THE DISTRIBUTION CODE OF LICENSED DISTRIBUTION NETWORK OPERATORS OF GREAT BRITAIN

# DC 0036

# Joint DCRP/GCRP Working Group Terms of reference for a review of the standards and processes used to assess harmonic levels, and in particular Engineering Recommendation G5/4-1

## Objective

The objective of this joint **DCRP/GCRP** working group ('the working group') is to review the standards and processes employed by electricity transmission and distribution network owners to assess harmonics and, in particular, produce a report describing any changes that are considered necessary to Engineering Recommendation G5/4-1 (Planning levels for harmonic voltage distortion and the connection of nonlinear equipment to transmission systems and distribution networks in the United Kingdom) and Engineering Technical Report ETR 122 (Guide to the application of Engineering Recommendation G5/4 in the assessment of harmonic voltage distortion and connection of non-linear equipment to the electricity system in the UK). Justification for any proposed changes In developing proposals the working group will consider the economic and technical case for change. In particular the working group will consider a cost/benefit case and whether any proposals would result in unnecessary additional time being expended or would result in unreasonable costs or risks being imposed upon industry participants.

## Membership

Membership will ideally include representatives of Transmission Companies, Distribution Network Operators (including Independent DNOs), generators, nonlinear demand connections, ENA, and trade associations. The working group chair and secretariat will be provided by National Grid.

## Scope of work

The scope of the review is as follows:

General

• Whether there are circumstances where it would be more efficient for the relevant network operator to provide the harmonic mitigation rather than the connectee;

• Whether it is appropriate to employ different standards and/or ; for transmission compared with distribution connections;

• An update of the references currently within G5/4-1 GCRP pp10/22 September 2010 Standards;

• Whether there are international standards that could be adopted or referenced (e.g. IEC TR 61000-3-6) in anticipation of the implementation of EU Network Codes);

• Whether other technical standards or recommendations would need to change as a result of any review of G5/4-1 Allocation of rights;

• The process used to allocate the limits described in G5/4-1 between different users in similar areas including whether 'first-come, first-served' is the appropriate way of allocating limits or whether there are alternative methods (e.g. equal rights as per IEC TR 61000-3-6) that can be justified economically;

• How 'competing' applications are dealt with, and how changes to customers' requirements may impact on their right to emit harmonics;

• Research into whether any other countries (e.g. Australia/New Zealand) have moved from the 'first-come, first-served' approach to the 'equal rights' approach and whether any lessons can be learnt from their experience?

**Evaluation of background levels**

• Clarification on the criteria used to measure and predict the applicable level of background distortion to be used in an assessment e.g. whether using background measurements based on a minimum of 1 week is valid

• How to progress with harmonic assessments where a new substation needs to be built i.e. how is the background level at the new substation estimated?

• How lack of firm customer emission data impacts upon the connection process

• A review of the trend data from the ENA Harmonic Data Gathering Project in relation to effectiveness of existing G5/4-1. Roles and responsibilities

• The roles and responsibilities of the different stakeholders in the process (e.g. Transmission Owners, Offshore Transmission Owners, Distribution Network Owners and users connected to these systems) Technical issues

• Are the harmonic levels in the current version of G5/4 adequate or acceptable?

• Should harmonics levels above the 50th harmonic be included within G5/4?

• Should individual limits for each group of interharmonics be included within G5/4-1?

• A consideration of whether the simplified Stage 3 assessment for relatively small capacity 33kV connections can be adopted

• How to assess harmonic levels for fluctuating loads

• Approach on how to coordinate 'outages' between transmission and distribution systems under Fault Level consideration (e.g. one supergrid transformer out from a transmission substation and one 132kV feeder out from a distribution network simultaneously)

• Review guidance on how to treat situations where Planning Levels are exceeded.

• Is the process suitable for application to the design of mitigation measures?

• Whether there are 'non-technical' changes that need to be introduced into other codes (e.g. CUSC, DCUSA). Interaction with other work The working group will need to be cognisant of other work progressing on this topic, for example, the Electricity Networks Association Power Quality/Electro-magnetic co-ordination group and CIGRE. Deliverables The working group will deliver a report to the GCRP and DCRP describing and justifying any changes that it believes should be progressed to ER G5/4-1 and ETR122, together with an initial estimate of likely development costs and timescales involved Any further recommendations relating to standards or processes employed in harmonic assessments that do not impact on either ER G5/4-1 or ETR122, will be flagged up via the appropriate governance route.

**Reporting and timescales**

The working group will meet approximately once every two months. The group will provide a short report on progress to each GCRP and DCRP. The working group will produce a more detailed report for the September 2011 GCRP and DCRP to provide further information on progress, expected completion date and the required resource to complete the review.

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