ELECTRICITY DISTRIBUTION LOSSES

OFGEM WORKSHOP – 14 APRIL 2003

TOPICS AND QUESTIONS FOR AFTERNOON DISCUSSION SESSIONS

Format

- Delegates will be assigned to one of three discussion groups (15 – 20 people each), each composed of a mix of participants. Delegates will be advised of their discussion group by email on Thursday 10 April.

- Ofgem has put together a set of questions to aid discussion in the breakout groups.

- A member of Ofgem staff will chair each group and an additional member of staff will record key discussion points from each group. An anonymised summary of the points raised will be made available to delegates in due course.

- After the discussions, a brief summary of the key discussion points will be presented to the workshop by a non-Ofgem volunteer from each group.

Questions

The questions cover the three areas below. It is important to note that the material in the background notes is intended to facilitate discussion and does not necessarily represent Ofgem views or policy.

Group A - incentive design
Group B - measurement issues
Group C - cost of losses and other issues

Group A – incentive design

Background

Incentive arrangements

Responses to the January consultation paper seem to indicate that DNOs do not expect expenditure on loss reduction to be allowed as expenditure in the price control review. This might suggest that the desired outcome may be achieved by a relatively minor adjustment to the current incentive scheme.

DNOs are required by license to construct and operate efficient networks (also considering losses). By allowing expenditure on reducing losses in allowed revenue/ RAV, DNOs would in principle be neutral as whether to take such measures or not. However, the existence of other incentives, in particular the efficiency incentives on opex and capex, might lead distribution businesses to compromise on efforts to reduce losses in order to benefit from these incentives. Therefore, an incentive on reducing losses needs to be in place to ensure that the 'drive to efficiency' does not exclude losses.

The *capital expenditure efficiency incentive* currently rewards (penalises) DNOs if their actual capex is lower (higher) than what was forecasted (assuming that the forecasted work has been undertaken). Currently, DNOs retain (bear) about 30 per cent of such an efficiency gain (loss). On the other hand, the *operating expenditure efficiency incentive* currently rewards (penalises) DNOs with the full efficiency gain (loss). Ofgem intends to review these two efficiency incentives during the current price control review, which may result in a consistent sharing of efficiency gains between DNOs and customers for capex and opex.

The losses incentive should aim to allocate the same proportion of the *surplus* benefits from a reduction in losses to the parties as the expenditure efficiency incentives do. This would ensure an *efficient outcome* with respect to losses and a fair *sharing of the resulting surplus benefits* between DNOs and customers.

Example

To illustrate the above, consider the following example that works for either investment or operating decisions.

Assume that an effort to reduce losses will cost £**C** and will result in benefits of £**B** and that the expenditure was not included in the price control projections. The DNO will have to bear a share, **p**, of the initial outlay due to the expenditure efficiency incentive and the cost to the DNO will therefore be £**pC**. However, because of the resulting reduction in losses, the DNO will also receive an incentive benefit. If the DNO is allowed to retain the same proportion, **p**, of the benefits, the incentive payment will be £**pB**. It is clear to see that the effort will take place if and only if $\mathbf{B} > \mathbf{C}$, ie when it is *efficient* to do so.

The benefit to society of the above effort is (**B** – **C**). The DNO will retain **p**(**B** – **C**), while the customer receives (1 – **p**)(**B** – **C**). Thus, not only is an *efficient outcome* achieved, but the *sharing factor* of the surplus *benefit* between DNOs and customers is also exactly the same as for the efficiency incentives.

Timing of an incentive

Although it is impossible to accurately measure losses, they can be estimated for each half hour throughout the year. An incentive scheme can therefore reward or penalise the DNOs for deviations from a benchmark for each half hour. A value can then be placed on losses using a price, which could be the half-hourly electricity price from the balancing market or a price fixed in advance (or set in some other way).

To the other extreme, the volume of losses can be aggregated over several years and deviations from a benchmark in this period can be valued at a price which again could be based on market out-turns or a fixed rate.

A shorter time span of the incentive improves the signals to DNOs to take short term measures to reduce losses. It will also improve the incentives on DNOs to take loss reducing measures that might affect losses proportionally more in periods where the electricity price is high. A shorter time span for establishing prices will allow the value attached to losses to track market prices more closely but will also increase the volatility of prices. This will increase the risk on DNOs.

Further, it is also possible to set different prices for deviations of forecast volumes from the benchmark and deviations of actual from forecast. This may encourage efforts to reduce measurement errors.

A longer span will reduce the impacts of measurement errors and therefore the risk on DNOs. The arrangements can also be made simpler. However, the short term signals will be weaker.

Issues for discussion

The scope for this group is to discuss issues regarding how an incentive scheme should be designed, in particular with regards to the above. Specific areas for discussion are set out below.

Incentive arrangements

- Do DNOs expect additional and efficiently incurred expenditure on loss reduction to be allowed in the price control?
- If DNOs were confident that such expenditure would be allowed, would this lead to increased efforts to reduce losses?
- Will the approach described above increase efforts to reduce losses? Is it likely to support an efficient outcome?
- Are there any problematic issues regarding the interaction or consistency with the incentives in the price control (opex/capex and IIP)?
- What is the appropriate performance benchmark for an incentive?
    - historic levels
    - assessment of an efficient level for each DNO
    - yardstick – normalisation?

Measurement interval

- What are the advantages and disadvantages of a short measurement interval versus a long measurement interval?

- What is the appropriate measurement interval of an incentive scheme?

    - by half-hour
    - daily
    - yearly
    - longer

If the above topics are covered within the allocated time, the 'other issues' outlined in the information for discussion group C should be discussed.

Group B – measurement issues

Background

Electricity entering distribution networks is metered by each half hour. However, due to the high costs of these meters, relatively few exit points are metered with this degree of accuracy. Most customers' consumption is recorded approximately once a year and typical profiles are used to allocate the annual consumption across the 17520 half hours of the year. This naturally leads to errors in recorded consumption for individual half hours.

There are, however, a number of other disturbances to estimated consumption. Many of these were mentioned in the January 2003 consultation document. Further sources of error were mentioned by respondents to the consultation. Some of the sources that have been mentioned are:

- settlement errors
- meter and metering inaccuracies
- illegal abstraction
- inaccuracies in inventories of unmetered supplies
- unregistered customers

As distribution losses are measured as the difference between the electricity entering and exiting the distribution networks, the distortions to consumption figures cause errors in estimated losses. The magnitude of these errors may have impacts on the effectiveness and appropriateness of alternative incentive schemes on losses and impose costs on the industry in terms of risk and uncertainty.

Issues for discussion

The scope for this group is to examine and discuss measurement issues. Specific areas for discussion are set out below.

- what are the main sources of distortions?
- who has, and who should have, the responsibility for reducing these distortions?
- how can the distortions be reduced?
    - settlement
    - meter and metering – frequency of reading/ accuracy/ type of meter (HH)
    - illegal abstraction – revenue protection
    - unmetered supplies
    - unregistered connections

- are there ways of improving our knowledge about distortions?
    - intermediate metering
    - local substation metering
    - what is the likely magnitude of distortions?
    - is there consistency across companies in measuring losses?

- is there any experience from previous efforts to reduce distortions?

If the above topics are covered within the allocated time, the 'other issues' outlined in the information for discussion group C should be discussed.

Group C – cost of losses and other issues

Background

However an incentive scheme is designed, it is necessary to assign a value to the electricity that is lost. This enables a comparison of the benefits and costs of measures to reduce losses. One of the key areas in assessing the cost of losses is the choice of components to include.

A unit that is lost on the distribution network imposes costs on society from generating and transporting the electricity. Appendix 3 to the January 2003 consultation paper used the UKPX wholesale price as an estimate of the energy costs, which gave a value of £17.9 per MWh.

However, the environmental impact of generating electricity is currently not internalised in the wholesale price. Therefore, an estimate of carbon emission caused by losses was made by analysing the fuel sources used in generation at different load levels and valuing their estimated emissions in carbon equivalents at £81/tC. This resulted in a range for environmental costs of losses between £4.6 and £11.2 per MWh.

The costs of transporting the electricity that is consumed in wires and transformers on a distribution network include transmission costs and some distribution costs. The January paper used use of system charges calculated as if losses were consumed by a customer to calculate the transportation costs of losses, bearing in mind that these units are lost across the distribution network and not only at the LV level. The resulting transportation costs were estimated at £7.1/ MWh.

The overall cost of losses was therefore estimated to be in the range £29.6 to £36.2 per MWh. This estimate corresponds to the benefit to society of reducing losses by 1 MWh. Further details of how the calculations can be found in appendix 3 to the consultation paper.

Issues for discussion

The scope for group C is to discuss the appropriate method of calculating the cost of losses on distribution networks. Specific areas for discussion are set out below

a) which cost components is it appropriate to include in the cost of losses?

b) how should these components be estimated?

- energy cost
  - wholesale price?
    - loss weighted?
    - demand weighted?
    - simple average?
    - costs of generation?
- transportation cost
  - transmission?

- distribution?
- use of system charges?

- environmental cost
  - renewables obligation buy-out price suggests £30/MWh
  - Ofgem's work suggests £4.6 - £11.2/MWh
  - removable when carbon trading is introduced?

- what are the differences between the costs of technical and non-technical losses?

Other issues

- what are the likely or possible impacts of distributed generation on distribution losses?

- do the impacts warrant a special treatment of distributed generation with respect to an incentive scheme on distribution losses?

- would it be appropriate to include an adjustment, for example to the benchmark, for the relative mix of HV and LV consumption to correct for longer term trends?

- are there any other experiences, nationally or internationally, that might be relevant to this review?