

**CIGRE Study Committee C6**

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

<b>JWG* N° C6.25/B5/CIRED</b>	<b>Name of Convenor :</b> G. Mauri (ITALY) <b>E-mail address:</b> Giuseppe.Mauri@rse-web.it
<b>Technical Issues # (2): 1, 5</b>	<b>Strategic Directions # (3): 1, 2</b>
<b>The WG applies to distribution networks (4): Yes</b>	
<b>Title of the Group:</b> Control and Automation Systems for Electricity Distribution Networks of the Future	
<p><b>Scope, deliverables and proposed time schedule of the Group :</b></p> <p><b>Background:</b></p> <p>The increasing diffusion of variable not programmable energy sources, the forecasted forthcoming diffusion of distributed energy storage systems (ESS) and the active participation of demand will characterise the Electricity Distribution Networks (EDN) of the future. General requirements from EDN are a secure and reliable quality of power, adequate for the digital age. Such requirements are achievable only with the support of control and automation systems which manage, command and regulate the behaviour of the many devices and systems that support operation of EDN. Centralised control functions and local control functions (e.g. governing active customers, distributed generators, microgrids and Virtual Power Plants) will have to coordinate their operation taking into account not only “internal inputs” coming from EDN monitoring and protection systems, but also “external inputs” coming from Electricity Transmission Networks (operated by the Transmission System Operator) and the forthcoming “smart world” (i.e. smart cities, smart transports, smart industries, smart customers etc.). The processing of all such inputs coming from different sources will still be subordinated to the possibility for Distribution Companies to operate EDN under their ultimate responsibility.</p> <p>The working group will consider work done by WG C6.11 (Development and Operation of Active Distribution Networks); WG C6.15 (Electric Energy Storage Systems); WG C6.20 (Integration of Electric Vehicles in Electric Power Systems); WG C6.21 (Smart Metering – state of the art, regulation, standards and future requirements), WG C6.22 (microgrids), and WG C6.09 (Demand side Management and Demand Response), WG B5.34 "The Impact of Renewable Energy Sources and Distributed Generation on Substation Protection and Automation and coordinate with ongoing B5.43 "Coordination of protection and control of future networks". International Standards and standardization roadmaps will be also considered.</p> <p><b>Scope :</b></p> <ol style="list-style-type: none"> <li>1. Definition of Control and Automation Systems for EDN of the future: boundaries, constrains, possible architectures etc.</li> <li>2. Survey on the current state of the art and expected requirements for the Control and Automation of EDN (a questionnaire will be sent to distribution companies)</li> <li>3. Needs for interfacing EDN control and automation systems with control and automation systems of the transmission network and also systems like EDM (Energy Data</li> </ol>	

Management) and PFM (Portfolio Management) for exchanging market prices (dynamic tariffs for end-user) and balancing group information (schedules)

4. List of control and automation functions relevant for the EDN operation in the new scenario (e.g. coordinated control of distributed generators and ESS; interface with system protections including islanding management; voltage and frequency control by active and reactive power management; etc.)

5. Requirements for the architecture of control and automation systems for future EDN (e.g. hierarchical, centralised, distributed, local control; etc.)

6. Communication requirements for control and automation of future EDN (e.g. protocols and information systems for a seamless data exchange; security; privacy; etc.)

7. New technology for control and automation of future EDN (e.g. control of power electronic at all voltages; etc.)

8. Roadmap for the evolution towards EDN of the future (The 2030-2050 vision)

**Deliverables :**

- Technical brochure “Requirements and guidelines for Control and Automation systems which will operate the Electricity Distribution Network of the Future”
- Summary in Electra
- Power Point slides for Tutorial

**Time Schedule :** start : August 2012

**Final report :** August 2014

**Comments from Chairmen of SCs concerned:** Close collaboration with SC B5.

**Approval by CIGRE Technical Committee Chairman :** Klaus Fröhlich

**Date :** 20/07/2012

**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)**

<b>1</b>	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
<b>2</b>	The application of advanced metering and resulting massive need for exchange of information.
<b>3</b>	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.
<b>4</b>	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.
<b>5</b>	New concepts for system operation and control to take account of active customer interactions and different generation types.
<b>6</b>	New concepts for protection to respond to the developing grid and different characteristics of generation.
<b>7</b>	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
<b>8</b>	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
<b>9</b>	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.
<b>10</b>	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)**

<b>1</b>	The electrical power system of the future
<b>2</b>	Making the best use of the existing system
<b>3</b>	Focus on the environment and sustainability
<b>4</b>	Preparation of material readable for non technical audience