as suggested in section 1.3 of the July report (similar in the September report):

'The existence of these offsetting costs was discussed in Oxera (2003) and estimated at the time. In this report the net benefits from the generation sector from loss reductions have been estimated directly by comparing the total cost of generation under uniform loss charging with that under zonal loss charging, thereby accounting for the reduction in overall generation required due to avoided losses, and the offsetting increases in output from more expensive plant.'

However, on further investigation, doubt has been raised in my mind about exactly how the calculations of 'loss saving' were performed. Section 2 'Modelling Approach' says:

'The price at which generators are willing to despatch was modelled as short-run avoidable costs adjusted by the generator AAZ TLM. Intuitively, this reflects the fact that the more output is scaled back, the higher the market price will need to be to allow a generating unit to cover its overall avoidable costs. The total level of demand to be met was reduced by the estimated level of losses, allowing the total net benefit of zonal loss charging to be calculated.'

1. Further explanation of the final sentence would be appreciated. Presumably the demand referred to here is the assumed level of customer demand from the system rather than the

level of generation required to meet it and losses. How does that lead to the total net benefit of zonal loss charging?

'3.5.3 Near-term loss impacts [referring to tables 3.17-3.20]
The following tables show the impact of zonal loss charging out to 2011/12. Information is presented on:
- estimated annual loss savings-from the snapshot load-flow modelling;
- total energy produced-the total annual demand on the generators prior to zonal loss charging;
[Party commented - For a given demand, the loss savings should be the difference between the total energy produced with and without zonal schemes. Note that Oxera analysis indicates demand response to the schemes is apparently small]
- the percentage of total energy produced that the loss savings represent;
- the estimated variable transmission losses from the load-flow modelling under uniform loss charging;
[Party commented -'Reference' level of losses]
- the estimated loss savings as a percentage of the variable transmission losses;
- the estimated total transmission losses from the load-flow modelling under uniform loss charging;
[Party commented -Includes simple adjustment to include fixed losses]
- the estimated loss savings as a percentage of the total transmission losses;
- the market price of electricity under uniform loss charging;
[Party commented -Theoretically the market price could/would change under zonal loss charging according to the location of marginal generation/demand.]
- the net benefit of reduced losses under zonal loss charging.'

2. Do tables like 3.17 show net benefit of change in cost of generation (allowing for small demand changes) as suggested by this description OR value of losses at market price as suggested by the headings in the table, or something else? The tables are clearly not showing reported annual price*annual losses reduction, but could be showing the weighted sum of price*loss at the snapshots.

3. There are also rows in the same tables like 3.17 entitled 'value of energy produced £m' (July 2006) and "Value of total energy sold (£m)' (September 2006). Exactly how are the values in these rows determined, and do the final rows in the tables entitled 'value of losses' represent changes in these values of energy produced/sold between with and without zonal schemes, or something else? If so, are the two values used to determine the change available?

Oxera Response:

1. The data on 'Value of losses' in Tables 3.10 and 3.17 in the respective reports do refer to the net benefit of the switch from uniform to zonal losses, taking account of (a) the reduction in transmission losses associated with the changes to the generation dispatch and (b) the higher operational costs of generation associated with the new dispatch profile.

2. The dispatch profiles are calculated against a fixed final demand requirement (demand-side response is calculated as a second-order effect separately in the paper). The change in the transmission losses associated with the switch to the zonal dispatch profile is then estimated using the load flow model and the implied reduction is valued at the time-weighted average price in the uniform scenario. In addition, this loss saving is scaled down to remove loss savings associated with reactive power losses (previous analysis of this scaling factor by Professor Bialek in the Oxera 2003 paper for the DTI suggests 10% to 15% of losses are associated with reactive power uses.

3. The change in the generation cost associated with the new despatch profile was calculated using Oxera's proprietary wholesale electricity model comparing the marginal cost of

generation for each plant and their associated load factors for each snapshot period, appropriately weighted.