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Dear Mark,

Impact assessment and consultation on Western Power Distribution's modification proposal to change their distribution use of system model

SSE continue to believe that a distribution use of system charging methodology based upon a long run incremental cost (LRIC) model is inconsistent with the relevant objectives in standard condition 4B of the distribution licence. In our view, such models bring volatility and instability in charging for individual customers (demand and generation alike). As such, they cannot be considered to be cost reflective or to facilitate competition in the generation and supply of electricity. Furthermore, we believe that the complexity of such models reduces rather than enhances much needed transparency.

Western Power Distribution's (WPD's) proposed change to their distribution use of system (DUoS) charging model is no exception. We do not believe that WPD have shown that their proposed modification will bring enduring benefits to their customers.

Our detailed concerns regarding the WPD model are provided as an Annex to this paper. These are ongoing concerns that have not been mitigated by the changes made following WPD's two consultations. Our comments on Ofgem's consultation questions are as follows.

WPD state that their proposal better meets the relevant objectives with regard to transparency and cost reflectivity. Does the modification proposal better achieve the relevant objectives?

We do not believe that that the modification proposal will better meet the relevant objectives with regard to transparency and cost reflectivity as contended by WPD.

Ofgem have noted that the model is more detailed to understand than the Distribution Reinforcement Model (DRM) and current site specific charging arrangements due to the volume of data required for nodal prices and the requirement for more in depth modelling. The model, by its nature, is very complex and it is by no means clear how some of inputs are derived or justified from a technical standpoint. This does little to promote credibility and acceptability. Simply publishing the prices and model does not make it more transparent or acceptable to users.

We do not consider that WPD have adequately made the case that LRIC methodology is more cost reflective than their current approach in setting EHV charges. The LRIC methodology proposed only brings in a small proportion of the revenue required and does not reflect all the costs. WPD have not established that the LRIC approach identifies real costs or that the method is not unduly distorted by the weight it attaches to load growth several decades in the future. The model for generation is not clear and the adoption of a uniform growth does not reflect the reality of generator connections. This affects the nodal charges and gives rise to volatility in generation prices. No attempt has been made to normalise the charges to match real costs.

We believe that increasing instability and volatility of network charges has a detrimental effect on suppliers and generators in terms of greater risk and exposure to increases in DUoS charges over a period. We believe that this is detrimental to competition in both supply and generation. Less stable DUoS charges may potentially also have detrimental effects on the competition in distribution that is represented by independent distribution networks, which see host DNO's charges as an input cost.

Have we correctly captured the main issues in Annex 1?

Yes, the main issues are captured. However, we continue to have serious concerns on the matter. These are expressed above and in our detailed comments on the WPD model in the attachment.

In addition to our general concerns over the suitability of an LRIC methodology for setting use of system charges, we are concerned that the WPD model for generation DUoS is unclear. Whilst we agree that WPD should not apply their LRIC model to existing generators, given the ongoing debate regarding how generators (both existing and new) should be charged for use of system we believe that more detail on the generation model is essential.

Have we correctly identified the impacts in Annex 2? In particular we would welcome quantified assessments of impacts.

As noted above, we are concerned about the volatility in output prices that will be introduced in moving to the proposed LRIC methodology. The volatility will affect the EHV charges directly as forward looking views of parameters such as network configuration and forecast use of network capacity change from year to year. The reaction of suppliers to such volatility would be to seek to pass on the DUoS risk to customers via pass-through arrangements where feasible, or factor in an appropriate premium into future prices to cover perceived risk. End customers would therefore see higher or volatile prices themselves.

We are surprised that, in Annex 2, Ofgem continue to use the Bath University study to assess the potential benefits from a revised charging model. In particular we are very concerned over the continued use of a figure of £200m as the potential saving compared with the status quo which Ofgem have taken from the Bath paper. We have previously pointed out that this figure is completely unsubstantiated and immediately followed by a caveat that any such extrapolation from the study work "would have little foundation". We are therefore extremely disappointed that Ofgem continues to use such an unsubstantiated figure in its impact assessment.

In summary, we continue to have concerns with the LRIC approach to charging for use of system. WPD's proposed LRIC model does not alleviate these concerns and, we believe, will bring instability and volatility to their DUoS charges. The model appears to give undue weight to the cost of reinforcements in the distant future where actual load growth is unknown. The proposed model for generation is not clear.

In our view the modification proposal does not better meet the relevant objectives with regard to transparency and cost reflectivity. Therefore, we believe that Ofgem should veto the proposal and maintain the existing charging arrangements for 2007/08.

Yours sincerely,

Rob McDonald
Director of Regulation

ANNEX: SSE Comments on WPD proposed LRIC Methodology

Section 4.9 of the WPD Proposal describes the calculations for deriving the marginal costs. This is based on the effect of a small, 0.1 MVA, increment in demand. The formula can be rewritten in analytical form as follows:

Let *C* (MVA) be the capacity of the asset. Let *D* (MVA) be the current demand, so that *X* is the ratio *D*/*C*. Let *r* be the annual rate of growth. Let *A* be the cost (£/MVA) of the additional asset required for reinforcement when the demand increases to meet the capacity. Let *a* be an annuity factor (p.a.) and *d* be the discount rate (p.a.). Then the marginal cost *p* (£/MVA p.a.) is given by:

$$p = a\, A\, (d/r)\, X^{(d/r - 1)}$$

As noted at earlier workshops, this formula can show perverse behaviour as *r* increases. Whenever $X > \mathrm{Exp}(-r/d)$ then a decrease in *r* leads to an increase in the charge rate, *p*. Thus using the quoted discount rate of 6.9% p.a. and a growth rate of 1% p.a., then whenever $X > 93\%$, the charge rate increases as the rate of growth decreases.

The cause of this effect can be understood in that the smaller the growth rate, then the larger the relative effect of a small increment in demand, and the further away the time of reinforcement, then the larger the reduction in time to reinforcement caused by an additional increment of demand.

WPD tackle this issue by applying a uniform growth rate over the whole network. However, if the growth rates decreased over the next few years, then the introduction of a lower growth rate at some time in the future would inject some perverse movements in charge rates.

This perverse behaviour is an indication of a more fundamental flaw in the proposed LRIC methodology. The ratio of the total sum recovered per MVA to *A*, the asset cost per MVA, by the time the asset needs to be reinforced (expressed as NPV) is given by:

$$y = a\, d\, \mathrm{Log}(1/X) / r^2$$

In general this is evidently not equal to unity. Furthermore as *r* becomes smaller, *y* becomes very large. The table below shows the value of *y* for different values of *X* and *r*, where *d*, as before, is taken as 6.9% p.a. and *a* is based on the same discount rate for a period of 40 years (0.07414 p.a.).

r	0.5%	1.0%	2.0%
X			
0.98	4.13	1.03	0.26
0.94	12.66	3.16	0.79
0.90	21.56	5.39	1.35
0.80	45.66	11.42	2.85

One cause of this feature is the inappropriate use of the annuity factor. An annuity factor applies when say a mortgage is to be repaid in constant repayments over a fixed number of years. Here the period before reinforcement varies and as the demand increases both the charge rate and the level of demand paying the charge increase.

It can be argued that scaling will modify the charge rates in any case. However, the distortion between the charge rates which vary with the ratio of demand/capacity remain. The effect is to overcharge long term reinforcement against short term reinforcement. This is the <u>opposite</u> effect to what is required. Growth rates in the long term are very uncertain and this effect substantially over weights investments many years ahead based on the least certain data. The example by WPD (referred to later) considers a case where the time to reinforcement is brought forward from 70 years to 30 years. Even if historic data and predictions of future load growth gave any credence to the forecasts, it will be seen by extrapolating from the table above that the charge rates based on this are grossly exaggerated.

Within the WPD network there will be declining industrial areas where overall load growth may be negative, even when commercial and domestic growth may be positive. The regional economic message is that new industry is to be encouraged, yet even when there is ample spare capacity for new industry, the charge rate will be set to discourage new load. However scaling is applied, this would be giving inappropriate economic signals.

Another well versed criticism of the LRIC methodology is that it becomes increasingly volatile as the growth rate decreases, becoming inapplicable when the growth rate reduces to zero. If the belief that the introduction of economic charging will affect the growth and location of demand proves to be correct, then current substantial increases in energy prices may well choke off future increases in demand, at least for a time. Furthermore, if the price signals succeed in increasing embedded generation, then this effect may persist. It is desirable that any methodology replacing DRM should be robust for the current and future likely growth rates, including zero growth rate.

Contingency Analysis

The revised proposal states that the identification and timing of reinforcement schemes is carried out by a (N-1) contingency analysis. No details of these are provided in the proposal and no sample data is provided to enable the methodology to be followed in detail. The proposal states that “The spreadsheet model used to derive charges allows further understanding of the method and is available. We intend to develop a version of this model to be available to users.” Network and demand data is said to be available on payment circuit by circuit. In order to provide a detailed assessment of the WPD method it would be necessary to study a selection of networks with demand and generation sites.

Some of the areas which could be examined are:

There is a large variation in the nodal charge rates. Is there clustering of the nodes with higher charge rates, reflecting a general lack of capacity in the network area or are there substantial variations between nodes on the same network? If so, would these be substantially affected if the nodal growth rates were to be used instead of a constant 1%?

To what extent are the nodes with the higher prices linked to relatively short reinforcement periods and are there examples where high charge rates arise from longer term reinforcement?

In effect we are asking: can the individual nodal rates be substantiated as arising from real differences when real nodal (growth rate) data is taken into account?

The time to reinforcement is evaluated on a 1% growth rate in demand. It is stated that the same 1% is used for generation. It isn’t clear whether this is 1% of existing generation or 1% of the current demand. If the former, since there will be many network areas without any generation, it presumably sets a zero generation charge for such nodes. Such a model would seem to be inappropriate when there is a target to achieve a major increase in embedded generation. It would be helpful to see in detail an illustrative case.

Charge Setting

Sections 4.13 and 4.14 are unclear. Section 4.13 states that if the reinforcement is driven by summer conditions, then “the branch price is the <u>negative</u> of the summer price multiplied by the assessed summer demand”. Does this assume that in this case the summer reinforcement is driven by generation? In areas with substantial air conditioning load the reinforcement would still be driven by demand and using a negative value would be erroneous. Again actual examples would be helpful. The same question arises in setting the generation charges (4.14).

Section 4.18 proposes to change the method of splitting the required revenue between the EHV network and lower voltage networks from DRM to MEA value. The reason for this is not clear as it would seem that if anything the DRM could give a better indication of network cost than the historical investment costs. The table shows that the switch does make significant adjustments and therefore requires clear justification.

It would be helpful if some understanding could be provided of why the night charges have increased substantially in Tables (p24 & 31) as against the day rates.

On the histograms of nodal prices (p28, 29, 42, 43), it is not clear why the DRM nodal prices vary at all (is it because the current prices have historic restrictions and do not match the actual DRM model)?

Cost reflectivity

Section 5.8 claims improved cost reflectivity. However, it has not been established that the LRIC approach corresponds to real costs or that the method is not unduly distorted by the weights attached to load growth several decades in the future. No attempt has been made to normalise the charges to match real costs. Thus if the cost of a particular reinforcement is say £1m, the amount to be recovered from customers over a number of years using the LRIC method could be as much as £5m (or more). This distorts competition. Rather than locate elsewhere on the network, users may turn to alternative power sources, or move abroad. If users are prepared to pay the real cost, then they should have this option as this provides genuine choice and enables optimum decisions to be made by users and utilities.

Attachment 1

This shows an example of how the charge rates can vary on the introduction of a large generator. Unfortunately not enough detail is provided to understand the situation, or to check the interactions within the network. It is worrying to find that quite large variations in charges arise for changes in estimated reinforcement dates from 91 to 35 years. This could be a location where industrial load is actually diminishing and new load needs to be encouraged. If reinforcement is not required for over 35 years with a nominal growth rate of 1%, then there would appear to be ample capacity to accommodate new load.

Other points to note

The annuity rate is increased by 0.9% to allow for operation, repairs and maintenance. The derivation of this is not clear. It maybe intended to take into account the fact that reinforcement involves ongoing costs. However, these will be paid for by the customers when they occur. Therefore, if they are included here, then they need to be subtracted from the O&M costs elsewhere.

The power factor used for the increment of demand is 0.95 and 1.0 for generation. It is stated that the effect of variations in the power factor have been studied and are not significant. No supporting examples have been provided.

No account is taken of fault levels. No evidence is provided to show that the upgrading of switchgear to match higher fault levels caused by increased generation is insignificant.

Reinforcements required to meet the existing demand are excluded.

It proposes a flat £/kVA charge to reconcile charges to allowed revenue. It is not clear if this is this different for different voltage levels.

It is stated that unless demand or growth rates vary substantially during a price control, then no changes in the assumptions will be made. We would suggest that what constitutes a substantial variation needs to be quantified.

Conclusions

There are major concerns regarding the cost reflectivity of the LRIC method. WPD have attempted to reduce volatility by using a uniform growth rate across the networks of 1%. However, this can give misleading cost messages in an area where load is declining. The method gives undue weight to the cost of reinforcements in the distant future where actual load growth is unknown. It is not possible to assess the outcomes without at least some sample network studies. The model for generation is not clear.