

# AIR

## 5 Reasons to Transition from SF<sub>6</sub> to Pure Air in MV Switchgear

by Christophe Prévé



Schneider  
Electric

Life Is On

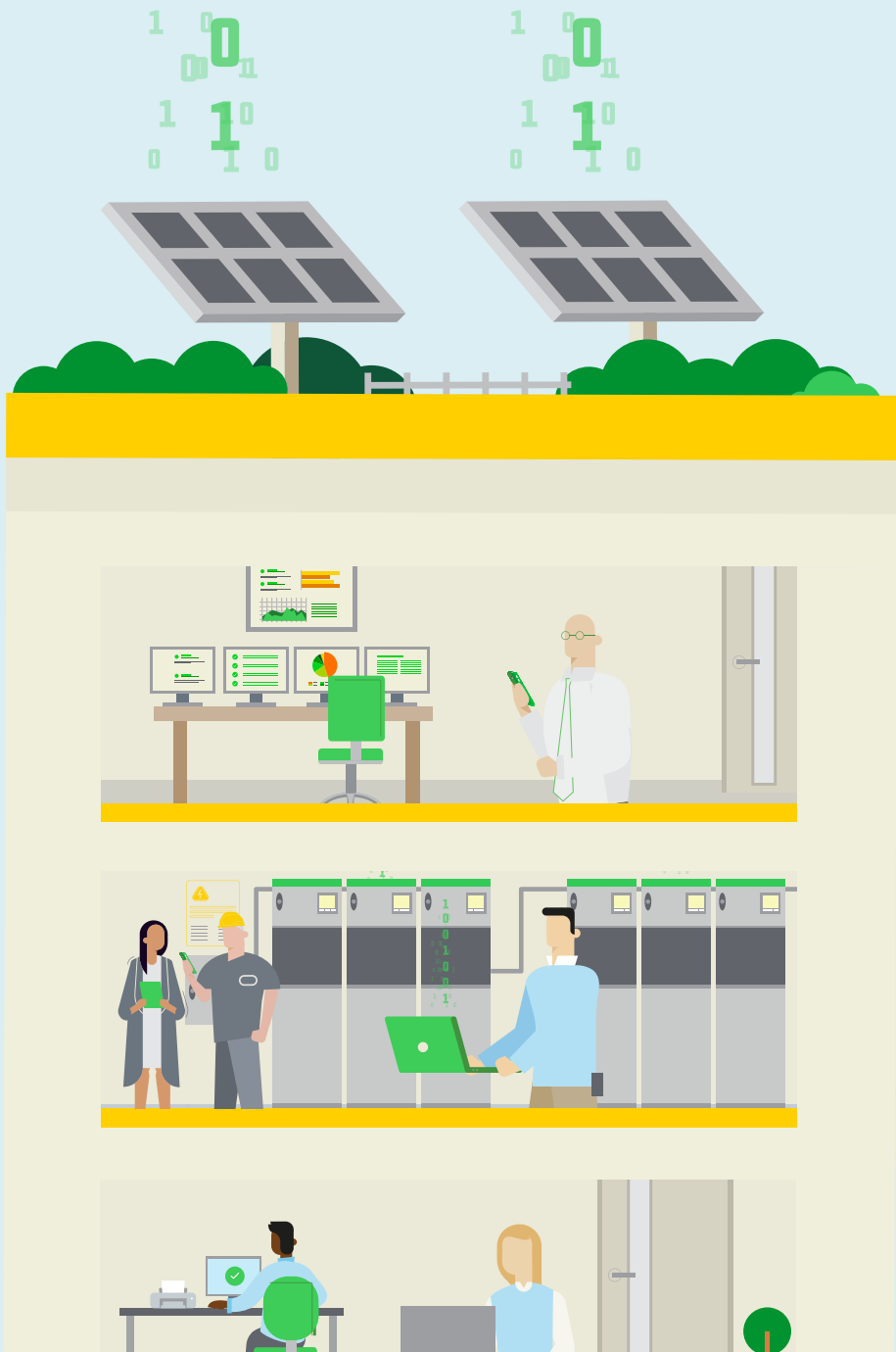
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# Executive Summary

As electrification increases and renewable penetration grows, so too does the need for more medium voltage switchgear.

This equipment commonly uses sulfur hexafluoride ( $SF_6$ ), a man-made gas with a very high global warming potential. As the electricity industry invests in a more sustainable and digital future, it seeks green alternatives to  $SF_6$ . Compared to other alternative gases for MV switchgear, pure air is quickly emerging as the superior choice.



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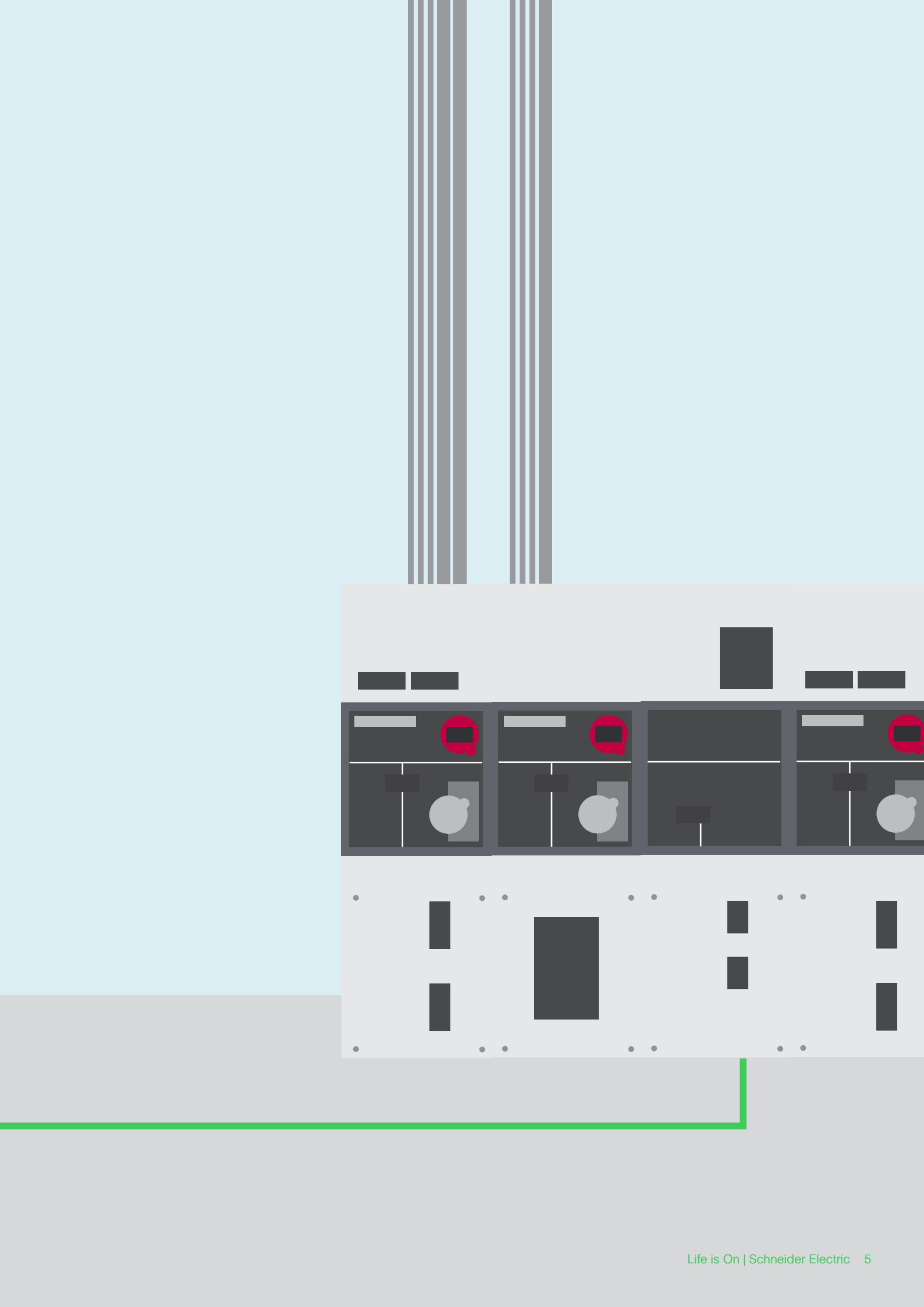
## What's SF<sub>6</sub>?

Sulfur hexafluoride (SF<sub>6</sub>) is a man-made gas that for decades has been widely used in high and medium voltage electrical equipment, like switchgear, as an insulating and breaking medium. The gas owes its popularity to its insulating and current breaking properties, thermal capacity, and stability. It's also inert, non-flammable, and completely non-toxic in its pure form. And crucially for the many tight spaces into which switchgear must be squeezed, SF<sub>6</sub>'s high insulating property made it possible to significantly reduce the size of switchgear.

And although you may not see them, switchgear are everywhere. They are essential electrical equipment for the grid, for industrial applications, and for large buildings. Over 30 million units of medium-voltage switchgear installed worldwide use SF<sub>6</sub>, a highly trusted technology.

Sounds great, right? Well, not exactly. There are some strong motivations for transitioning away from SF<sub>6</sub> to an innovative new alternative that uses only pure air.





## Reason One

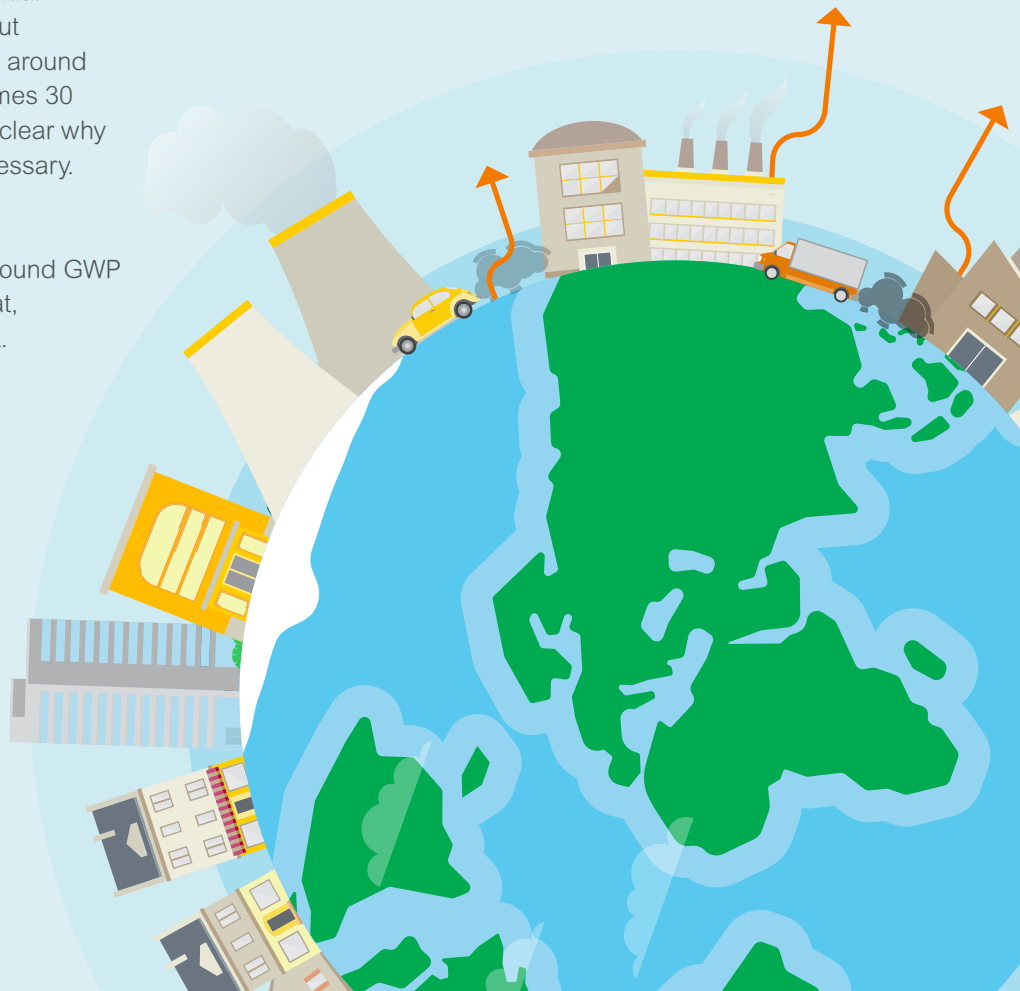
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# Pure Air is Superior to a Strong Greenhouse Gas

SF<sub>6</sub> has a global warming potential (GWP) 25,200 times greater than that of CO<sub>2</sub>. The GWP metric was developed to compare the global warming impacts of different gases. It is a relative measure of how much heat a greenhouse gas traps in the atmosphere. Specifically, it is a measure of how much energy the emissions of 1 ton of gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (GWP=1). The larger its GWP, the more the gas in question warms the Earth compared to CO<sub>2</sub> over that time period. SF<sub>6</sub> is one of six types of greenhouse gases targeted by the Kyoto Protocol and European Directive 2003/87 (Greenhouse Emission allowance trading).

Each typical load break switch, part of a unit of switchgear, has an average of 1 kg of SF<sub>6</sub> inside it. If 1kg were to be mistakenly released into the atmosphere, it would have the same potential environmental impact as driving a car about 200,000 kilometers (a typical vehicle emits around 120g of CO<sub>2</sub> per kilometer). Multiply that times 30 million switchgear units and it becomes clear why choosing the best alternative to SF<sub>6</sub> is necessary.

Pure air is the ultimate replacement of the greenhouse gas. It makes the concerns around GWP obsolete, as it has none. But more than that, its environmental safety is fully transparent.



## Reason Two

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# Pure Air Requires No Recycling

The pure air we breathe every day requires no recycling, naturally. The same cannot be said of SF<sub>6</sub> or other man-made F-gases. When an SF<sub>6</sub> switchgear unit reaches the end of its operational life, the gas is ideally recaptured, reprocessed, and reused. If it is handled within a closed system until the end of its lifecycle, the amount of leakage can be dramatically reduced, thus reducing its environmental impact. With pure air, no such concern exists.

Unfortunately, SF<sub>6</sub> end-of-life procedure is not always completed, and rules – when and where they exist – are often not properly enforced. SF<sub>6</sub>, after use, is considered hazardous waste because of the toxic byproducts that result from current breaking operations.

Additionally, end-of-life treatment of SF<sub>6</sub> or other man-made gases, can be costly – about 20% of the total cost of ownership. It involves numerous steps, including collection, recovery, and neutralization before recycling or destroying the gas. Only authorized hazardous waste managers can handle, transport, recycle, or destroy gases according to some national or regional regulations and standards. Using a pure air solution helps eliminate the need to produce SF<sub>6</sub>, drastically reduces switchgear's environmental impact, and avoids the end-of-life gas recycling process.

END-OF-LIFE TREATMENT OF  
SF<sub>6</sub> CAN BE COSTLY, ABOUT

**20%**

OF THE THE TOTAL COST  
OF OWNERSHIP



## Reason Three

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# Pure Air is a Win-Win Alternative to SF<sub>6</sub>

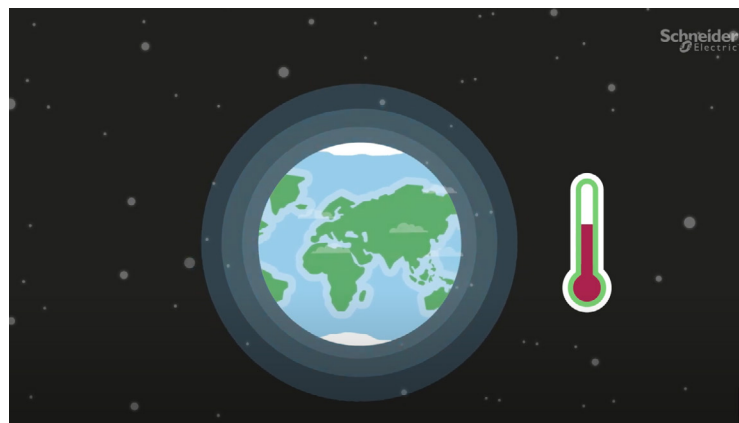
New medium voltage switchgear technology from Schneider Electric using pure air is a groundbreaking alternative to SF<sub>6</sub>. It replaces SF<sub>6</sub> in switchgear with an innovative combination of vacuum interruption and pure air insulation, each a proven and trusted technology. And new SF<sub>6</sub>-free switchgear using pure air is able to achieve something more: It keeps the small physical footprint for which traditional SF<sub>6</sub>-based equipment is so valued, and it is operated in the same way as before so technicians require no retraining.

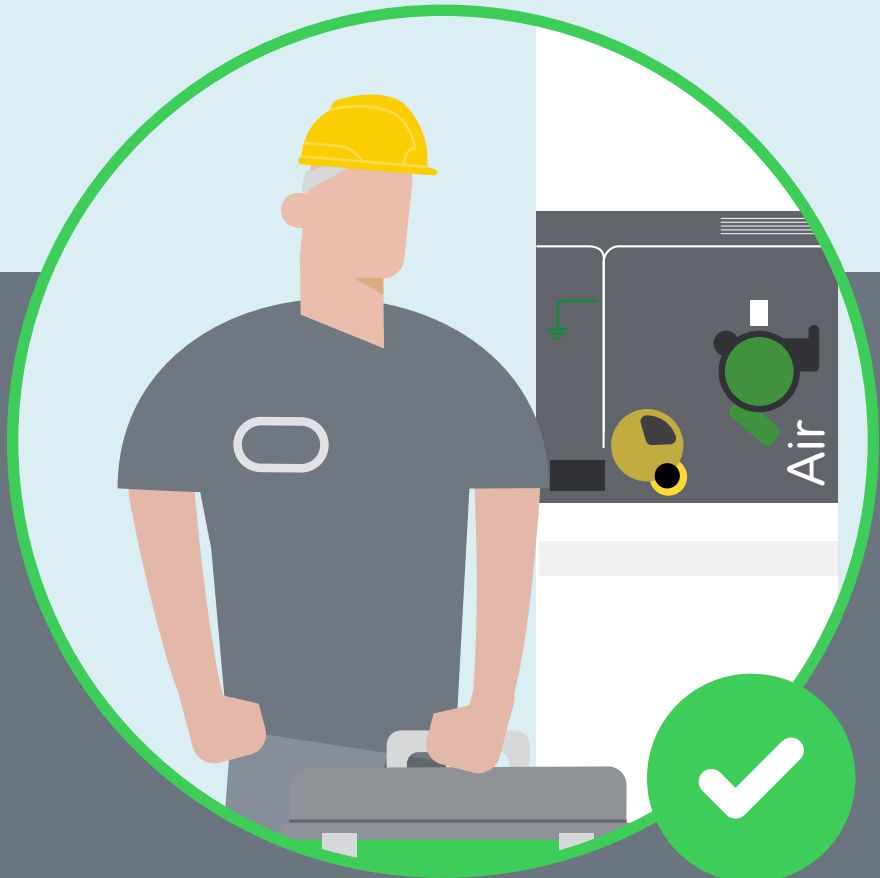
Green MV switchgear technology is already up and running in pilot projects around the world, including at [E.ON, the largest electrical distribution grid operator in Sweden](#), [EEC Engie, the electrical distribution operator in New Caledonia](#), and at [GreenAlp, a French electric distribution network](#), and [Renault Group Refactory in Flins, France](#).

### Key advantages of pure air in MV switchgear:

- Environmental friendliness
- Safety for people
- Ease of operation
- Same footprint as SF<sub>6</sub>
- No need for end-of-life gas recovery
- Long-life expectancy
- Interchangeability with the currently used SF<sub>6</sub> switchgear units

### [SF<sub>6</sub>-free explainer video](#)





## Reason Four

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# Pure Air is Green and Improves Safety

Health and safety are chief concerns when considering SF<sub>6</sub> alternatives because medium-voltage switchgear is used in public areas.

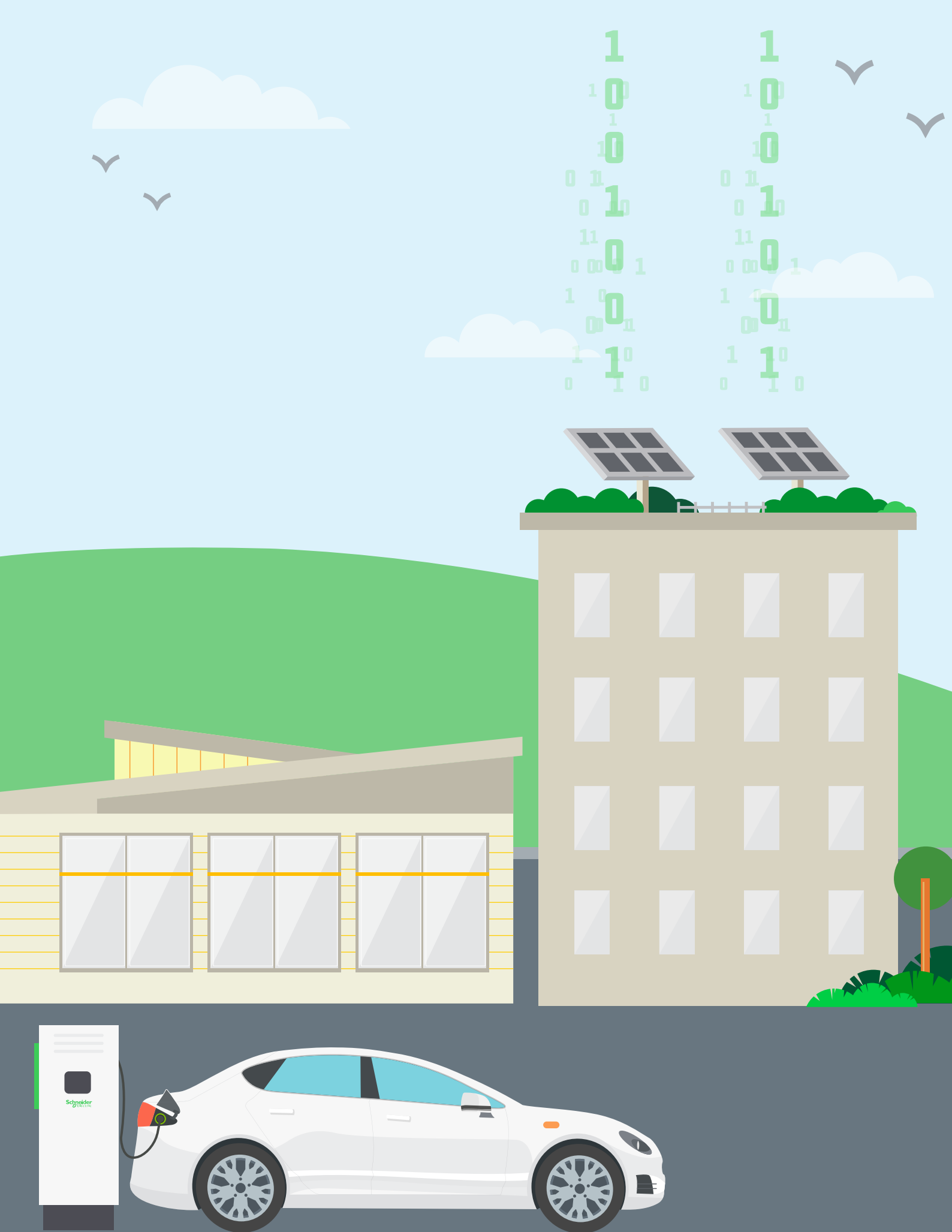
Pure air is a responsible alternative for protecting the public from potential health and safety risks. It is completely free from toxins, so in the event of a leak, there is no harm to either people or the environment. It also does not pose a health risk for those responsible for installation and end-of-life recycling and does not require strict equipment disposal regulations to protect people.

Pure air is also free from any potential health and safety risks associated with unproven proprietary gases.



Pure Air does not pose a health risk for those responsible for installation





## Reason Five

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# Pure Air is Free from Regulatory Concerns

Many companies are taking great measures to dramatically reduce greenhouse gas emissions. These strategic efforts are motivated not only by the desire to improve sustainability, but also by strong regulatory pressure that can come from several levels of policy: country, regional, and international. In Europe, for example, SF<sub>6</sub> use is already subject to stringent regulatory procedures, including its use, handling, decommissioning, monitoring, and inventory record maintenance. In 2014, SF<sub>6</sub> was banned in the EU for most applications except the electrical industry because at that time there was no alternative for SF<sub>6</sub>. In 2022 the European Commission put forward a new proposal for F-gas regulation that details the timeline for phase-out of SF<sub>6</sub> starting with new installations on 1<sup>st</sup> January 2026.

That is in addition to other potentially expensive regulations including additional taxes and carbon pricing initiatives.

It is prudent to future-proof operations by adopting an environmentally friendly alternative that's immune to potential regulation. The pure air and vacuum technology provides reliable breaking and insulating performance without the risk of being subject to environmental regulations or carbon taxes.



**THE EU PROPOSES TO BAN  
SF<sub>6</sub> IN NEW MV SWITCHGEAR  
INSTALLATIONS STARTING  
1<sup>ST</sup> JANUARY 2026**

# Conclusion

## For a future dominated by electricity, today's decisions matter

Globally, electricity consumption is predicted to increase by 48% by 2040. 87% percent of that increase is expected to take place in countries that often have less stringent environmental regulations. More MV switchgear is essential to satisfy this rapid growth and support industrialization, especially in developing nations, which are increasing their investment in transmission and distribution. Over the next decade electric utilities are anticipated to invest around \$3.2 trillion in new and replacement transmission and distribution infrastructure.

Against this background, making a green switchgear choice is especially important as the demand for MV switchgear rises – not only for utilities, but for private installations, too (such as commercial and industrial installations). And as the popularity of renewables continues to grow, it's important that their new MV infrastructure also be green.

Continue your discovery.  
Read how SF<sub>6</sub>-free and digital technologies empower decarbonization and efficiency

[Discover more](#)

New green MV switchgear contains an additional benefit – it's natively digital and connected. So in addition to being environmentally sound, its users can leverage the power of data for managing their infrastructure.

By choosing SF<sub>6</sub>-free switchgear that uses pure air and vacuum interruption in these new installations, companies not only benefit from reliable breaking and insulating performance with a proven safety record, they prepare themselves for growth, contribute to energy decarbonization, and free themselves from regulatory considerations.



# About the author

Christophe Prévé is the Chief Technology officer of MV Switchgear Activity at Schneider Electric. He graduated from the Ecole Supérieure d'Electricité (SUPELEC) in 1988. He began his career at a Grenoble, France utility as an Electrical Network Operator and then as an Electrical Studies Man-ager. He joined Schneider Electric in 1994 in the Protection Relay Department as an Electrical Network Expert. He had the opportunity to write a book on "Protection of Electrical Networks" in Edition Hermès. In 1998, he moved to MV Switchgear Activity where he took different responsibilities in R&D. He is now responsible for new product development and new technology integration. He is also a lecturer at the ENSE3 Engineering School in Grenoble.



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