CIGRE Study Committee B2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG N° B2.74	**Name of Convenor:** Nishal MAHATHO (SOUTH AFRICA) **E-mail address**: MahathN@eskom.co.za
Technical Issues #[2]: 8, 9	**Strategic Directions #[3]:** 1, 2, 3
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[5]: 1, 2, 4, 6	
Title of the Group: Use of unmanned aerial vehicles (UAVs) for assistance with inspection of overhead power lines	

Scope, deliverables and proposed time schedule of the WG

Background

Unmanned aerial vehicles (UAVs) have in recent years become available to assist with planned inspections of overhead power networks and with emergency inspection of such networks. They have the potential to significantly improve efficiency of both tasks, by reducing the time needed to complete the tasks and for increasing the number of defects detected during the inspections. UAVs are also expected to be cheaper than manned aerial inspections. However, there are practical questions of using UAVs in this application, e.g. when and how often to perform inspections, under which conditions they should and should not be performed, how they should be performed and which UAV technologies are best suited to this application. Issues such as battery life and how to translate images into useful reports also require consideration. Legal requirements also need to be considered.

CIGRE TB 731, which deals with robotics on overhead transmission lines, has previously been published. The new work will advance TB 731 by focussing on UAVs, including distribution networks and providing updates on available technology and testing.

Scope:

1. Conduct a literature scan on latest UAV technologies suitable for this application.
2. Collate experiences from around the world with respect to experience with UAVs on overhead power lines by conducting a survey.
3. Compile a guide to the conditions (technical, safety, environmental, legal and economic) under which UAVs are most suitable and when their use is not recommended and, when they are used, how such inspections should be performed.

The following aspects will be covered:

1. Available technologies (advantages and limitations).
2. Hardware and type of data collected.
3. Collation of common regulatory requirements relating to power line inspections by UAVs.
4. Payloads of interest, e.g. equipment for UV, Infrared, LiDAR.
5. Cost comparison with conventional inspection methods.
6. Communication between the UAV and the ground station.

7. Allowable distance between UAVs and energized objects, requirements for Electromagnetic Fields/Compatibility and weather constraints.
8. Test requirements updated from TB 731 and test experiences from members.
9. Methods for data processing and classification of defects.
10. Case studies of certain specific applications provided by member utilities.

This work will cover both transmission and distribution lines.

Topics not covered are :

- Use of UAVs for ice accretion detection and ice removal on conductors and supports.
- Types of software and licences.
- Implementation in Asset Management Policies.
- Collection of weather data.
- Communications with network operating systems.

Deliverables

☒ Technical Brochure and Executive Summary in Electra

☐ Electra Report

☒Tutorial[6]

☐ Webinar[6]

Time Schedule: start: April 2019 **Final report** : end 2022

Approval by Technical Council Chairman:

Date: March 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.