

CIGRE Study Committee B5
PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

JWG 1^o B5.C4.79	Name of Convenor: Mukesh Nagpal (CA) E-mail address: mukesh.nagpal@bchydro.com
Strategic Directions #2: 1	Sustainable Development Goal #3: 9
The JWG applies to distribution networks: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	
Potential Benefit of WG work #4 : 1,2,3,4,5	
Title of the Group: Protection Roadmap for Low Inertia and Low Fault Current Networks	
<p>Scope, deliverables and proposed time schedule of the JWG:</p> <p>Background:</p> <p>Over the last decades, significant and fast increase of Decentralized Energy Resources (DER) Inverter Based Generation (IBG) have been observed in many countries to facilitate the integration and transmission of renewable energy (e.g., solar and wind farms, HVDC links, etc.). It becomes more and more obvious that this (r)evolution will go on in the foreseeable future and will probably accelerate due to the urgent need for decarbonization and the decision made by some countries to leave the nuclear technology in relatively short term.</p> <p>It became obvious that all these DER and IBG have strong impacts on many aspects of power systems, including protection functions and schemes. Many of these impacts have been successfully anticipated, but some of them have only been detected thanks to experience feedback after the first implementations. This gave rise to many parallel activities in many countries and organizations, without focus, division of work, and harmonization. Consequently, plenty of documents (with repetition and overlap) mainly addressing narrow topics have been produced over the time and continue to be released today. In such a context, getting a clear and comprehensive “state-of-the-art” overview of key problems and recommended solutions remains really challenging.</p> <p>Besides, this lack of overview prevents the community to move from “lagging mode”, where some issues are discovered on the field, to “leading mode”, where priorities for future works can be defined soon enough thanks to a clear view on missing elements. This would allow identifying concrete solutions in time through appropriate and harmonized actions.</p> <p>Finally, it must be underlined that the time aspect is a critical success factor for a working group on these aspects. As mentioned above, the deployment of decentralized and power electronic converters is on the way and will probably accelerate over the next several years. In parallel, IEC and IEEE are preparing standards or guidelines for standardization aiming at establishing consistency in this domain. The sooner the deliverables of the working group are made available to the community, the better.</p> <p>Scope:</p> <p>The goal of this working group is to address all these issues through the following steps:</p> <ol style="list-style-type: none"> 1. State-of-the-art of well-known phenomena impacting the behavior and the design of protection schemes/equipment in systems near unconventional sources: 	

- a. short and comprehensive description of the issues organized by protection principle / functions (e.g. directional, distance, step distance, break failure etc.) and protected apparatus (e.g. line, transformer, busbar etc.)
 - b. short and comprehensive description of the possible solutions, with clear recommendations and feedback from users
 - c. list of publication references providing detailed information about the various phenomena and the recommended solutions
2. Setup of a roadmap defining the most urgent topics to be addressed in future works, together with a proposed deadline where the corresponding conclusions should be made available:
- a. Short and comprehensive description of the issues
 - b. Short and comprehensive description of what could happen if the corresponding issues are not solved
- The issues to be considered can be of various types: technological, asset management, knowledge management, network codes and standards etc.
3. Survey sent to the Cigre community (universities, utilities, manufacturers ...) aimed at collecting inputs regarding scope items 1 and 2. Specific attention will be paid to develop a well-structured and "to the point" survey, where the priority will be given to the clarity, the conciseness and the unambiguity of answers

The final goal is to get a comprehensive and holistic view of problems, solutions and remaining issues (when known) instead of an in-depth and silo-based description.

Out of scope:

- Detailed presentation of issues and solutions

Remarks:

- Due to the fast evolution of the technology, it is expected to have the report 2 years after the start of the working group.
- For point 1, publications inside and outside Cigre will be considered. Also, C2/C4 TB 851 released in December 2021 should be considered.
- Need to have representatives from primary and secondary equipment manufacturers, utilities universities or research centers.

Deliverables:

- Technical Brochure (1st release after 2 years, 2nd release after 4 years) and Executive Summary in Electra
- Electra Report
- Future Connections
- CSE
- Tutorial
- Webinar

Time Schedule: start: 08 2022

Final Report: 08 2024

Approval by Technical Council Chairman:

Date: August 2, 2022



Notes: ¹ Working Group (WG) or Joint WG (JWG), ² See attached Table 1, ³ See attached Table 2 and CIGRE reference Paper: Sustainability – at the heart of CIGRE's work. ⁴ See attached Table 3

Table 1: Strategic directions of the Technical Council

1	The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-of-the-art technological advances
2	Making the best use of the existing systems
3	Focus on the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)
4	Preparation of material readable for non-technical audience

Table 2: Environmental requirements and sustainable development goals

	CIGRE selected the 7 SDGs that are the most relevant to CIGRE. In case the WG work refers to other SDGs or do not address any specific SDG, it will be quoted 0.
0	Other SDGs or not applied
7	SDG 7: Affordable and clean energy Increase share of renewable energy; e.g. expand infrastructure for supplying sustainable energy services; ensure universal access to affordable, reliable, and modern energy services; energy efficiency; facilitate access to clean energy research and technology
9	SDG 9: Industry, innovation and infrastructure Facilitate sustainable infrastructure development; facilitate technological and technical support
11	SDG 11: Sustainable cities and communities Increase attention on sustainable and resilient buildings utilizing local (raw) materials, power for electric vehicles, strengthening long-line transmission and distribution systems to import necessary power to cities, developing micro-grids to reinforce the sustainable nature of cities; protect and safeguard the world's cultural and natural heritage; reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management
12	SDG 12: Responsible consumption and production E.g. Promote public procurement practices that are sustainable; address reducing use of SF6 and promote alternatives, encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle, address inefficient fossil-fuel subsidies that encourage wasteful consumption
13	SDG 13: Climate action E.g. Increase share of renewable or other CO ₂ -free energy; energy efficiency; expand infrastructure for supplying sustainable energy; strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; integrate climate change measures into national policies, strategies and planning; improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
14	SDG 14: Life below water E.g. Effects of offshore windfarms; effects of submarine cables on sea-life
15	SDG 15: Life on land E.g. Attention for vegetation management; bird collisions; integration of substations and lines into the landscape

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.

Comments:

1) CIGRE Official Study Committee Rules re WG Membership:

<https://www.cigre.org/GB/about/official-documents>

No more than one member per country unless by SC Chair exception.

WG nominees must first be supported by their National Committee (or local SC Member) as an appropriate representative of their country.

Acceptance of the nomination is granted by the SC Chair and advised to the WG Convener

2) CIGRE will provision a dedicated Space for the Working Group in the Knowledge Management System. The WG will use the KMS for drafting collaboration, capture and retention of discussion and meeting records. WG Members will be sent registration instructions by the Convener.

<https://www.cigre.org/article/GB/collaborative-tools-2>