CIGRE Study Committee C6

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG C6.35	**Name of Convener: Alexandre Oudalov** (SWITZERLAND) **E-mail address**: alexandre.oudalov@ch.abb.com
Strategic Directions #[2]: 1,2	**Technical Issues #[3]: 1, 2, 5**
The WG applies to distribution networks (4): Yes	
Potential Benefit of WG work #[6]: 1 and 4	
Title of the Group: Distributed energy resources aggregation platforms for the provision of flexibility services	

Scope, deliverables and proposed time schedule of the Group:

Background:

The generation of electricity from renewable energy resources is steadily increasing, driven by policy and equipment cost reduction. Part of the deployment is in the form of distributed energy resources (DER), including distributed generation and storage. DER solar PV systems, wind turbines, biomass and biofuel fed generators, and battery energy storage systems, are in the range of a few kilowatts to several megawatts.

While individual DER do not cause operational challenges on distribution feeders, the cumulative effect of many units should be considered. If properly coordinated, they can provide a significant flexibility in the energy supply. They can be dispatched or curtailed based on the grid conditions and business opportunities at specific times. Coordination can be done at local feeder or substation level or across larger territories.

The business opportunities include the provision of ancillary services to grid operators, for frequency regulation reserves, the more common today. There are commercial aggregators in the USA, EU and Australia. There are also ongoing activities in markets in distribution and in transactive energy. Participation of DER in energy, ancillary services and capacity markets is being considered, resulting in discussions on defining new market rules in different jurisdictions, including retail markets featuring peer-to-peer transactions.

Scope:

The main objectives of this WG are to (a) collect and analyze information on technical, economic and regulatory aspects of DER aggregation; (b) analyze methods for integrating aggregated resources into network planning and operation. The following topics will be explored and elaborated within the WG.

1. Overview of economically attractive DER aggregation approaches. Aggregators are classified according to contracted customers and services offered services, as well as aggregator interaction with other major stakeholders. The following are considered: (a) participation in ancillary services markets, including frequency regulation, capacity and energy markets; (b) bilateral agreements with distribution network operators, including voltage support, congestion management, black start and restoration; (c) services to end-users and customers, including backup power.
2. Review of aggregation technologies including DERMS (Distributed energy resource management system), VPP (virtual power plant), and Microgrids, considering among others the role of ICT and forecasting, trading and scheduling optimization.

3. Analysis of technological improvements that will allow DER aggregation to move to the next level of controllability and flexibility: (a) improved forecasting of production and consumption; (b) use of control capabilities of DER, including demand response.
4. Identification of regulatory and business model trends related to DER aggregation: (a) new wholesale market rules; (b) peer to peer (transactive) markets – open retail competition.
5. Experiences and case studies of DER aggregation.
6. Guidelines and existing practices, techno-economic challenges and solutions for the deployment of DER aggregation platforms.

Joint work with other SCs:

Results from JWG C2.B4.38 'Capabilities and requirements definition for Power Electronics based technology for secure and efficient system operation and control' will be taken into account for further work of this WG. A liaison expert from SC C2 will be invited.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule : start : August 2018 **Final report** : December 2020

Approval by Technical Council Chairman

Date : 06/07/2018

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

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