

CIGRE Study Committee B5

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG N° B5.83	Name of Convenor: Tang Yi	
Strategic Directions #²: 1,3		Sustainable Development Goal #³: 7,9
The WG applies to distribution networks: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No		
Potential Benefit of WG work #⁴: 1,4		
Title of the Group: Protection for modern distribution networks		
<p>Scope, deliverables and proposed time schedule of the WG:</p> <p>Background:</p> <p>Over the years economic developments and the penetration of Distributed Energy Resources (DER) present ever increasing challenges to protection of MV/LV distribution network, including:</p> <ol style="list-style-type: none"> 1. Detection and clearing of very high impedance faults such as downed conductors, tree faults to reduce risks of electric shocks and bush fires. 2. Very fast fault isolation and service restoration to mitigate the impacts of faults to sensitive loads such as semiconductor manufacturing apparatus, bank computer systems. 3. The infeed of DERs changes fault current distribution and may result in mal-operating of widely used overcurrent protection. 4. New anti-Islanding methods which have no NDZ (Non detection zone) , are compatible to voltage and frequency ride though requirements of DERs are required. 5. More sensitive protection for micro grids with a large portion of inverter interfaced DERs whose fault currents are limited are required. 6. Suitable protection methods for DC distribution networks are required. <p>These challenges have been pushing forward towards inventions and applications of innovative protection relays utilizing state of art of microelectronic and communication technology. The proposed report will establish the state of the art in this field and investigate emerging protection methods for distribution networks and make suggestions for further developments and applications of new protection relays.</p> <p>Scope:</p> <ol style="list-style-type: none"> 1. Overview of present protective relay applications in distribution networks. 2. Challenges faced by protection of modern distribution networks and technical requirements for new protection methods. 3. Analysis of fault impedance coverage of conventional protection relays and new protection methods for high impedance faults (taking into account the accuracy of instrument transformers). 4. New earth fault protection methods especially those using transient signals for neutral isolated and compensated distribution networks. 5. Directional overcurrent protection for distribution networks with high penetration of DERs and new fault direction identification methods. 6. Pilot protection scheme for distribution networks to achieve fast fault isolation and service restoration. 7. Developments on anti-islanding protection methods which can detect islanding and are matched to voltage and frequency ride though functions of DERs. 		

8. Protection methods for micro grids to cope with weak fault current infeed of inverter interfaced DERs.
9. First discussion on fault analysis of DC distribution networks and applied protection methods.
10. Suggestions on the developments and applications of new protection methods for modern distribution networks.

Relations to other WG:

Findings of WG B5.48 (Protection for Developing Network with Limited Fault Current Capability of Generation) and WG B5.94 (High Impedance Faults – TB 402) have to be taken into account and referenced.

Exclusions:

Detailed discussion on fault analysis of DC distribution networks and applied protection methods, this will be covered by a future working group based on the conclusion of the B5.83 brochure.

Deliverables:

- Technical Brochure and Executive Summary in Electra
- Electra Report
- Future Connections
- CSE
- Tutorial
- Webinar

Time Schedule: start: March 2023

Final Report: December 2025

Approval by Technical Council Chairman:

Date: February 16th, 2023



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>