CIGRE Study Committee B4

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG [1]N° B4. 81	**Name of Convenor:** Kamran Sharifabadi (Norway)	
Technical Issues #[2]: 3	**Strategic Directions #[3]: 1**	
The WG applies to distribution networks[4]: No		
Potential Benefit of WG work #[5]: 2-3-4		
Title of the Group: Interaction between nearby VSC-HVDC converters, FACTs devices, HV power electronic devices and conventional AC equipment.		

Scope, deliverables and proposed time schedule of the WG:

Background:

Large integration of renewable energy sources and HVDC converters in power system have resulted in displacement of conventional power generation, lower system inertia and lower short circuit capacity of the AC power system. The AC grids integrates multiple converters in the close vicinity that potentially influence each other. The interoperability and stability of the system with massive amounts of converters is regarded as a key issue in future power systems and decarbonization of the industry.
In recent years large-scale integration of solar, wind and HVDC converters, have resulted in several stability problems in the power system.
Interactions phenomena between VSC-HVDC converters and other power electronics devices or passive HV components installed on the network, can have a wide range of frequencies: from interarea oscillations, to sub-synchronous interaction and even high frequency interaction (between 100 Hz till several kHz). In addition, interactions due to non-linear behaviour such as transformer saturation, control non-linearity, etc. can also occurs.
TB 149 presented methods to coordinate controls of classical HVDC and FACTS in the same system.
At the moment the industry utilizes new VSC (Voltage Source Converter) technologies, new approaches and recommendations for modelling of equipment's, new and more powerful offline EMT (Electro Magnetic Transient) simulations tools, and RTS (Real Time Simulation) tools connected to replica of control & protection cubical of the equipment.
Various simulations tools and models from the converters and passive grid components are available. Through various papers presented in CIGRE conferences it has been documented that the tools and models representing the active and passive components have a major influence on the study result.
At the moment there are no clear recommendations or standards on modelling requirements, preferred tools to be utilized at which stage of the project life cycle to perform the required studies.

Scope:

This WG focuses on the interaction between VSC-HVDC converters and the other power electronics or passive HV (High Voltage) devices or components. The TB should provide recommendations on:

- Methodologies to analyse and to assess control interactions in meshed AC networks with multiple converters
- Required data and modelling recommendations to analysis such interactions
- Time schedule to perform such studies at various stage (life cycle) of a VSC-HVDC

or FACT project

- Simulation (offline and real time) tools and models that can impact the study results
- Confidentiality issues and model exchange for multivendor systems
- Risk assessment and solutions (this may be useful for HVDC owners and operator to improve specifications and requirements for vendor models)

Deliverables:

☒ Technical Brochure and Executive Summary in Electra

☒ Electra Report

☒ Tutorial[6]

☒ Webinar[6]

Time Schedule: start: March 1-2019 **Final Report**: August 1-2022

Approval by Technical Council Chairman:

Date: February 7th, 2019

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

Table 1: Technical Issues for creation of a new WG

1	Active Distribution Networks resulting in bidirectional power and data flows within distribution levels up to higher voltage networks
2	Digitalization of the Electric Power Units (EPU): Real-time data acquisition includes advanced metering, processing large data sets (Big Data), emerging technologies such as Internet of Things (IoT), 3D, virtual and augmented reality, secure and efficient telecommunication network
3	The growth of direct current (DC) and power electronics (PE) at all voltage levels and its impact on power quality, system control, system operation, system security, and standardisation
4	The need for the development and significant installation of energy storage systems, and electric transportation, considering the impact they can have on the power system development, operation and performance
5	New concepts for system operation, control and planning to take account of active customer interactions, and different generation types, and new technology solutions for active and reactive power flow control
6	New concepts for protection to respond to the developing grid and different generation characteristics
7	New concepts in all aspects of power systems to take into account increasing environmental constraints and to address relevant sustainable development goals.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics
9	Increase of right of way capacity through the use of overhead, underground and submarine infrastructure, and its consequence on the technical performance and reliability of the network
10	An increasing need for keeping Stakeholders and Regulators aware of the technical and commercial consequences and keeping them engaged during the development of their future network

Table 2: Strategic directions of the Technical Council

1	The electrical power system of the future: respond to speed of changes in the industry
2	Making the best use of the existing systems
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, social and economic benefits 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 directions
5	Guide or survey related to existing techniques; or an update on past work or previous Technical Brochures
6	Work likely to contribute to improved safety.
7	Work addressing environmental requirements and sustainable development goals.