

CIGRE Study committee B3
PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

JWG B3/A3.76

NAME OF THE CONVENOR

Knol Piet (NETHERLANDS)

NAME OF THE SECONDARY CONVENOR

LUTZ Bernhard (GERMANY)

TITLE

Practical and Operational User Experiences from Non-SF₆ Gas and Gas-Mixtures in Substations

THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION

4 / Sustainability and Climate Change

POTENTIAL BENEFIT OF WG WORK

- 1 / commercial, business, social, economic benefits
- 3 / likely to contribute to new or revised industry standards
- 4 / state-of-the-art or innovative solutions or directions

STRATEGIC DIRECTION

- 2 / Making the best use of the existing systems
- 3 / Focus of the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)

SUSTAINABLE DEVELOPMENT GOAL

- 7 / Affordable and clean energy
- 9 / Industry, innovation and infrastructure

BACKGROUND :

Recent developments in switchgear technology show a significant increase in the use of vacuum switching, non-SF₆ gases and gas-mixtures for insulation and arc-quenching in medium-voltage (MV) and high-voltage (HV) applications. These alternative solutions typically rely on components found in ambient air - such as N₂, O₂, and CO₂ - and may also include fluorinated compounds.

The primary driver for this transition is the reduction of potential greenhouse gas emissions throughout the full life cycle of switchgear equipment. This shift supports global climate-change mitigation efforts, aligns with evolving regulatory frameworks, and contributes to the achievement of net-zero targets.

With Study Committees A3 and B3 publishing the Application and User Guide for Non-SF₆ Gases, and with the number of installed bays increasing rapidly, valuable operational experience is now emerging across the industry. Collecting these user insights and synthesizing the key observations will be essential to support further standardization, guide safe and effective implementation, and inform future technology development.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

Share user Experiences of non SF₆ gasses

SCOPE :

1. Field Experience Collection

- Gather user feedback from existing installations across different geographies, climates, voltage levels (MV, HV),

- as well as equipment types (air-insulated switchgear, gas insulated switchgear, gas insulated lines).
- Identify specification of the equipment, sourcing performs, operational conditions, commissioning practices, and maintenance approaches.
2. **Performance Assessment**
- Evaluate insulation and switching performance of non-SF₆ gases and gas-mixtures under real-world operating conditions.
 - Document reliability, availability, and lifetime behaviour as observed by users.
3. **Environmental and Safety Aspects**
- Assess environmental performance across the equipment life cycle, including gas-composition and-decomposition as well as leakage behaviour, overall handling, maintenance, and end-of-life considerations.
 - Collect safety-related observations, including required qualifications, procedures, and incident reporting (if any).
4. **Operational Challenges and Mitigation**
- Identify recurring challenges such as monitoring, gas handling, climatic sensitivity, or interoperability with existing substation infrastructure.
 - Summarize mitigation measures and best practices implemented by operators.
5. **Lessons Learned and Recommendations**
- Derive practical guidance for future installations, including specification, operation, and maintenance considerations.
6. **Out-of-Scope Items**
- Fundamental gas development, laboratory research, and manufacturer design details.
 - Technology benchmarking or ranking of specific vendors or proprietary solutions.
 - Please note there are D1.A3.B3 TOR in preparation, where the physical background and material properties for the following two aspects will be in focus 1) Gas leakage and permeation as well as 2) gas decomposition (physical-chemical background, decomposition products, gas analysis, impact on materials (compatibility and maybe also permeation) and EHS

DELIVERABLES AND EVENTS

Deliverables Types

Electra report
Future connections
Technical Brochure and Executive Summary in Electra
Tutorial
Webinar

Deliverables schedule

Technical Brochure	Q4	2029	Technical Brochure and Executive Summary in Electra
Electra report	Q4	2029	Electra Report
Future connect.	Q3	2029	Electra Report
Tutorial	Q1	2030	Tutorial
Webinar	Q1	2030	Webinar

Time schedule

Q2	2026	Recruit members (National Committees, WiE, NGN)
Q3	2026	Develop final work plan
Q3	2028	Draft TB for Study Committee Review

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:

Rannveig Loken
July 09th, 2026