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Dear Mark

Measurement of Losses

We are encouraged that Ofgem recognise the issues associated with the measurement of losses and share our desire to target incentive mechanisms on the reduction of technical losses explicitly.

The proposal outlined in your letter is an interesting proposition that clearly warrants some serious consideration. In this letter I will set out our initial thoughts on the feasibility, effectiveness, costs, benefits and timing of installing a smart meter on the LV side of each of our ground mounted and pole mounted transformers.

Feasibility

It is operationally feasible to fit meters to all transformers. Whilst we do not have a similar standard operation from which to estimate the costs of fitting a meter on the lower voltage side of a transformer, we believe that it would be possible to use the current transformers (CTs) already in place to supply the Maximum Demand Indicators (MDI) on ground mounted transformers. The MDIs would no longer be required and rendered redundant. Pole mounted transformers may be more difficult, where there is no existing CT, but for the volume of work considered here it will be possible to develop a standard retrofit kit. Unfortunately, for both ground mounted and pole mounted cases, it is likely that an outage will be required to ensure the installation of this new equipment can be carried out safely. This is likely to have a significant impact on customer service if the programme is undertaken in a relatively short time period.

The other significant practical consideration is the availability of a smart meter reading infrastructure. If a clear and rapid decision was made on the infrastructure that will be utilised for the national roll-out of smart metering to all customers, then meters compatible with this infrastructure could be fitted and data made available as soon as the infrastructure for the national roll-out was in place.

Effectiveness

Technical losses are the sum of Fixed losses and Variable losses, the latter being the product of network resistance and the square of the current flow. The DNO can exercise choices which directly influence fixed losses and network resistance, but has no direct control over the level or shape of the power demands of its customers. It may be noted that for ENW fixed losses make up less than one third of the total.

The level of technical losses on the existing network is the result of decisions taken over the period of its construction, and the incremental improvements that can be made are individually small in relation to the overall level. For example, the replacement of an individual transformer with a low loss unit might save 30% of nameplate losses; however a DNO might replace at most 1-2% of its transformer stock in a year. Thus, the annual savings might be 0.3-0.6% of total transformer losses, which for ENW would be approximately 2GWh.

Clearly such savings have a value, but the effect is easily masked by other effects within the current measurement of overall losses. The direct measurement of losses will assist in diminishing the masking effect, by removing the impact of settlements volatility. Furthermore, ignoring LV losses takes out about a quarter of our total losses as currently measured. As indicated in your letter, it is most difficult to control technical losses at the LV level and most losses initiatives to date have focussed on HV solutions. Therefore, the smart metering proposals will increase the relative impact of any particular initiative.

However, if the losses incentive remains based on relative performance of losses as a percentage of distributed units, measured against a fixed benchmark, circumstances where a change in distributed units can cause an apparent change in losses performance and distort the effectiveness of the incentive will remain a problem, specifically:

- *Fixed losses*

The fixed element of losses will serve to cause the percentage loss performance to get worse as distributed units reduce. Although this effect might be outweighed by reducing variable losses (dependent on the nature of the change in demand), it will serve to dilute the overall loss reduction.

- *Connection of DG that nets off from demand*

When a generator is installed at the same site as demand it will reduce units distributed to that site, and would normally also reduce the losses associated with serving that demand. However the current mechanism incentivises reductions in losses relative to the benchmark level (5.48% of units distributed for ENW), rather than absolute changes in losses. If a generator is installed at a site associated with lower losses than the benchmark level, then the absolute reduction in losses will be smaller than the amount set by the benchmark. Thus, for a generator installed at an HV site with a typical LAF of around 1.03 and reducing demand by 1000 MWh per year, the absolute level of loss reduction is 30MWh, but losses would need to reduce by 54.8MWh for the effect on the losses incentive to be neutral. In these circumstances the DNO would be penalised for a 24.8MWh increase in losses.

- *Increasing proportions of LV (rather than HV) connections will adversely affect relative losses performance*

This effect is related to the previous, in that connection of demand at sites with LAFs greater than the benchmark level will add to losses at a greater rate than demand connected at higher voltage levels.

Costs

We have made some initial estimates based upon all installation work being carried out under circuit dead conditions because of the safety issues related to working on live CTs. As ENW have 16,000 ground-mounted transformers and another 16,000 pole-mounted transformers the programme cost is estimated as £30million +/- 50%.

This estimate does not include any costs associated with communications infrastructure and data processing. Additionally there may be costs for the mitigation of the impact of outages on customers. A new data base, fully aligned to network connectivity models, may need to be created and maintained to support the system.

Benefits

We have estimated that the potential annual savings in technical losses that can be delivered by a DNO are of the order of low single figure GWh, and hence hundreds of thousands of pounds benefit each year rather than millions. However, the benefit to a DNO under the existing losses scheme is only a proportion of the benefit to customers and society.

In addition, this programme would provide the essential data on real-time substation loadings that could form the basis of an active network management system. Furthermore, it is possible that some configurations of a rapid data exchange could facilitate fault identification and cause diagnosis and provide data to support to enhanced remote switching and network reconfiguration.

Timing

The fitting of smart metering to the entire pole-mounted transformer stock will present a considerable challenge and therefore we can not yet confidently commit to the delivery of this programme in the estimated two years. However, a focussed programme could achieve a significant penetration in this time period and the entire programme could be completed in less than five years.

In summary, we believe there are no practical obstacles to the installation of the smart meters, although the timescale is possibly over-ambitious and the provision of an associated data network requires more investigation. The installation of this metering would certainly assist in making a purely output-based losses incentive a more practical proposition, but would not alleviate all the concerns associated with the existing mechanism. The cost of the programme is clearly high in relation to the specific benefits attributable to losses and, therefore, any cost and benefit analysis would need to include the wider benefits associated with the increased network monitoring and the real time provision of information to enable more active network management.

Yours sincerely,

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