CIGRE Study Committee D1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG N° D1.73	**Name of Convenor:** Michel Frechette (CA) **E-mail address**: frechette.mick@gmail.com
Strategic Directions #[2]: 1,2,3	**Technical Issues #[3]: 1**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 2,4	
Title of the Group: Nanostructured dielectrics: Multi-functionality at the service of the electric power industry	

Scope, deliverables and proposed time schedule of the Group:

Background:

After completing successfully an important series of co-operative tests within WG D1.24, some reflection was required to absorb these new data and integrate them to those continuously produced and reported in the open literature. This was achieved via the Working Group D1.40 that produced the Technical Brochure TB 661. The TB gave an integrated overview of the field showing its growing relevance and potential towards multiple electro-technical applications.

Today, more than ever, the field remains active and full-scale deployment of technologies is occurring. To name a few: submarine cable using XLPE doped with MgO (implemented), DC cables using PE with carbon black as an insulation (commissioned), hydro-generator insulation using nano-silica, motor insulation using hybrid organic-inorganic nano-insulation. Most recently, Japan has decided on a national effort (5-years) seeking electro-technical applications based on nano-dielectrics. Some other developments, e.g. nano-materials to replace crosslinked technology for HV cables, are being achieved in the framework of the European program Horizon 2020.

The WG D1.40's work has highlighted a need to demonstrate the tailoring possibility of several functions at the same time. This group will contribute to the design of multifunctional nano-dielectrics and use a cooperative-test approach to characterize the prepared sample performance.

Dr. Masahiro Kozako (JAPAN) will act as the secretary of the working group.

Scope:

1. Review of recent progress in the field of nano-dielectrics
2. Choice of multifunctional parameters and target values (for samples)
3. Contributions on how to design the samples (for nanostructured samples)
4. Fabrication of samples and selection of cooperative tests
5. Carrying out tests including some in extreme conditions and collect analyses
6. Integrating results and conclusions

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule: start: May 2018 **Final Report**: May 2021

Approval by Technical Committee Chairman:

Date: 13/12/2017

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

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
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 (ref. 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

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit