CIGRE Study Committee A2
PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP (1)

WG N° A2.50	**Name of Convenor :** Jean-Christophe Riboud **E-mail address**: jean-christophe.riboud@rte-france.com
Technical Issues # (2): 1, 5, 7	**Strategic Directions # (3): 1, 2, 3**
The WG applies to distribution networks (4): Yes	
Title of the Group: Effect of the distributed energy sources and consequent induced reverse power flow (step up) on transmission and distribution transformers	

Scope, deliverables and proposed time schedule of the Group:

Background:

Originally, transmission and distribution networks were designed for step down operation transmitting energy from the highest voltage to the final user's voltages. The introduction of more and more renewable or distributed small power generation has created power injection in the lower voltage level which in many cases exceeds the consumption of the local network. This creates an upstream power flow and changes the usual step down operation of the transformer into a step up mode to transfer the energy. The design of the transformer and regulation of the voltages may no longer be suitable for a safe and long-term operation. Furthermore, most distributed energy generation utilises inverters, which may produce harmonics on the network and affect the transformer life.

Scope:

The scope of this working group is to address the effect of step up operation on transformers that were not designed for this purpose. The effect on flux density, temperature rise, noise and other performances for both core and shell types designs shall be addressed. Possible tap changer control problems will also be taken into account. Differing transformer locations in final distribution, primary distribution and principal transmission will be examined, as well. The report will address the theoretical consequences for core flux and voltage regulation, risks and limitations to step up operation for each technology and the assessments necessary to allow this mode of network operation.

Deliverables:

Report to be published as Technical Brochure with summary in Electra

Time Schedule: start: Fall 2012 **Final report**: August 2016

Comments from Chairmen of SCs concerned:

Approval by Technical Committee Chairman:

Date: 18/12/12

(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	Interactive communication with the public and with political decision maker