

g³ Technology



The Alternative to SF₆ for High Voltage Applications

Removing Greenhouse Gases from the Grid

Nineteen of the 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.

g³, pronounced “g” cubed, is GE’s game changing 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 **30 sites** that together will reduce the impact of the installed gas masses by more than one million tons of CO₂ equivalent and cut GHG emissions by more than 99%. These projects include **more than 100 145 kV GIS bays and nine 420 kV GIS bays, 5,000+ meters of GIL, and fourteen 145 kV Live Tank Circuit Breakers.**

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

Technical Benefit

- g³ gas is applicable to all voltage levels
- g³ gas 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 gas 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

Better for the grid, Better for the planet

- 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
16 sites, more than 100 bays



GIS in Switzerland (Axpö)

420 kV Gas-Insulated Lines

63 kA, for -25 °C/-30 °C applications
8 sites, more than 5,000 meters



GIL in England (National Grid)

Live Tank Circuit breakers up to 145 kV

40 kA, for -30°C applications
5 sites, 14 circuit breakers



Live Tank CB in Switzerland (Groupe E)

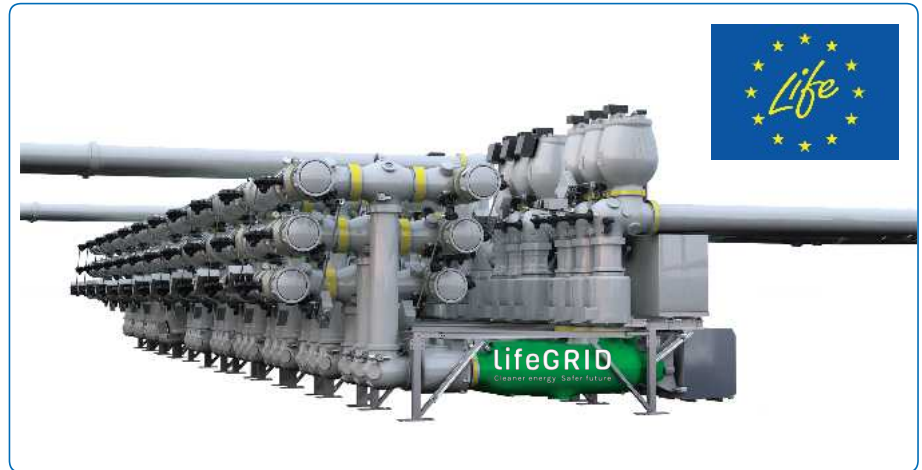
Development of a 420 kV g³ GIS

Next on the g³ roadmap is the development of a g³ 420 kV GIS including the g³ interrupter for this GIS.

LifeGRID

LifeGRID is GE's project to develop the 420 kV g³ circuit breaker at the core of the substation. This project is being co-funded over a three-year period by the EU's LIFE Programme dedicated to climate change. The specifications of the circuit breaker's main performance requirements were made with the inputs of a major electrical grid operator.

To know more: www.lifegrid.eu



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