

## CUSC Environmental Standing Group

### Background

The above Group was convened on the 11<sup>th</sup> July 2008 as a Cross-Codes Group primarily to consider and undertake work to provide guidance on how future modifications to the CUSC should factor in a “carbon cost” assessment as part of the normal process of assessing a Modification against the Applicable CUSC Objectives. This is necessary to conform to the Office of Gas and Electricity Markets (Ofgem) requirements and Government directives.

The outcome is intended to be used as a model to provide guidance to the Secretariat of other Code Groups as required.

Although outside the remit of the Group, the following information is an example of one of many design and operational considerations that a Distribution Network Operator (DNO) must consider in meeting both their Distribution Licence and Distribution Code (D-Code) obligations.

The Distribution Code (DIN2 – Distribution Licence Duty) makes specific reference to Condition 9 of the Distribution Licence obligations and in DIN 2.1 (b) states:

*(b) Is designed so as to:*

*(i) Permit the development, maintenance, and operation of an efficient, coordinated and economical **System** for the distribution of electricity.*

*(ii) Facilitate competition in the generation and supply of electricity.*

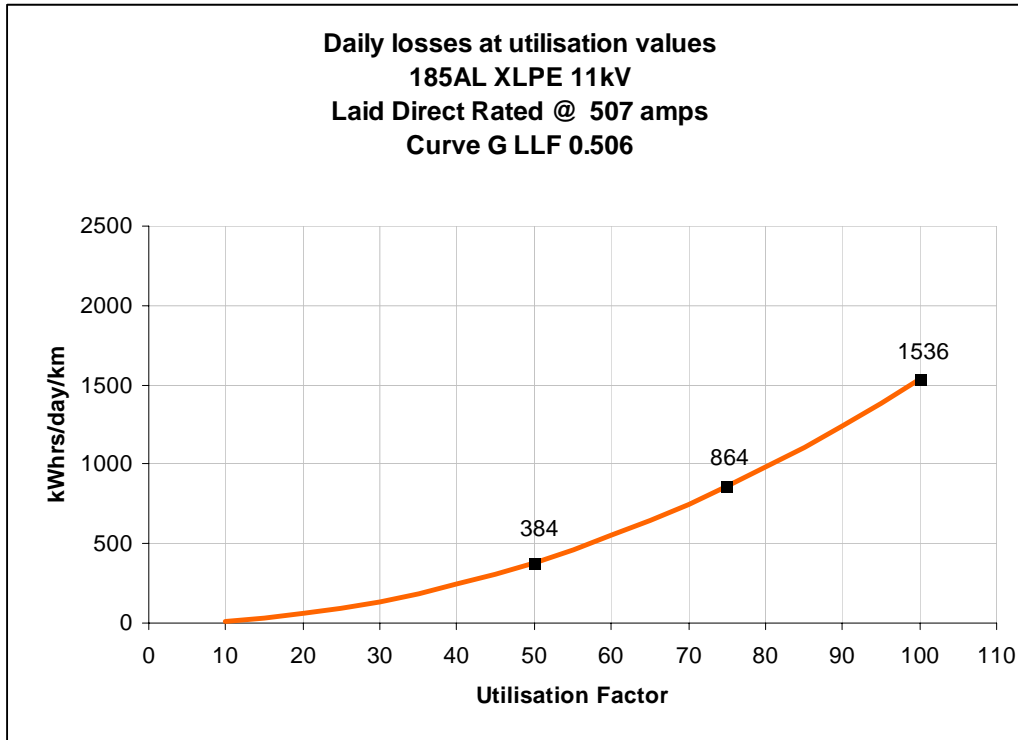
One important consideration is the effect of distribution losses associated with cables, plant and equipment and how this compares to the equivalent “carbon cost” as a relative measure.

DIN 7 – Publications of the D-Code makes reference to relevant Industry publications that are applicable in meeting the above obligations so any change to these documents will also impact on the environmental consideration outlined above e.g. changes to Engineering Recommendation P2/6 – Security of Supply, could directly affect the design and operational requirements applied by a DNO to their **System**.

This can be explained briefly in the following tables and associated notes, which outline the effects of operating standard high voltage distribution cables at different levels of cable Utilisation.

**Cable Load/Loss Comparison**

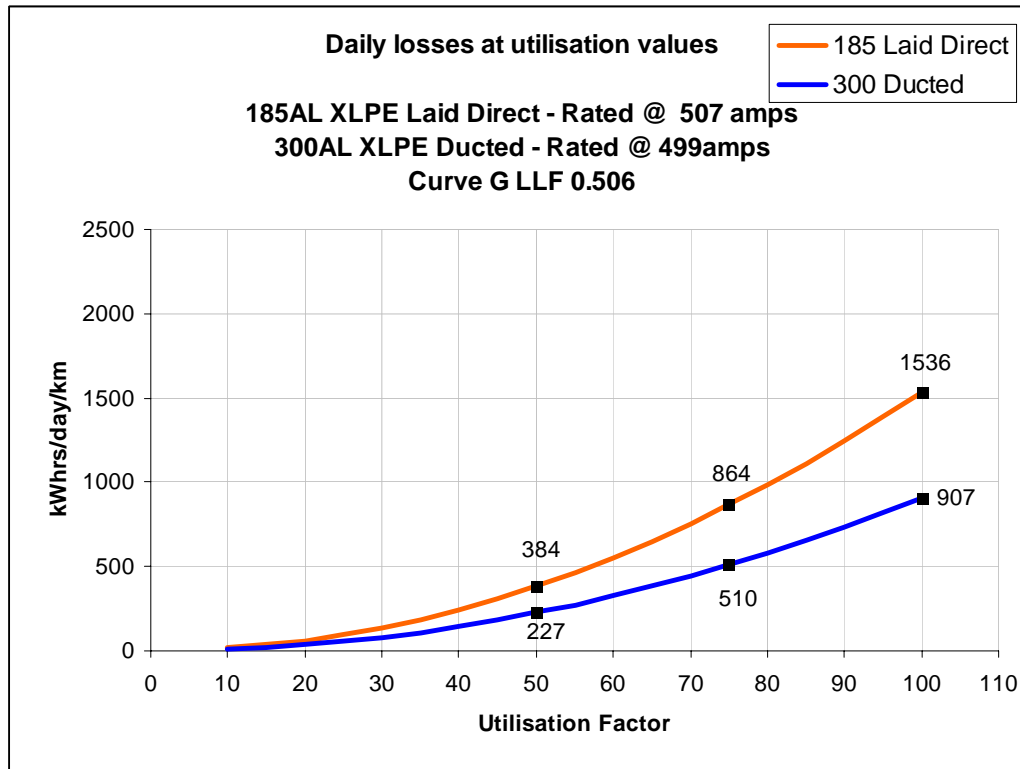
**Effect on Losses of Utilisation Factor**



This graph shows the relationship between utilisation factor and daily losses.

- Normally rings are run at 50% utilisation i.e. an open ring with each half running to 50% full load. During cable fault repairs the ring is closed to restore supplies and one side runs up to 100% for a number of days only.
- Note that at 50% the Laid Direct cable incurs daily losses of 384 kWhrs/km.
- At 100% it incurs 1536 kWhrs/km an increase of 400%
- Some networks run a 3 out of 4 configuration with each circuit running at 75%. During a single cable fault the remaining 3 circuits then pick up 25% each and run at 100%.
- Note that 75% utilisation incurs 864 kWhrs/km daily losses which is an increase of 225% over the 50% utilisation.
- Another way to consider this is that 75% utilisation incurs an extra 480 kWhrs losses per hour per km – enough to run 480 one bar electric fires all day and the same again applies for each additional km of cable.

**Effect on Losses of Employing Ducted Cable Circuits**



This graph shows the effect of using a larger cable in a duct to obtain a similar circuit rating.

- When cables are ducted they must be run at a lower current due to the poor heat dissipation of the ducts.
- To obtain a similar circuit rating to the 185AL Direct Laid cable (507amps direct), a 300AL cable must be used (499amps in ducts).
- It can be seen that the larger Ducted cable circuit runs with fewer losses than a Laid Direct circuit. E.g. at 50% utilisation the Ducted circuit incurs only 60% of the losses of a Direct Laid circuit of the same capacity.
- Again, using the one bar electric fire example – a 1 km ducted circuit at 50% utilisation saves enough in losses to run 157 one bar electric fires all day.

**Summary**

It can be determined from the above that the more a distribution asset cable is utilised and this would also apply to transformers etc, the more losses are incurred and hence, a greater affect on the “carbon cost” and associated environmental issues.

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