CIGRE Study Committee C4

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG* N° C4.43	**Name of Convenor: Takatoshi Shindo** (Japan) **E-mail address**: shindo@criepi.denken.or.jp
Technical Issues # 10	**Strategic Directions # 2,3**
The WG applies to distribution networks (4): No	
Title of the Group: Lightning problems and lightning risk management for nuclear power plants	

Scope, deliverables and proposed time schedule of the Group :

Background :

Lightning protection is an important concern for the design of power generation plants. Such concerns are particularly important in the case of nuclear power plants, where every effort must be made to minimize the risk of any accidents. Several factors should be considered concerning rational lightning protection for power generation plants.

Firstly, power generation plants should be protected from mechanical damage, fire and/or explosion due to direct lightning flashes to structures. Direct lightning flashes to structures can cause injury to human beings and appropriate protection measures are needed. Because over-voltages are generated by lightning flashes to structures, lines connected to the structures and the area nearby may be affected and, therefore, special care is necessary for the insulation design of the electrical systems. Furthermore, modern power generation plants use highly sophisticated control systems and sensors to operate the plants securely and effectively. This is done using numerous ICTs (Information and Communication Technologies); such systems are generally vulnerable to over-voltages induced by lightning and so must be protected from such over-voltages.

To establish a rational lightning protection design for power generation plants, in addition to the factors mentioned above, the cost for implementation must be taken into consideration. The concept of lightning risk management, therefore, must be introduced.

The IEC has already published international standards on lightning protection design for structures as IEC 62305 series and several MTs (Maintenance Teams) have been working to improve the standards. However, there is almost no international consensus on how to design lightning protection using the concept of lightning risk management for power generation plants, especially for nuclear power plants. From the considerations above, it is beneficial for society to investigate the latest knowledge on this problem and summarize it.

Scope :

1. Review the lightning protection design schemes for structures from the viewpoint of avoiding physical damage and over-voltages that could generate flashover at electric apparatus and lines and investigate the applicability of these schemes to nuclear power plants.

2. Investigate lightning protection design practices of nuclear power plants available in the world.

3. Propose a guideline on lightning protection design for nuclear power plants based on the concept of lightning risk management.

Deliverables : Report to be published in Electra or technical brochure with summary in Electra **Time Schedule** : start : January 2017 **Final report** : 2020
Comments from Chairmen of SCs concerned :
Approval by Technical Committee Chairman : M. Wald **Date** : 17/02/2106

(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