LCN Fund Full Submission

Supplementary Answer Form

Tick if this answer is Confidential: ☐

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Project code:	NPGT202/1	Question Number	NPG004
Question date	30/08/12	Answer date	04/09/12
Submission section question relates to	Appendix 5		
Topic	Costs		
Question	In Appendix 5 it is stated that for the base case cost of DNO network reinforcement £35 per kW per year has been used. Please provide the derivation of this figure - including the capital costs per kW for the components of the network (e.g. plant, cables, lines etc.) that make it up.		
Notes on question			
Answer	This answer covers the following: • overall derivation of the £35/kW/year figure; and • capital costs per kW of components of the network. **Overall derivation of the £35/kW/year figure** To derive the £35/kW/year figure for avoided network reinforcement, we use the Common Distribution Charging Methodology (CDCM) and the extra-high voltage distribution charging method (EDCM). *CDCM* GB electricity distributors (DNOs) have adopted the CDCM for customers connected at LV and HV. This uses a single common spreadsheet, with licensee-specific inputs. Two of the key inputs into the CDCM model are the load factor and coincidence factor. These define customer groups in terms of: • how flat the load curve is for that group - load factor is calculated as		

average consumption over maximum consumption in the peak half-hour period (each in kWh); and
- how that group contributes to general network demand - coincidence factor is calculated as the demand in that group at time of general network peak over peak demand for that group (each in kW).

Adjusting the load factor and coincidence factor, to mimic customer responses, in the Northeast model for 2012/13 charges allows us to derive a value for flexibility based on the avoided cost of reinforcement. The calculations in the attached spreadsheet (Table 1 and Table 2) show that this comes to around £54/kW in the Northeast and £46/kW in Yorkshire.

As around half the gross asset value of the network lies in its LV cables, we can assume that the benefit for flexibility is split evenly between higher and lower voltage tiers. (i.e. £27/kW in the Northeast and £23/kW in Yorkshire is allocated to each of the higher and lower voltage tiers).

EDCM

DNOs have also developed a common EDCM. The un-scaled marginal costs from the long-run incremental costs (LRIC) outputs of the demand EDCM model (as published in Annex 6 'Un-scaled nodal costs' of the Statement of Use of System Charging) show a range from zero to £15/kVA/year in the Northeast, with a mean of £4/kVA/year because many sites have sufficient headroom to infer low charges. In Yorkshire the range is zero to £19/kVA/year, with a mean of £3/kVA/year. (The EDCM works in kVA rather than kW but, for the purposes of this exercise, reasonable power factors are assumed and a close equivalence between the two units taken).

The distributions of the un-scaled nodal charges are shown in Figures 1 and 2 in the attached spreadsheet.

Value of flexibility in terms of avoided reinforcement

We have used these site-specific marginal costs to modify the generic £/kW/year benefit derived above (i.e. the £27/kW/year in the Northeast and £23/kW/year in Yorkshire). Assuming that the mean EHV charges are built into the generic postage stamp benefit for demand reduction at higher voltages then bespoke prices for demand reduction at higher voltages can be derived as follows.

- The value of avoided reinforcement from the CDCM model is £54/kW/year in Northeast and £46/kW/year in Yorkshire.
- As around half the gross asset value of the network lies in its LV cables, we can assume that these values are split evenly between higher and lower voltage tiers.
- If mean EHV charges are £4/kW/year we can assume that this is built into the generic postage stamp £27/kW/year or £23/kW/year benefit for demand reduction at higher voltages. Therefore, bespoke prices for avoided reinforcement at higher voltages can be derived in the below table:

	Northeast	**Yorkshire**
Postage stamp costs for higher voltage systems	£27/kW/year	£23/kW/year
Less £4 mean	£23/kW/year	£20/kW/year

EHV component of this £27		
Plus bespoke EHV component;	£0/kW/year - £15/kW/year	£0/kW/year - £19/kW/year
Derived on demand incentives	£23/kW/year - £38/kW/year	£20/kW/year - £39/kW/year

Given that the latest bespoke avoided costs of reinforcement at higher voltages are in the range £23-£38/kW/year in the Northeast and £20-£39/kW/year in Yorkshire, we have used a figure of £35/kW/year in the GBFM business case on the basis that most of the flexibility would be used at the more heavily loaded primaries.

Capital costs per kW of components for the network

The asset costs that are used to derive the un-scaled marginal costs from the LRIC outputs of the demand EDCM model are as follows:

- 33kV line/cable = £108,886/km
- 66kV line/cable = £105,321/km
- 132kV line/cable = £151,881/km
- 33kV transformers = £440,322
- 66kV transformers = £512,913
- 132kV transformers = £1,187,320

Attachments

Microsoft Excel 97-2003 Worksheet

Verbal Clarifications

(Consultants)