CIGRE Study Committee B1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG N° B1.54	**Name of Convener:** Harry Orton (Canada)
Technical Issue : 9	**Strategic Direction : 1**
The WG applies to distribution networks (4): Yes	
Title of the Group: Behaviour of cable systems under large disturbances *(earthquake, storm, flood, fire, landslide, climate change)*	

Scope, deliverables and proposed time schedule of the Group :

Background:

This topic is extremely important since in the recent past several large disturbances occurred in various countries. Everybody remembers for example the earthquakes in Nepal this year and Christchurch, New Zealand in 2010. More than 500 cable faults requiring repair were counted in Christchurch.

In the closing session of the Auckland Symposium, in September 2013, the General Report outlined the need of further work in this area regarding cable design and/or installation design for seismic areas.

Scope:

The Scope of Work will document the resultant damage, required repairs, recommend improved accessory and cable designs and suggest alternate installation methods for LV, MV, HV and EHV cable systems due to the occurrence of major disturbances.

Major disturbances include the following events:

- Floods, fire and global warming,
- Major earthquakes, liquefaction and resultant landslide or tsunami,
- Hurricanes, cyclones, tornadoes, typhoons,
- Ice storms, windstorms and mud and/or landslides.

Terms of Reference:

The Terms of Reference should include, but is not limited to the following:

1) Assess extent of damage to the cable system categorised by event and voltage class,
2) Document the repairs carried out,
3) List spares required for deployment,
4) Recommend measures to mitigate damage severity,
5) Recommend cable and accessory design changes,
6) Recommend installation improvements, for example, alternative cable duct designs, to use or not to use direct buried cables and to include cable snaking or not,
7) Suggest test protocols specific for each major disturbance, for example seismic situations, reference industry and academic investigations,
8) Whenever possible visit utilities and sites to gain first-hand knowledge of events,
9) Evaluate existing international and domestic standards for their relevance to cable

systems due to large disturbances, for example IEEE Standard 693-2005 on Recommended Practices for Seismic Design of Substations

10) Make contact with storm centres around the world to assess availability and advantages of early warning systems.

Deliverables: Technical brochure with summary in Electra and Tutorial

Time Schedule: November 2015 **Final report:** August 2018

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman : M. Walker

Date : 11/11/2015

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 TF

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 readable material for non-technical audiences