CIGRE Study Committee C4

PROPOSAL FOR THE CREATION OF A NEW JOINT WORKING GROUP (1)

JWG* N° C4.24/CIRED	**Name of Convenor :** Francisc Zavoda (Canada) **E-mail address**: zavoda.francisc@ireq.ca
Technical Issues # (2): 1,3	**Strategic Directions # (3): 1,2**
The WG applies to distribution networks (4): Yes (but also covers transmission)	
Title of the Group: Power Quality and EMC Issues associated with future electricity networks	

Scope, deliverables and proposed time schedule of the Group :

Background :

The increasing complexity of the electric power network and its management, growing demand and service quality expectations such as greater grid reliability, efficiency and security as well as environmental and energy sustainability concerns have triggered the next major step in the evolution of the electric power system towards a flexible power network or "Smart Grid". To achieve this result requires the implementation of new technologies in power systems, including renewable energy sources (RES), distributed generation (DG) and latest information and communication technologies. Power quality is an important aspect of the power system, which cannot be neglected, and an adequate power quality guarantees the necessary compatibility between consumer equipment and the grid.

The main factors influencing power quality are: generation equipment, end-user equipment and the grid itself. Each of these are expected to see significant changes in future electricity networks, and thus it is expected that power quality and EMC issues will also likely change. It should be noted here that the term power quality, as used by CIGRE, includes both voltage quality and continuity of supply. Two primary categories of issues have been identified:

- At the consumer equipment level, which is connected to the distribution system,
- At the power system level, that is on the transmission system.

Scope :

The following issues will be considered and addressed in further detail by the working group:

- The emissions (harmonic and unbalance) by new types of devices connected to the distribution network as production (DG) or consumption (load), especially devices with active power-electronics interface including equipment connected to low-voltage and installations connected to higher voltage levels. This might require the evaluation of new measurement techniques, including a closer look at the frequency response of existing instrument transformers and sensors. The main question is, will this require new ways of considering power quality in the design?
- The positive and negative impact of new smart distribution applications such as Volt &VAR control and feeder reconfiguration on power quality (voltage unbalance and harmonic flow) in the distribution system.
- How these power quality issues at the distribution level may impact the transmission system.

Deliverables :

1. A CIGRE technical report/brochure providing answers to above issues, and guidelines for utilities and consumers.

2. An Electra publication containing major conclusions and recommendations. **Time Schedule** : March 2013 **Final report** : March 2016
Comments from Chairmen of SCs concerned :
Approval by CIGRE Technical Committee Chairman : **Date** : 28/02/2013
Approval by CIRED Technical Committee Chairman : **Date** :

(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