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8 January 2021

CMP357 'To improve the accuracy of the TNUoS Locational Onshore Security Factor for the RIIO2 Period'

Additional comments

Is use of more decimal places more accurate?

The premise behind this mod is that expressing and using a factor to a greater number of decimal places (dps) makes it more accurate, and the accuracy of the consequential calculations and results that flow from it are therefore improved.

This is a critical presumption and it needs to be examined. In statistical terms accuracy is used to mean how close a derived value is to the "true" value which it represents. The expression of a number to a greater number of dps makes the number more precise, but it does not necessarily make it more accurate. The critical questions here are whether expressing the Locational Onshore Security Factor (SF) to more dps makes it more accurate and if so whether that greater precision of its expression is warranted in the context in which it is used.

It is clear that many of the factors used in the calculations alongside the SF are expressed to multiple dps, and the resulting tariffs for end users are eventually expressed to multiple dps. In this context, if it is possible to express the SF to more dps than one and this makes it more accurate as a value to be used in those calculations, then change proposed by this mod is certainly warranted. But how accurate is the value of the SF that is used?

NGESO (ESO) has clearly and transparently demonstrated how the SF is derived. For each year a least squares fit method is applied to all nodes on the network to determine the ratio between secured marginal costs and unsecured marginal costs. ESO has shown these plots for the next five future charging years.

All the lines follow a similar pattern. All have an intercept with the y axis that is above zero. This is quite consistent, and is to be expected. The secured marginal cost is for a network that is slightly smaller so slightly more stressed than the unsecured network: it will have different flows upon it but incrementally more flows along remaining wires. It would be expected that this would increase losses and marginal costs at all nodes. A node with a zero locational cost in the unsecured case could logically be expected to show a cost in the secured case (the intercept on the y axis), and

similarly a node that appeared to provide a small network benefit in the unconstrained case could move to a zero locational cost in the constrained case (intercept on the x axis).

It thus means that the 'c' factor in the 'y=mx+c' formula is real i.e. it does convey something that is truly happening in the physical network. It follows that neglecting it in the subsequent calculations for determining TNUoS locational cost is not appropriate and this leads to a slight error in the values for all locational costs. In summary, ALL locational charges should be slightly more positive (or slightly less negative if applicable) than they are currently calculated to be.

Changing the calculation formulae and methodology has been clearly stated to be out of scope of the mod, therefore considering an option which adjusts for this missing 'c' factor is not possible now. Given the existing calculation, the question which follows is whether constraining the regression line to pass through zero is a better way to establish the SF value that should be used in the calculations. Whilst this line is clearly a worse fit for the data in each case, it may give a more **accurate** representation through the SF of the effect of moving from an unsecured to a secured network **in the context where the 'c' factor is ignored**.

In each of the five year cases, the SF in the zero constrained cases increases, by a similar factor. To 4dps the average value over the 5 years increases by 0.0492 to 1.8045.

A larger value for the SF accentuates locational differences in order to achieve total locational charges that are closer to the "true" value averaged across all nodes when a constraint of passing through zero is applied. Use of the larger factor (derived from the constrained through zero case) means those nodes nearer the origin pay less (or receive more) than they "should" do in the best fit case *if the intercept value were included,* and those further away from the origin pay more (or receive a little more) than they "should" do (again if the intercept value were included). In order to achieve a best fit with the artificial constraint of passing through zero this case distorts (increases) the relative value difference between nodes with this being most significant for nodes furthest from the origin. Is this appropriate and/or desirable in the context of cost reflectivity? To answer this it seems helpful to step back to take a wider view of network charging across GB.

What value of Security Factor is most cost reflective?

It has been noted in several other CUSC Workgroups (including most recently CMP317/327) that the tariff model does not deliver accurate ***actual*** costs of using, maintaining or extending the network at each node, but rather an incremental marginal indicative cost. The result is cost reflective in that it is directionally and broadly reasonable in order of magnitude, but it does not truly match actual network costs at any location. The basic output of the tariff model is therefore by design not totally accurate (if this means matching actual network costs at a node). Distorting the results from the tariff model in the way that a slightly higher SF would (if the methodology were to adopt a constrain-through-zero regression line) may or may not improve accuracy of cost reflectivity at any node.

Furthermore, the use of an average both nationally and across a five year period rather than a nodal specific time dependent value in itself introduces inaccuracy at every node and accuracy is further lost as the nodes are aggregated into zones. This is not arguing for reducing accuracy in a parameter through rounding if such precision of dps expression of it can be justified, but it is arguing that using a rounded value for SF within a series of calculations that include other averaging and rounding effects is not necessarily a defect that needs correction.

FGG believe it is appropriate also to highlight constraint costs. In a paper presented to the CMP317/327 Workgroup RWE suggested that constraint costs could be considered an alternative to physical network costs: it may be more economic or beneficial to pay constraint costs than incur the cost of upgrading the network to remove or reduce those costs. Constraint costs appear in BSUoS and the First BSUoS Taskforce concluded that it was not practically possible to charge BSUoS or any element of it on a cost reflective basis to users without potential unintended consequences. So BSUoS constraint costs are not (and it is not proposed that they will be in future) allocated in a cost reflective way, yet they are in considerable part affected by the topology of the physical network.

From publications of the ESO, notably the recent ENCC weekly webinars, it is evidentially shown that most of the constraint costs incurred consistently arise from north to south power flows. These costs are material – they are the biggest single element of annual BSUoS. More generation or less demand in the south of GB (or conversely less generation or more demand in the north of GB) would not just appear as a benefit in TNUoS charge modelling; it may also be expected to reduce the constraint costs embedded within BSUoS.

Therefore, to the extent that there may be a structural bias in the locational differentials within the TNUoS charging, it would seem beneficial and appropriate for overall cost reflectivity that these should accentuate or exaggerate the north-south locational cost signals rather than reduce them. The TNUoS locational charge is one of the few tools within the charging toolbox that can send this locational signal, but the impacts that responding to it have will go beyond just TNUoS.

So although the constrain-through-zero option for linear regression would introduce a distortion that accentuates locational differentials, we believe this to be directionally beneficial when considered in the total charging landscape and therefore it is both appropriate and desirable.

What range of values may the Security Factor take?

Within the time available given urgency and the resulting highly compressed schedule it has not been possible to examine what modelling assumptions could lead the SF to change materially. We know the SF has reduced from 1.9 in 2004, and current modelling forecasts it to be consistently below 1.8 now, with a range of outcomes over the five years bounded within 0.02 of difference. No justification has been provided for the reduction over time. It is possible to hypothesise about what modelling assumptions or network physical and regulatory characteristics may drive the value up or down, but without testing these through comprehensive modelling any of these remain speculative. We believe any change to greater precision of expression should be supported by more comprehensive analysis that demonstrates this is appropriate.

We think this is important, to gauge how the SF may move over time given its use in the existing calculation methodology. It may be it is at a relatively low level during the current and immediate future years but as demand on the transmission network increases (as is forecast for the achievement of Net Zero) it may increase again towards 1.9. In this case retaining a value of 1.8 will provide stability over many years probably beyond the current price control period. Alternatively, more widely distributed generation and storage may lead to the network being more resilient (in cost impact) to individual circuit loss and the downward trend of the value of the SF may continue. There is no evidence to justify one view over the other, and indeed the future value will be dependent on what actually happens, not what is currently forecasted to happen. More modelling would help inform whether either of these suppositions is possible or likely.

This drives to a conclusion as to whether expressing the SF to more than 1dp can be justified. Without more rigorous examination across a range of plausible scenarios that demonstrate it would be likely to outturn in the same similarly tight range (0.02) that we can see as forecast output for the next five years, we do not consider that greater precision of its expression beyond 1dp reflects improved accuracy of the value determined. On the basis of the five data points we can see that a 2dp precision prima facie appears justifiable and appropriate, but we don't believe sufficient evidence has been provided to make this a robust conclusion.

Why change?

Our final criteria is the impact of any change. If the benefit from a proposed change is questionable or the decision finely balanced, then we think the preference should be to retain the status quo, in the interests of stability, predictability and robustness of systems across industry. Notwithstanding that the cost of change here is expected to be negligible, and the impact small, we do not think the case for change is strong enough to justify urgent implementation.

Conclusion

Therefore we do not support the Original Proposal because:

- we do not think extending the number of decimal places for the average SF improves accuracy (indeed it may reduce it given the specific values of each annual SF and the resulting value that emerges);
- With the specific values that have been published by ESO we believe using a value of 1.8 for SF within the current calculations and methodology is probably more accurate (in terms of cost reflectivity) than using a value of lower than 1.8, but note this is coincidental;
- We do not think it has been evidentially demonstrated with a sufficient sample size that 2dps precision or more for expressing the final SF is justifiable given the potential range of changes there may be in underlying modelling assumptions. For this reason without a broader evidence base we would not support the indicated ESO mod coming forward later this year; and
- Regardless of the above, we believe any further mod in this area needs a wider definition of the defect which considers the SF in the context of the whole calculation and methodology and other network charges (including proposed changes to them that may result from the current AFLC SCR).

We believe there is benefit in codifying the current practice of using the SF to 1dp for clarity and transparency.

Yours sincerely

Mark Draper

Chair