CIGRE Study Committee B2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG N° B2.87	**Name of Convenor:** Dr. Bálint NÉMETH (Hungary)
Strategic Directions #[2]: 2, 4	**Sustainable Development Goal #[3]:** 9
The WG applies to distribution networks: ☒ **Yes** / ☐ **No**	
Potential Benefit of WG work #[4] : 3,5,6	
Title of the Group: Live line and vicinity working on overhead lines: Safe Management Guidelines	

Scope, deliverables and proposed time schedule for the WG:

Background:

Overhead line maintenance and construction on energized high and medium voltage lines are regular activities at all utilities. The main role of live-line work is to maximize availability of the network and/or avoid service disruption to customers.

Safety procedures adopted by individual network operators and live-line work service providers are based on International Standards (e.g. EN and IEC standards (TC 78); EN 50110-1:2013, General; IEEE 516, AS 5804 High-voltage live working). For example, the standards provide guidelines for assessing the integrity of existing insulation and identification of electrical hazards, as well as suggest methods to *calculate safe electrical clearances* for line workers and mobile platforms (Minimum Approach Distance; e.g. EN 61472, Live working - Minimum approach distances for A.C. systems in the voltage range 72,5 kV to 800 kV – A method of calculation). While useful, most calculation methods utilize generic or typical values. Furthermore, the standards provide limited guidance with respect to the effect tools used in live-line work have on the electric field. Similarly, requirements for helicopter platform access to a live conductor are also not addressed.

Technological advancement with composite insulators led to several new designs, so-called “compact geometries”, being introduced in transmission and distribution grids around the world. From live-line maintenance’s point of view, *minimum approach distance* (MAD) values have to be reconsidered for these new configurations. In addition, modification of geometry also has an effect on the distribution of the electric and magnetic fields, and this impact also needs to be understood.

More and more activities are performed in the *vicinity of the energized grid* (e.g. one line is alive while dead line maintenance work is done on the other) or working near or in close proximity to live power lines. As a result of inductive and capacitive coupling, both high voltage and high current may occur in the vicinity of the energized parts. It is essential to provide proper guidelines for these close proximity tasks in all type of grounding systems.

The objective of this WG is *to assess/develop management protocols and* engineering controls to ensure a safe work environment is provided for live-line and close proximity construction and maintenance on high and medium voltage overhead lines.

Scope:

- Review of acceptable risk levels adopted by regulatory bodies (e.g.is < $1x\ 10^{-6}$ acceptable?)

- Compare live-line work standards (IEC, EN, IEEE, ASTM, Australian Standard, etc.) and assessment of the basis for calculating MAD for AC live working
- Evaluate the risk of arc length exceeding MAD; evaluate a surge exceeding nominal design overvoltage
- Assess insulator integrity calculation methods
- Review methods for changing insulators to manage unusual insulator configurations or damaged strings
- Minimizing hazards during inadvertent HV and EHV System Overvoltage Conditions with the use of Portable Protective Air Gap (PPAG) applications during Live Line Barehand Work Methods while changing insulators
- Evaluate other electrical hazards, such as Ferranti effect, induced voltages from parallel lines, lightning surge
- Review hot stick and barehand live work methods at line voltage exceeding 35 kV
- Review HVAC overhead lines grounding techniques and working in the vicinity of voltage including induced voltage and currents which could lead to fatalities
- Safety principles for Live Working in HV and MV grids (Safe Work Zone)
    - Cause and effects to the workers of any ground potential rise due to poor soil conditions of the grounding integrity during an unplanned system fault current incident
    - Vehicle grounding / earthing while in the vicinity or working on or near energized lines – earth cable sizing to support fault current availability
    - Rescue techniques – High altitude rescue from the bundle conductor from a conductor cart, lattice structure, aerial basket

Scope exclusion

- Glove & barrier
- TB 831 (WG B2.62) COMPACT DC OVERHEAD LINES

References

- CIGRE: Live Work – A Management Perspective (Technical Brochure No 561). Joint Working Group B2/B3.27, Paris (2013)
- CIGRE, WG B2.64 Inspection and Testing of Equipment and Training for Live-Line Work on Overhead Lines

Deliverables:

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

Time Schedule: start: January 2022 **Final Report**: December 2024

Approval by Technical Council Chairman:

Date: February 16,2022

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 rapid changes in the industry by preparing and disseminating information on 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 SF_6 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.