CIGRE Study Committee D2

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

JWG N° D2/C6.47	**Name of Convenor: ALEXEY NEBERA (RU)** **E-mail address**: nebera_aa@rtsoft.ru
Strategic Directions #[2]: 1	**Technical Issues #[3]:** 1 and 5
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 1 and 4	
Title of the Group: Advanced Consumer-Side Energy-Resource Management Systems	

Scope, deliverables and proposed time schedule of the Group:

Background:

The amount of "active" Distributed Energy Resources (DER), including various types of electricity generation and storage is constantly growing and constitutes already a notable part of total installed capacity and consumed energy in many countries. Taken together with more traditional "passive" DER like consumer controllable loads and recent electrical vehicles-to-grid technology these resources can potentially provide many advantages both to Electric Power Utilities (EPUs) and consumers. Currently a major part of these DER do not play an active and positive role in a power system. Often they are forced to work autonomously, or with restricted power injection towards EPU networks. Main reasons for these limitation reside in the technical complexity of control of a huge amount of DER and due to the lack of residential market instruments, motivating DER owners to provide energy services.

Recent advances in Industrial Internet of Things, Blockchain and other new information and communication technologies (ICT), as well as methodology and experience gathered e.g. in Transactive Energy pilot projects, provide a potential platform to deal with the DER control challenge.

Scope: The scope of this joint working group (JWG) is to:

- Overview and classify existing and emerging DER types;
- Analyze risks associated with uncontrolled DER deployment and benefits of coordinated (between EPU and consumers) DER usage both for consumers and EPUs;
- Evaluate a list of potential business cases and their applicability to representative set of countries;
- Analyze current state of new ICT applicable for coordinated or shared control of multiple DER and international experience in deployment of these technologies;
- Define the most important interactions between control systems of EPU, generation or load aggregator and consumer, which need to be foreseen to keep reliability of supply and stability of a power system;
- Produce guidelines for selection and use of ICT for various business cases involving EPUs, aggregators and consumers.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[1]
Time Schedule: start: May 2018 **Final Report**: December 2020
Approval by Technical Committee Chairman: M. Waldner **Date**: 01/06/2018

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

[1] Presentation of the work done by the JWG

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