Annex 3 - CMP315: Treatment of incremental network investment

Current TNUoS locational charges are based on the long run marginal cost (LRMC) of the system. This is calculated by using the transport model to work out the incremental flow on every circuit of the system caused by a change in generation and/or demand[1] and multiplied by the annuitized value of the transmission infrastructure capital investment required to transport 1 MW over 1 km[2]. The transport model uses different classes of transmission infrastructure (400 kV, 275kV and 132 kV and overhead line and underground cable) and has a cost per MWkm for each asset class. In the model these are characterised by the *expansion constant*, the cost for 400 kV overhead line, and then *expansion factors* for each asset class representing the ratio of the cost of 400kV overhead line to the other asset classes (and, by definition, the expansion factor for 400kV overhead line is 1).

The model provides (and is intended to provide) the LRMC of the system required to connect the generation or demand, rather than the short run marginal cost (SRMC) of connection. For example, if demand can be connected to the system without any changes to the system it still pays/receives the locational TNUoS charge. This reflects both the opportunity cost the connection places on the system and reflects the cost that would be incurred/saved when the relevant assets are replaced if they were replaced with minimum sized assets.

The intention of CMP 315 is to retain the above methodology. However, the calculation of the cost annualized transmission investment should be expanded to reflect current TO practice that:

i. Some assets are being life extended[3]; and
ii. Some assets are having their capability enhanced (for example reconductoring overhead lines with higher capacity conductor).

The proposed way to represent this in CMP 315 is to reflect this in the capital cost of the relevant asset class. For example, consider a 400 kV overhead line (single circuit for simplicity) could be built for the following costs:

Towers / and other construction	1.5million GBP/km
Conductor (2000 MVA)	0.5 million GBP/km

Under the current methodology this would feed into the annualised calculation based on a 50 year asset life[4]

However, TOs are now creating additional capacity by reconductoring overhead line routes with higher capacity conductor part way through their asset life. In this scenario, the expenditure programme for an overhead line might now look like:

Year	Action	Cost (GBP million/ km)
0	Towers / and other construction	1.5
0	Conductor (2000 MVA)	0.5
30	Reconductor (2500 MVA)	0.75

The capital cost of this overhead line has increased from 2 million GBP/km to 2.75 million GBP/km (albeit with 0.75 million GBP expenditure deferred by 30 years, and assumes that the cost of the

[1] CUSC 14.15.4
[2] CUSC 14.15.59
[3] This could mean the depreciation period in the Expansion Constant could differ from the regulatory settlement
[4] CUSC 14.15.65

original conductor is still recovered), and the time weighted lifetime average circuit capacity is 2200 MVA (an alternative would be to use the full 2500 MVA value but recover the conductor over 20 years).

The alternative solution of simply charging the reconductored overhead line based on an asset cost of 0.75 GBP million/km rather than the original cost of 2 million GBP/km would mean a reconductored overhead line would have a lower charge in the transport model than an existing overhead line. Hence adding generation or demand to the system that caused reconductoring (and hence additional capital expenditure) could result in a lower cost reflective charge.