CIGRE Study Committee B1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG B1.47	**Name of Convenor :** Ken Barber (Australia) **E-mail address**: istanapark@gmail.com
Technical Issues 9	**Strategic Directions 1**
The WG applies to distribution networks (4): No	
Title of the Group: Implementation of Long AC HV & EHV Cable Systems	

Scope, deliverables and proposed time schedule of the Group :

Background :

The power transmission network has been developed during the last decades based on the use of overhead lines. EHV underground cables systems have been available since a long time, but their development has been limited by large capacitance and dielectric losses as well as relatively low current rating compared to OHL. However with the use of new materials and processing technology the situation has changed significantly, so that the constraints on maximum length and power transfer have been largely overcome.
The difficulties in installing new overhead lines are making it essential to consider the use of longer underground cables links, as demonstrated by the increasing number of long underground projects. There are still however technical challenges to consider whilst planning new cable installations. The most sensitive topics are those concerning reliability, impact on the transmission grid and installation.

Excellent work has been done by Cigre Working Group C4.502, "Power System Technical Performance Issues Related to the Application of Long HVAC Cables".

We propose the following definition of long length of HVAC cables for this topic:-

> *"A long length of insulated cable is one where the load due to the capacitive current (at power frequencies cables behave as capacitors therefore they generate reactive power) needs to be taken into account in the system design. Typically this would be 40 km for voltages less than 220 kV and 20 km for 220 kV or greater".*

Given the different scope of work, this definition is slightly different to that of WG C4.502.

Scope :

The aim of the new WG is to create a Technical Brochure which covers the practical issues relating to system design, installation and monitoring of long HVAC cables. A particular focus will be made on:

1. Current state development (SCFF cable vs. XLPE cable, Surge arrestors, Reactive compensation)

2. Challenges for implementation (Matching power rating by hybrid circuits, controlling EMF)

3. System design (Amount of reactive compensation, Losses, Sheath bonding for long length)

4. Installation (Construction, Horizontal directional Drilling, Right of Way)

5. Monitoring (Temperature monitoring, control of route condition)

6. Maintenance (Fault location, access to route information)

7. Practical experience (Table of significant projects) **Deliverables :** Technical brochure with summary in Electra and Tutorial **Time Schedule** : March 2014 : **Final report** August 2016
Comments from Chairmen of SCs concerned :
Approval by Technical Committee Chairman : **Date** : 24/04/2014

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