CIGRE Study Committee A2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

JWG N° A2/D1.67	**Name of Convenor : Tara-lee MacARTHUR (AU)** tara-lee.macarthur@energyq.com.au
Strategic Directions #[2]: 1,2,4	**Sustainable Development Goal #[3]: 9**
The WG applies to distribution networks: ☒ Yes / ☐ No	
Potential Benefit of WG work #[4] :1-6	
Title of the Group: Guideline for Online Dissolved Gas Analysis Monitoring	

Scope, deliverables and proposed time schedule of the Group

Background:
Dissolved gas analysis (DGA) has been an industry standard for detecting and determining faults in transformers for over 50 years. In developments over the last 30 years, online DGA monitoring devices have been a valuable tool for the detection of incipient faults as well as an aid in the condition assessment of power transformers.

One of the major advantages of online monitors is the high sampling rate of the parameter being measured relative to the traditional offline testings methods. Online monitoring gives users significant volumes of data to trend and analyses, new insights into the performance, and the ability to observe a high rate of change, including rapid deterioration of the condition.

Online monitoring systems can be configured to alert the asset operator when incipient failure modes are observed within the transformer, requiring rapid decision-making and possible action. If users respond promptly to these alarms, major failures can often be prevented.

Today, the industry lacks information about the typical values and, most importantly, typical rates of gas formation based on continuous online measurements. In addition, one must notice that gas rates are now referred to as the minutes or hourly ranges and may have transient oscillations that are not compatible with the experience observed in laboratory DGA, typically obtained after yearly or similar sampling rates.

Scope:
The proposed scope of work is divided as follows:

1. Develop guidelines for the interpretation, acceptable limits and trends for online DGA monitoring equipment. Typically they are not covered by existing standards and guides.
2. Recommendation for the application of key gas or multiple gas monitors (2 gas, 3 gas, 5 gas, or 9 gas)
3. Gather online sensors data based on anonymity for initial analysis to be performed by the WG. This data is fundamental.
4. Assess the impact of sensor output resolution (if in the seconds, min. or hourly range).
5. If possible, associate gas readings (levels and trends) to failure data.
6. Compare the different interpretation methods according to their application for monitoring electrical equipment (advantages/challenges).
7. Develop a list of recommended actions users should take when an alarm occurs. In addition, define other useful correlating data being measured/archived in the monitor to assist in diagnosing the issues together with gases measured.

8. Develop a guide to selecting an online DGA system, the verification processes of results of online DGA systems.
9. Develop evaluation criteria for online DGA systems (e.g. mounting options, the criticality of the equipment, value of the equipment)
10. Develop guidelines for maintenance requirements for online DGA systems
11. Provide examples of the different use cases for online DGA systems.

Remarks:
Reference to CIGRE Technical Brochures and Green Books with respective coordination with some WGs, relevant for this WG:

- TB343 Recommendations for Condition Monitoring and Condition Assessment Facilities for Transformers, TB 671 Transformer Condition Assessment, TB 783 DGA Monitoring Systems
- TB 630 Transformer Main Subsystems Annex A FMEA Example
- *NEW* WG B3.61 Risk and Asset Health-Based Decision Making

Deliverables:

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

Time Schedule: start: Autumn 2022 **Final Report:** Spring 2024

Approval by Technical Committee Chairman :

Date : July 25th , 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