CIGRE Study Committee C4

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG* N° C4.36	**Name of Convenor : Masaru Ishii** (JAPAN) **E-mail address**: ishii@iis.u-tokyo.ac.jp
Technical Issues # (2): 10	**Strategic Directions # (3): 2, 4**

The WG applies to distribution networks (4): No

Title of the Group: Winter Lightning – Parameters and Engineering Consequences for Wind Turbines

Scope, deliverables and proposed time schedule of the Group :

Background :

Winter lightning has attracted a great amount of attention, since the damages to wind turbine blades experienced along the Japanese west coast are linked to this phenomenon. Based on a review of available literature on the topic, the wind turbines experiencing damage in Japan mainly fail due to the following three reasons. (1) The interception effectiveness is low, i.e. many of the strikes miss the air termination: (2) the lightning environment is more severe than general lightning environment: (3) the frequency of lightning occurrence is considerably higher than other parts of the world, such that scheduled maintenance and service intervals need to be revised. It is crucial that lightning engineers and scientists understand different lightning environments and adopt reasonable approaches on them.

Scope :

1. Identify the regions of the world where winter lightning plays a significant role in the necessary lightning protection measures for wind turbines.
2. Identify valid probability distributions of the different lightning strike parameters; peak current, specific energy, charge, duration etc. for the winter lightning phenomena, based on existing data and new measurements.
3. Identify and describe the winter lightning phenomena in engineering terms with the aim of providing an optimum base for defining good lightning protection principles.
4. Identify how the phenomenology of winter lightning should be reflected in standards for lightning protection of wind turbines or aircrafts. Output of the Working Group is expected to have influence on future revisions of IEC and SAE documents.
5. Evaluate how to improve existing verification tests for lightning protection of wind turbines and aircrafts and seek implementation of the revised test methodologies in relevant standardization committees.
6. Define test methods representing life time exposure and aging, since the wearing due to the charge impact is one of the major differences from 'traditional' lightning strike exposure.

Deliverables : Report to be published in technical brochure with summary in Electra

Time Schedule : start : September 2014 **Final report** : 2017

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman : M. Waldron
Date : 09/02/2014

(1) Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2
(4) Delete as appropriate

Table 1: Technical Issues of the TC project “Network of the Future” (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non technical audience