

g³ Technology



The Alternative to SF₆ for High Voltage Applications

Removing Greenhouse Gases from the Grid

Nine of the ten warmest years on record have occurred since 2000, where greenhouse gases (GHGs) are at the root cause of climate change. Sulfur hexafluoride (SF₆), an insulating gas used in high-voltage switchgear, is estimated to contribute 23,500 times more than carbon dioxide (CO₂) to the greenhouse effect and can remain in the atmosphere for 3,200 years. Previously, Power Generation and Transmission utilities had no alternative to SF₆ for these products.

Green Gas for Grid (g³, pronounced “g” cubed) is GE’s environmentally-friendly alternative gas to SF₆ developed for high voltage (HV) electrical transmission equipment. g³ products feature the same ratings and same dimensional footprint as the state-of-the-art SF₆ ones, with a drastically reduced environmental impact: more than 99% less gas global warming potential (GWP), comparatively. Also, g³ products operate with no restriction under the same temperature range as SF₆ products (down to -30°C).

GE has a number of g³ initiatives currently underway on **19 sites** that together will reduce the impact of the installed gas masses by more than 380,000 tons of CO₂ equivalent and cut GHG emissions by more than 99%. These projects include **70 GIS bays , 2033 meters of GIL, 6 AIS Current Transformers, 3 Combined Mesuring Units and 2 AIS Live Tank Circuit Breakers.**

Same Performance, Global Warming Impact Reduced by More than 99%

Technical Benefit

- g³ is applicable to all voltage levels
- g³ is applicable at the same ambient temperature ranges as SF₆
- g³ high voltage equipment feature the same dimensional footprint as state-of-the-art SF₆ equipment
- g³ is non toxic and falls in the same safety class as SF₆

Environmental Benefit

- Remaining gas GWP represents only +/-1 % of that of SF₆
- g³ products dimensions are not increased, so the other environmental factors remain unchanged, contributing to the lowest environmental impact over the life cycle

Financial Benefit

- Utilities can qualify for tax reductions or incentives related to the reduction of their greenhouse gas emissions

Green

- g³ products feature a **reduced Global Warming Potential by more than 99%** compared with SF₆ products
- **Lowest environmental impact** over the life cycle of all SF₆-free solutions
- No impact on ozone depletion

Safe

- In the same toxicity class as SF₆ in its fresh state or after interruption in a circuit breaker
- 3M™ Novec™ 4710 molecule is registered according to European REACH process for chemicals

Easy to operate

- Gas mixtures prepared in factories by certified suppliers
- g³ filling and recovery at customer sites with gas cart
- Accessories for HV equipment including density switches, valves (mistake proof), moisture absorber
- Measurement devices to monitor gas ratio, moisture, tightness and detect leakage



g³ Portfolio

145 kV Gas-Insulated Substations

40 kA, for -25°C applications
11 sites, more than 63 bays



GIS in Switzerland (Axpö)

420 kV Gas-Insulated Lines

63 kA, for -25°C applications
5 sites, more than 2033 meters



GIL in England (National Grid)

Current Transformer up to 245 kV
Voltage Transformers up to 123 kV
Combined metering units up to 123 kV
63 kA, for -30°C applications
2 sites, six 245 kV Current Transformers



CTs in Germany (TenneT)

Designed for g³

72.5 kV Gas-Insulated Substations

31.5 kA, for -25°C applications



145 kV Live Tank Circuit-breaker

40 kA, for -30°C applications



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