

CIGRE Study Committee B1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG 1^{N°} B1.88	Name of Convenor: Pierre Mirebeau, FRANCE	
Strategic Directions #²: 1		Sustainable Development Goal #³: 9,12
The WG applies to distribution networks: <input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No		
Potential Benefit of WG work #⁴ : 1,2,3,4,6		
Title of the Group: Recommendations regarding the use of non SF6 gases in cable systems		
Scope, deliverables and proposed time schedule of the WG:		
Background:		
<p>Sulphur hexafluoride gas (SF6) is the most currently used gas in the transmission grid for its remarkable properties as a high strength gaseous dielectric medium and arc suppression (e.g. high-voltage circuit breakers, switchgears). Nevertheless, SF6 has the major drawback of presenting a global warming potential (GWP) of 23500 (relative to CO2), and it has a lifetime in the atmosphere of 3200 years, thus placing it amongst the gases presenting the most potent greenhouse effect.</p> <p>This has led industry and research engineers to seek alternatives to SF6. The challenge is to keep high performance in harsh ambient conditions, in terms of voltage withstand, current interruption and heat transfer, with similar design to today's equipment.</p> <p>Research was done on substitutes to SF6, covering different dielectric gases all having various properties and fields of use. For instance, reference is made to TB 849 "electric performance of new non-SF6 gases and gas mixtures for gas-insulated systems and TB 871 "Current interruptions in SF6-free Switchgear".</p> <p>Components of cable systems have been developed. Due to the major difference between SF6 and the alternative gases, it's relevant to issue a technical recommendation regarding the use of non SF6 gases in cable systems.</p>		
Scope:		
Assess the consequence of replacing SF6 gases for cable accessories.		
Components:		
All accessories of cable systems that presently contain or are surrounded by SF6 gas, e.g. GIS terminations, outdoor terminations, except laboratory terminations.		
Voltage:		
All voltages where SF6 is used in HVAC and HVDC		
Gases:		
The WG should concentrate on insulating gases that are used in power network equipment, e.g. C4-FN, C5-FK, HFO1234zeE, and compressed Air. This selection is coordinated with SC B3 and A3. A link to WG B3-A3.60 should be established.		
Tests to be considered for components:		

Compatibility (and corrosion) including by products in case of electric arc and/or moisture.

Thermal conductivity (Electrothermal motion of the gas)

Gas content measurement, including moisture and by-products.

Pressure tests

Behaviour at low temperature, dew point.

Gas leakage

Tests to be applied to the cable system:

Address any special issue when testing a cable system where non SF6 insulating gases are used.

Practical issues to be addressed:

Safety and Toxicity of gases and by products in coordination with B3-A3-D1.

Degradation mechanisms.

Retrofitting of components.

WG members

The members of the working group shall be essentially composed of cable system and components manufacturers, academic and utilities. An expert from D1 WG.67 (TB 849) and an expert from B3/A3.60 should be included in the WG. Liaison with A3.41, B1/B3/D1.79 and B3/D1.63.

Deliverables:

Annual Progress and Activity Report to Study Committee

Technical Brochure and Executive Summary in Electra

Electra Report

Future Connections

CIGRE Science & Engineering (CSE) Journal

Tutorial

Webinar

Time Schedule: start: Q4 2022

Final Report: Q4 2025

Approval by Technical Council Chairman:

Date: December 11th, 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

WG Membership: refer Comments at end of document

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: WG Membership

<https://www.cigre.org/GB/about/official-documents>

- a. Only one member per country (by exception of SC Chair)
- b. WG nominees must first be supported by their National Committee (or local SC Member) as an appropriate representative of their country.
- c. Acceptance of the nomination is granted by the SC Chair and advised to the WG Convener

2) Collaboration Space

<https://www.cigre.org/article/GB/collaborative-tools-2>

CIGRE will provision the WG with a dedicated Knowledge Management System Space.

The WG will use the KMS for drafting collaboration, capture and retention of discussion and meeting records.

Official country WG Members will be sent registration instructions by the Convener.

Official country WG Members may request the WG Convener to allow additional access for an extra national subject matter specialist to aid in the work at the national level, including NGN members.