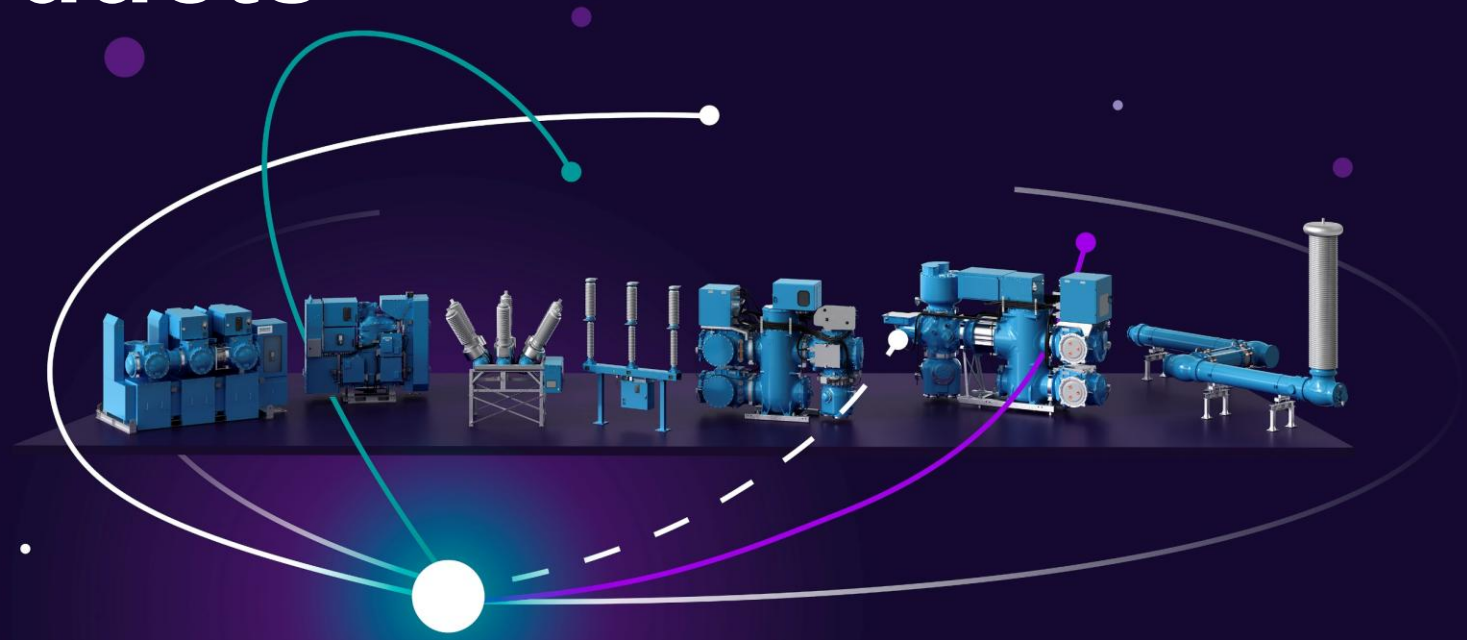
Siemens Energy Blue high-voltage products

Sustainable zero-impact switchgear for a net zero future



Status: August 2026

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1. The growing market demand for SF_6-free high-voltage switchgear

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There is an increasingly urgent need to achieve decarbonization in all sectors worldwide – actions to reduce GHG emissions must be taken fast

- In the UNFCCC (United Nations Framework Convention on Climate Change) Paris Agreement signed by 189 countries in 2015, it was agreed to limit anthropogenic global warming to well under 2º centigrade
- Each country must determine and report regularly on how it intends to mitigate its greenhouse gas emissions and thus reduce global warming
- Up to now more than 100 countries have submitted a net-zero document (Net-Zero Tracker)

US
2035: 100% clean electricity
2050: Net zero GHG pollution

EU
2050: First climate-neutral continent

China
> 2030: CO_2 emission peak
> 2060: Carbon neutrality





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The pressure on power companies to phase out SF_6 and other F-gases is especially high

- With global carbon emissions hitting an all-time high of 47.5 Gt in 2020*, there is growing pressure on power companies to step up their decarbonization efforts
- SF_6 is classified as a strong greenhouse gas (GHG) with a CO_2 equivalent of 24,300, but is still commonly used as an isolation gas in switchgear products
- An increasing number of companies have already committed to switching to SF_6-free alternatives





* Climatewatchdata.org

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SF_6 gas has a GWP 24,300 times higher than CO_2 – and the GWP of other F-gas alternatives is also way above zero

What is global warming potential (GWP)?

It represents the heat absorption effect of any GHG relative to CO_2, which has a GWP of 1

SF_6 installations
10,000 tons of SF_6 are installed annually, with leakage[1] of 50 tons and a GWP of around 24,300[2]

It takes **1,000 years** for nature to absorb SF_6

19,440,000,000 trees are needed to absorb the impact of the yearly installations and **89,424,000** to absorb the yearly leakage of SF_6

Fluoronitrile-mix[3]
10,000 tons of Fluoronitrile-mix are installed annually, with leakage[4] of 50 tons and a GWP of around 500

It takes **30 years** for nature to absorb Fluoronitrile-mix

321,600,000 trees are needed to absorb the impact of the yearly installation and leakage

Vacuum and clean air
This is the most environmentally friendly switching technology in the world with a GWP of 0

The leakage rate of clean air is **0.1%** and it is naturally absorbed by the surrounding air

0 trees needed
No greenhouse gases
No impact on health or environment

At the moment, **natural-origin gases** like **clean air** are the **only way to achieve zero.**

[1]Leakage rate of SF_6 is typically 0.5%. Source MDPI: Evaluation of SF_6 Leakage from Gas Insulated Equipment on Electricity Networks in Great Britain, August 2018
[2]GWP-100 of Sulphur Hexafluoride (SF6) acc. To IPCC Sixth Assessment Report (AR6), 2023
[3]Besides vacuum and clean air, Fluoronitrile-mix is another discussed SF_6 alternative.
[4]Leakage rate of Fluoronitrile-mix is typically 0.5%

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Phasing out SF_6 and other F-gas mixes is inevitable – clean air is the only future-proof option

Health and safety risks of F-gases

- SF_6 and fluoronitrile F-gas mixes produce toxic decomposition products during electric arcs and operation
- Fluoronitrile F-gas mixes belong to the PFAS[1] group: more than 4,700 chemicals which accumulate in both humans and the environment, and which are highly persistent and toxic (negative health impact; contamination of water and soil).

Cost risks of SF_6 / F-gas regulations

- F-gas regulation 2024/573 (EU)[2]
- SF_6 ban in California (CARB) and New York state
- PFAS ban in Maine (DEP) and Minnesota
- ECHA report[3] from 08.2025 includes a restriction proposal for PFAS-F-gases in switchgears starting 2027(2028
- Worldwide institutions are following, e.g. Stockholm Convention (UN) or the Environment Protection Agency (EPA) having established a PFAS Council in the US

- **SF_6 is already restricted for new installations in some parts** and complete phase-out is future possible
- **F-gases are under investigation** and restriction as well as a ban is possible
- **Clean air** does **not need any regulation** now or in the future

[1] Per- and polyfluoroalkyl substances
[2] The EU bans using F-gases with a GWP >1 in switchgears in 2026 up to including 24 kV and 2028 for voltages above 52 kV
[3] European Chemicals Agency report

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Sustainable development drive globally regulations



European Union



United States



Rest of World

F-gas regulation (2024/573): ban of GWP ≥ 1 F-gases from **2028** > 52 kV & **2032** > 145 kV

EU Taxonomy (GWP < 10 compliant)

Law effective in **California** (CARB[3]) and in **New York** state for **SF_6** for ban from 2025 respectively 2027 in MV and HV

CN, JP, KR transition for SF_6 / F-gas-free started w/o regulations, in other countries first pilots

G7 commit in 2024 to phase out the use of SF_6 in new switchgear applications by 2035

Restriction proposal for **PFAS[1] incl. ban of PFAS F-gases like C4-FN in switchgears** from **2029** ≤ 145 kV & **2034** > 145 kV[2]

PFAS[1] restrictions: First laws effective incl. PFAS F-gas (e.g. C4-FN-Gas) in Maine and Minnesota – further adoptions expected in next years

Most countries follow UN Stockholm Convention (including the PFAS restriction for PFHxS, PFOA, PFOS & PSOSF (recommendation in 2025: PFCA)

1 Per-and polyfluoroalkyl substances including PFAS F-Gas C4-FN | 2 Expected Publication and Entry into Force (EiF) | 3 CARB: California air resources board

Replacing SF_6 in high voltage

We are doing it with clean air



Proven technology

Already 3,450 units with more than 67 million hours successfully in operation

Peak performance & safety

Highest switching performance, zero toxic by-products, fully compliant with IEC and ANSI/IEEE

GWP = 0

Clean air gives the equipment the lowest carbon footprint across its life cycle

Suitably sized

Our clean air units fit within the footprint of the SF_6 units they replace

Future-proof

Our Blue switchgear is the answer to the EU F-gas regulation GWP < 1

Siemens Energy welcomes the regulatory frame to cut CO_2 emissions for new installations:

Clean air insulation and vacuum switching technology is future-proof and not impacted by any restrictions or obligations with the revised EU F-gas regulation or expected PFAS restrictions!

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SF_6-free products are available and in reliable use worldwide up to 420 kV, the majority rely on natural-origin gases to ensure safe power grids!*

1. SF_6-free alternative technology & products **already available**
2. Manufacturers are committed to **close the portfolio gaps**
3. The proposed **transition time is sufficient to close and develop SF_6-free portfolio**

medium voltage	 ABB	 EATON	 efacec	 LS ELECTRIC	 MEIDEN	 MITSUBISHI ELECTRIC Changes for the Better	 nuventura	 ormazabal velatia	 TOSHIBA	 Schneider Electric	 SIEMENS	
high voltage	 GE VERNOVA	 HITACHI	 MEIDEN	 MITSUBISHI ELECTRIC Changes for the Better	 TOSHIBA		 TRENCH	 PFIFFNER	 HYOSUNG HYUNDAI ELECTRIC	 COELME egic	 SIEMENS energy	

*Natural-origin gases/F-gas-free with GWP <1

Source: Publications & web sites

● Factory in Europe

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2. Siemens Energy Blue high-voltage portfolio

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Our Blue switchgear portfolio already offers a solution,
with a greater mission in mind:

Achieving zero emissions and zero harm in energy transmission all over the world

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Until now, switchgear technology has typically used F-gases...

In particular, SF_6 gas.

But whenever technically possible, we must stop using these gases.

Because SF_6 is 24,300 times more climate-hostile than CO_2, and stays in the atmosphere for over 1,000 years.

To compensate for the annual global installations of SF_6 would take more than 19 billion trees.

That’s not sustainable. And other F-gases neither.

The only way to achieve carbon neutrality and zero toxicity is by using clean air.

Zero harmful gases. And zero contribution to climate change.

That's why our Blue portfolio uses clean air and vacuum switching technology.

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Siemens Energy Blue has a clear zero-compromise philosophy



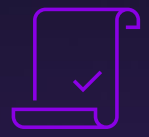
Zero environmental impact

- Zero SF_6 and other F-gases
- Zero GHG emissions and zero GWP
- Regulatory certainty and compliance
- Long lasting design (up to 50+ years) and circular materials



Zero impact on health & safety

- Zero toxic insulation gases
- Zero toxic decomposition products



Zero regulation & special handling

- Zero reporting & accounting of gases required
- Zero issues with current & potential F-gas regulation
- Zero special safety measures
- Zero gas disposal required at end of life



Zero compromise on performance

- Voltages from 72.5 to 420 kV
- Highest short-circuit switching capability with zero degradation
- Exceptionally high lifetime due to a very low arc energy
- Full performance down to -60°C
- Maintenance-free interrupter unit („sealed for life“)

Best in class switching performance with easiest gas handling!

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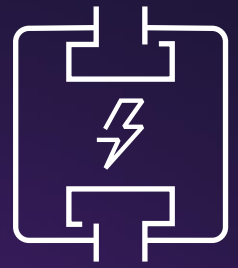
The Blue portfolio is based on game-changing technology: vacuum switching and clean air insulation

Clean air (N_2 + O_2) insulation



- Zero CO_2emissions, lowest CO_2 footprint, GWP = 0
- Zero toxicity, highest stability, easiest gas handling
- Zero liquefaction at low temperatures -60° C
- Zero patent dependencies, multiple suppliers

Vacuum interruption



- Zero toxic decomposition products, hermetically tight
- Highest switching performance w/o degradation, scalable short-circuit current capabilities
- Exceptionally high lifetime compared to other interrupting technologies due to a very low arc energy
- Zero maintenance (sealed for life)

Clean, safe and future-proof regarding F-gas and PFAS regulation!

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The Blue portfolio comprises individual products & solutions, supporting our clients on their way to zero

Up to 420 kV

Blue GIS™

- up to 72.5 kV / 50 kA
- F-gas-free 72.5 kV GIS with vacuum interrupter and clean air insulation
- Optimized footprint for versatile applications and by using LPIT[1]



Blue GIS™

- up to 145 kV / 63 kA
- World's first F-gas-free 145 kV GIS with vacuum interrupter and clean air insulation
- Optimized footprint by using LPIT[1]



Blue GIS™

- up to 420 kV / 63 kA
- World's first F-gas-free 420 kV GIS with vacuum interrupter and clean air insulation
- Optimized footprint by using LPIT[1]



Blue Circuit Breaker™ live tank

- up to 145 kV / 40 kA
- World's first 145 kV LT with vacuum interrupter and clean air insulation



Blue Circuit Breaker™ dead tank

- up to 145 kV / 63 kA
- World's first 145 kV DT vacuum interrupter with clean air insulation
- Same footprint as SF_6 product



Blue Circuit Breaker™ live tank

- up to 420 kV / 63 kV
- World's first 420 kV LT with vacuum interrupter and clean air insulation
- Similar footprint as SF_6 product



[1] Low Power Instrument Transformer

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Product one pagers

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3AV1 Blue dead tank circuit breaker™ up to 145 kV / 63 kA

Product characteristics

- Vacuum interrupter technology | clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime > 50 years, first major inspection > 25 years
- No reporting or emission costs during operation and recycling, e.g. taxes or CO_2 emission compensation (no SF_6 or F-gases)
- Same dimensions as the equivalent SF_6 circuit breaker

Technical features

- Proven reliable energy spring-drive mechanism
- Rated voltages up to 145 kV, rated frequency 50 / 60 Hz
- Rated continuous current up to 3000 A, rated short-circuit breaking current up to 63 kA
- Chopped wave (2 µs) voltage 838 kV
- Capacitive switching class (overhead lines and cables) C2
- Perfect for frequent breaking operations and extreme temperatures from -60 °C to +50°C
- Leakage rate < 0.1% p.a.

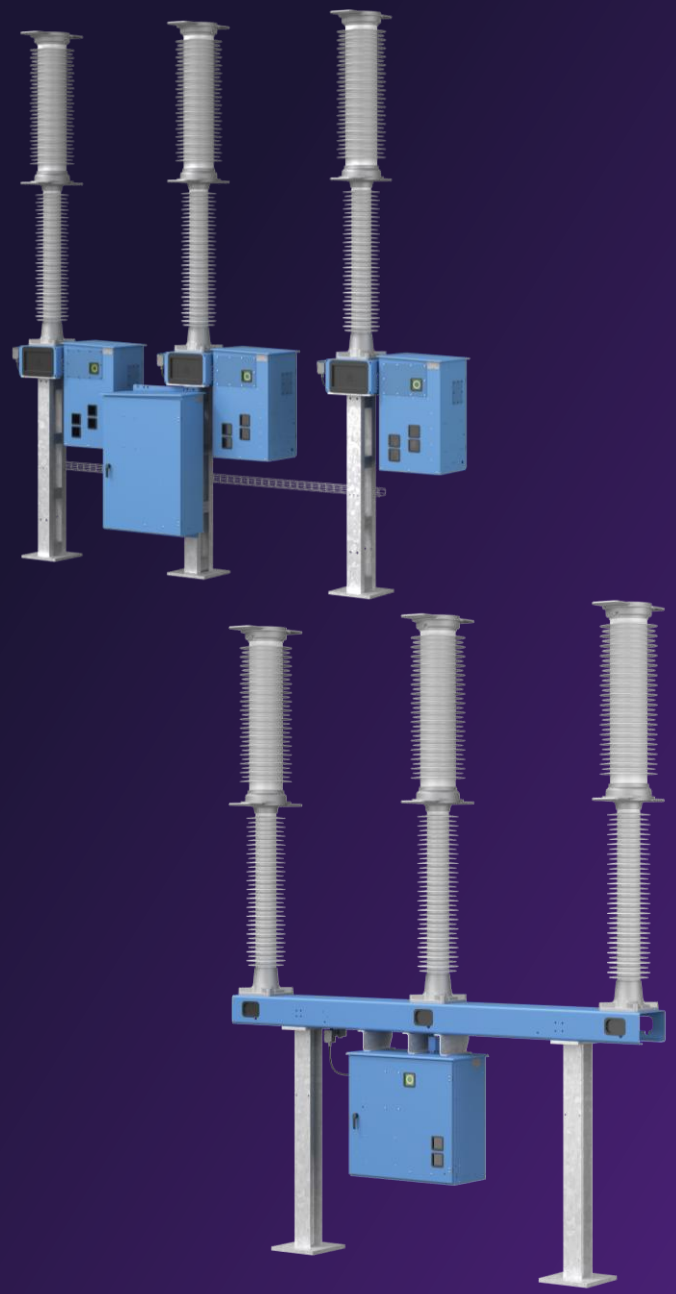
Types / variants

- Three-pole operation (FG)
- Composite insulators

Type tests

- Acc. to IEC / IEEE

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3AV1 Blue live tank circuit breaker™ up to 145 kV / 40 kA

Product characteristics

- Vacuum interrupter technology | clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime up to 50 y. | inspections after 13 & 26 y. | condition check after 40 y.
- No reporting or emission costs during operation and recycling, e.g. taxes or CO2 emission compensation (no SF_6 or F-gases)

Technical features

- Stored-energy spring drive mechanism
- Rated voltages up to 145 kV, rated frequency for 16.7 / 50 / 60 Hz
- Rated continuous current up to 3150 A, rated short-circuit breaking current 40 kA
- Perfect for frequent breaking operations and extreme temperatures from -60 °C to +55°C
- 0.5 g seismic conditions, high terminal loads (2 kN stat. / 5 kN dyn.)
- Two-cycle current interruption
- Leakage rate < 0.1% p.a.
- Optional sensors for CB monitoring with Noedra Node™ substation digitalization technology

Types / variants

- Three-pole & single-pole & double-pole operation (FG & FI & FE & FB) | composite insulators
- Also available as 60 Hz circuit switcher according to IEEE std. C37.016

Type tested

- Acc. to IEC 62271-100, -110, -310

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3AV2 Blue live tank CB up to 420 kV



MISSION

Co-funded by the European Union

Product characteristics

- Vacuum interrupter technology | Clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime up to 50 y. | inspections after 13 & 26 y. | condition check after 40 y.
- No reporting or emission costs during operation and recycling, e.g. taxes or CO_{2e} emission compensation (no SF_6- or F-gases)
- Same dimensions as the equivalent SF_6 circuit breaker

Technical features

- Stored energy spring drive mechanism
- Rated voltages up to 420 kV, rated frequency for 50 / 60 Hz
- Rated continuous current up to 5000 A, rated short-circuit breaking current 63 kA / 80 kA
- Perfect for frequent breaking operations and extreme temperatures from -60°C up to +55°C
- 0.5 g seismic conditions, high terminal loads (3 kN stat. / 6 kN dyn.)
- Two-cycle current interruption
- Leakage rate < 0.1% p.a.
- Equipped with new Noedra Node™ substation digitalization technology

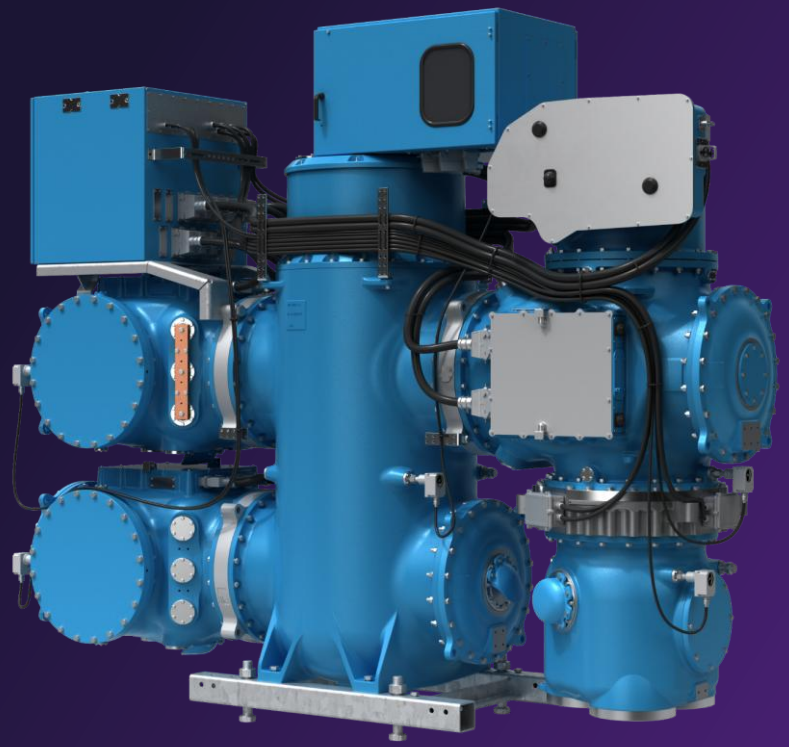
Types / variants

- single-pole operation (FI) | composite insulators

Type tested

- Acc. to IEC 62271-100

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8VN1 Blue GIS™ 145 kV / 63 kA

Product characteristics

- Vacuum interrupter technology | clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime > 50 years | first major inspection > 25 years
- No reporting or emission costs during operation and recycling, e.g. taxes or CO_2 emission compensation (no SF_6 or F-gases)

Technical features

- Rated voltages up to 145 kV, rated frequency for 16.7 / 50 / 60 Hz
- Rated short-circuit breaking current up to 63 kA
- Ambient temperature range -50 ºC to +55 ºC
- Stored-energy spring type driving mechanism of circuit-breaker
- Seismic withstand capability 1.0 g
- Leakage rate per year and gas compartment (type-tested) < 0.1%
- Optionally equipped with new Noedra Node™ substation digitalization technology

Types / variants

- Indoor and outdoor installation
- Optional with Low Power Instrument Transformer (LPIT) for reduced bay size / weight

Type tested

- Acc. to IEC / IEEE

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8VM3 Blue GIS™ 72.5 kV / 50 kA



Product characteristics

- Vacuum interrupter technology | clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime > 50 years | first major inspection > 25 years
- No reporting or emission costs during operation and recycling, e.g. taxes or CO_2 emission compensation (no SF_6 or F-gases)

Technical features

- Rated voltage up to 72.5 kV, rated frequency 50/60 Hz
- Rated short-circuit breaking current up to 50 kA
- Ambient temperature range -50 ºC to +55 ºC
- Stored-energy spring type driving mechanism of circuit-breaker
- Seismic withstand capability 1.0 g
- Leakage rate per year and gas compartment (type-tested) < 0.1%

Types / variants

- Indoor and outdoor installation
- Optional with Low Power Instrument Transformer (LPIT) for reduced bay size / weight

Type tested

- Acc. to IEC / IEEE

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8VQ3 Blue GIS™ 420 kV / 63 kA



LifeBlue Project GIS 420 kV

Co-funded by the European Union

Product characteristics

- Vacuum interrupter technology | clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime > 50 years | first major inspection > 25 years
- No reporting or emission costs during operation and recycling, e.g. taxes or CO_2 emission compensation (no SF_6 or F-gases)

Technical features

- Rated voltage up to 420 kV, rated frequency 50/60 Hz
- Rated short-circuit breaking current up to 63 kA
- Ambient temperature range -30 ºC to +40 ºC
- Stored-energy spring type driving mechanism of circuit-breaker
- Leakage rate per year and gas compartment (type-tested) < 0.1%

Types / variants

- Indoor installation
- Optional with Low Power Instrument Transformer (LPIT) for reduced bay size / weight

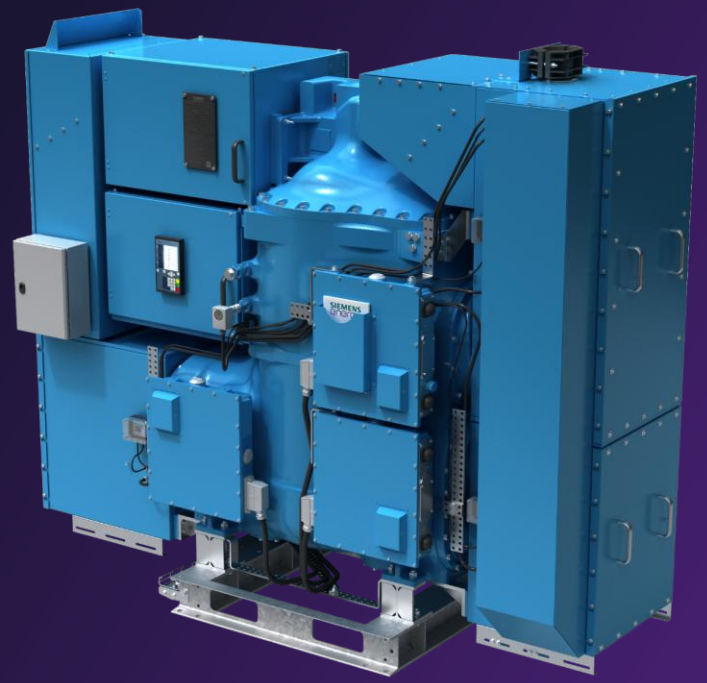
Type tested

- Acc. to IEC

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8VM1 wind tower Blue GIS™ 72.5 kV / 31.5 kA

Designed for wind turbine applications



Product characteristics

- Vacuum interrupter technology | clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime > 50 years | first major inspection > 25 years
- No reporting or emission costs during operation and recycling, e.g. taxes or CO_2 emission compensation (no SF_6 or F-gases)

Technical features

- Rated voltage up to 72.5 kV
- Rated frequency 50/60 Hz
- Rated short-circuit breaking current up to 31.5 kA
- Ambient temperature range -30 ºC to +45 ºC
- Stored-energy spring type driving mechanism of circuit-breaker
- Seismic withstand capability 0.5 g
- Leakage rate per year (type-tested) < 0.1%
- Internal arc classification of HV cable compartments IAC A FLR 31.5 kA, 1 s (acc. IEC 62271-200)

Types / variants

- Factory tested GIS with up to three bays mounted on a base frame incl. automation and protection
- Coming soon: Low Power Instrument transformer (LPIT) in the cable bushing

Type tested

- Acc. to IEC / IEEE

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8VM3 Blue GIS™ power pack 72.5 kV / 31.5 kA

Ideal for wind turbine applications and small DSOs (indoor)



Product characteristics

- Preassembled Ring Main Unit (RMU)
- Vacuum interrupter technology | clean air insulation technology
- Weight of SF_6 or other fluorinated greenhouse gases = 0 kg; GWP = 0
- Expected product lifetime > 50 years | first major inspection > 25 years
- No reporting or emission costs during operation and recycling, e.g. taxes or CO_2 emission compensation (no SF_6 or F-gases)

Technical features

- Rated voltage up to 72.5 kV; rated frequency 50/60 Hz
- Rated short-circuit breaking current up to 31.5 kA
- Ambient temperature range -30 ºC to +40 ºC
- Stored-energy spring type driving mechanism of circuit-breaker
- Seismic withstand capability 0.5 g
- Leakage rate per year and gas compartment (type-tested) < 0.1%
- Internal arc classification of HV cable compartments IAC A FLR 31.5 kA, 1 s (acc. IEC 62271-200)

Types / variants

- Factory tested RMU with up to 3 bays mounted on a base frame incl. automation and protection
- Coming soon: Low Power Instrument transformer in the GIS partition and the cable bushing

Type tested

- Acc. to IEC / IEEE

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3. Blue product evaluation

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Customer product evaluation criteria for switchgear products



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Three isolation mediums: a comparison



Vacuum / clean air

N_2 and O_2 (80% / 20%)



CO_2-F mix fluoronitrile[1]

$(CF_3)_2CFCN$



SF_6 sulfur hexafluoride

SF_6

[1] Fluor-ketone gas mix is not considered due to its inability to withstand temperatures below 5°C

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Criteria 1: Environmental impact



Vacuum / clean air

Zero greenhouse gas
GWP = 0
Regulatory certainty and compliance
(Immediately absorbed)



CO_2-F mix fluoronitrile

Greenhouse gases
GWP ~ 500
(Lifetime 30 years)



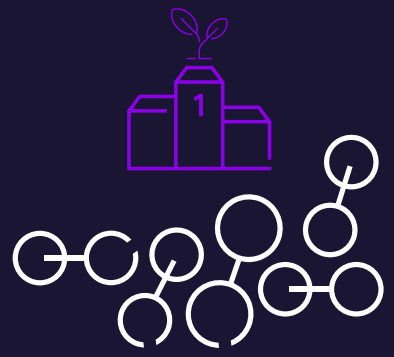
SF_6 sulfur hexafluoride

Greenhouse gas
GWP ~ 24,300
(Lifetime 1,000 years)

Vacuum / clean air is the **most environmentally friendly** switching technology in the world

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Criteria 2: Health & safety



Vacuum / clean air

Vacuum: zero decomposition products; sealed for life

Clean air: non-toxic decomposition products, non-hazardous

Gas leakage < 0.1% p.a./compartment



CO_2-F mix fluoronitrile

Toxic decomposition products (details unknown)

Hazardous (details unknown)

Gas leakage < 0.5% p.a./compartment (details unknown)



SF_6 sulfur hexafluoride

Toxic decomposition products

Hazardous when inhaled, causes skin and eye irritation

Gas leakage < 0.1% p.a./compartment

Vacuum / clean air is **non-toxic, non-hazardous** and does not require special safety systems such as ventilation or CO_2-monitoring

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Criteria 3: Performance



Vacuum / clean air

Vacuum circuit breaker can switch up to 30 times 40 kA currents

Zero degradation of short-circuit switching performance

From -60 °C to +55 °C



CO_2-F mix fluoronitrile

CO_2-F mix shows decreasing switching performance

Does not recombine completely after arcing

From -30 °C to +55 °C



SF_6 sulfur hexafluoride

SF_6 CB can switch up to 10 times 40 kA currents

Long term stability (SF_6 gas recombines)

From -40 °C to +55 °C

Vacuum / clean air offers the **highest short-circuit switching capability** without degradation and can be operated in a wide temperature range, being especially suitable for **very low temperature applications**

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Criteria 4: Gas handling & costs



Vacuum / clean air

Vacuum interrupter is sealed for life > zero maintenance

No special tools, training, ventilation or reporting

No recycling or special EOL treatment necessary

Lowest lifecycle costs



CO_2-F mix fluoronitrile

unknown

Special tools, training, ventilation and reporting

No recycling option, disposal can cause extra CO_2

Higher lifecycle costs



SF_6 sulfur hexafluoride

Additional gas maintenance

Special tools, training, ventilation and reporting

Can be cleaned and re-used (extra effort)

Higher lifecycle costs

Vacuum / clean air is maintenance- and regulation-free and requires no special EOL treatment.
Overall it has the lowest lifecycle costs

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Criteria 5: Manufacturer competence



1970

First HV GIS with air insulation 170 kV



1976

First MV vacuum CB



2010

First HV vacuum pilot CB with clean air 72.5 kV



2017

First vacuum CB 145 kV and GIS 72.5 kV with clean air



2018

First HV vacuum GIS with clean air 145 kV



2022

First GIB with clean air 420 kV



2024

New wind tower GIS with clean air 72.5 kV



2026

First 420 kV vacuum CB and GIS with clean air

Design & engineering → **Manufacturing** → **Test lab** → **Supply** → **Installation, testing, commissioning** → **Training & after sales**

Siemens Energy has **over 60 years of experience** in switchgear with **global production** of 48,000+ GIS bays and 165,000+ CBs as well as more than **50 years of experience in vacuum and air insulation** technology

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Customer product evaluation criteria for switchgear products



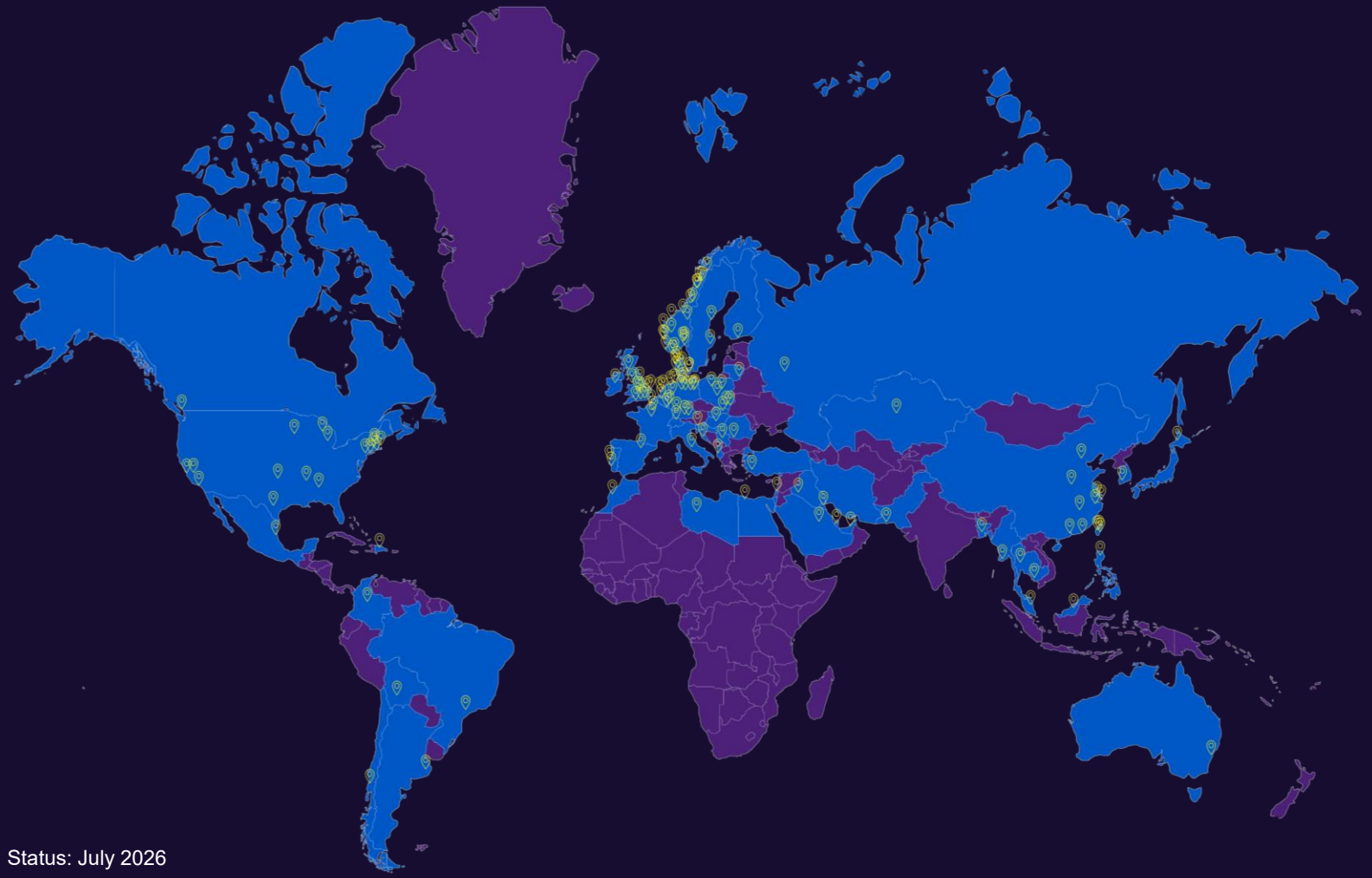
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4. Blue success stories

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Zero-harm energy transmission is already becoming a reality around the world



Status: July 2026

> 67 million hours
of commercial operation

~ 10,500,000 tons
of CO_2-equivalent saved

> 8,500 units
sold

> 3,450 units
already in operation

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Notable case studies

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Leading grid operators install clean air technologies



Globally around 8,500+ Blue CB und GIS sold and
3,450+ units successfully in operation.

~10,500,000 tons of CO_2-equivalent saved

Status: July 2026

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A € 60 million investment in clean air technology

Key facts

- Transformation of 6,200 m^2 site in Berlin
- Production of vacuum interrupters for clean air Blue switchgear being ramped up
- Powered 100% by renewable energy
- Project announced: 2021
- Operational: 2024



Berlin factory

- Highly automated, fully digitally connected
- Entirely green energy supply
- Clear commitment to climate-neutral power transmission
- Major boost to local economy





Vacuum interrupter

- Eliminate need for climate-hostile F-gases
- Enable Blue products to achieve Zero GWP
- Future-ready: not subject to EU F-gas legislation

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The world's first SF_6-free high-voltage switchgear with clean air insulation

Key facts

- Customer: Netze BW GmbH, Germany
- Modernization of a 110 kV substation in Noerdlingen
- Operation requires no SF_6 or any other greenhouse gas
- Year of order: 2017
- Energization: 2018



Circuit breakers

- Installation of two SF_6-free 3AV1 Blue Circuit Breakers™ for 145 kV
- Vacuum interrupter technology
- Clean air insulation technology





Instrument transformers

- Six SVAA voltage and current transformers with clean air insulation

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The world's first SF_6-free gas-insulated switchgear with clean air and vacuum technology

Key facts

- Customer: BKK Nett, Norway
- Modernization of a 145 kV Koengen substation in Bergen – Norway's largest cruise port
- Operation requires no SF_6 or any other greenhouse gas
- Year of order: 2018
- Energization: 2020



Gas-insulated switchgear

- Installation of 3 bays of the 8VN1 Blue GIS™ for 145 kV
- Vacuum interrupter technology
- Clean air insulation technology





Low-power instrument transformers

- GIS includes low-power instrument transformers (LPIT) to ensure a compact design

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The world's first facility combining eco-efficiency and digitization

Key facts

- Customer: Netze BW, Burladingen, Germany
- Capacity of 80 MVA
- Blue portfolio goes digital with Noedra Node™
- Year of order: 2020
- Energization: 2022



Gas-insulated switchgear

- Installation of five 8VN1 Blue GIS™ bays with low-power instrument transformers (LPIT)
- Vacuum interrupter technology
- Clean air insulation technology





Noedra Node for GIS

- Smart sensors record all relevant product operating data: gas pressure, temperature, and number of switching cycles
- Service life of around 40 years

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Cutting-edge substation upgrade using our F-gas free Blue circuit breaker technology

Key facts

- Customer: National Grid
- Location: Ayer, Massachusetts, US
- Operation requires no SF_6 or any other greenhouse gases
- Year of order: 2022
- Energization: 2023



Gas-insulated switchgear

- F-gas free DT CB to serve several North Central Massachusetts communities
- First Siemens Energy project of in total 18 Blue DT breakers for the installation in National Grid's U.S. electricity network





Customer benefits

- Replace harmful gases in switchgear with clean air to fulfill commitment to decarbonize switchgear technology
- Easiest gas handling process

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First SF_6-free gas-insulated busducts with clean air for Alyth substation

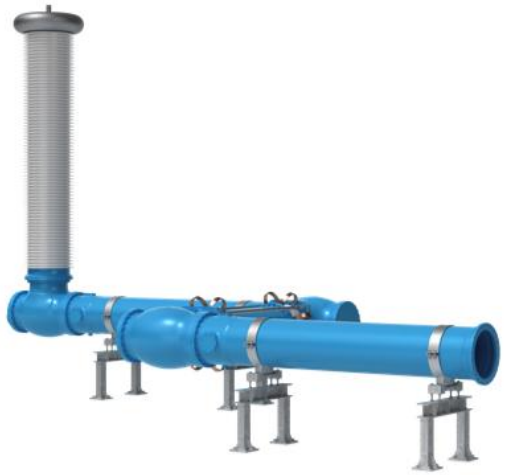
Key facts

- Customer: Scottish & Southern Electricity Networks
- Location: United Kingdom
- Operation of GIB requires no SF_6 or any other greenhouse gas
- Year of order: 2022
- Energization: 2023



Gas-insulated busduct

- New switchgear for 275 kV Alyth substation, including infrastructure ready for future scalability to 400 kV
- Project involves the installation of 8VQ3 Blue clean air gas-insulated bus ducts (GIB) measuring a length of more than 500 meters





Customer benefits

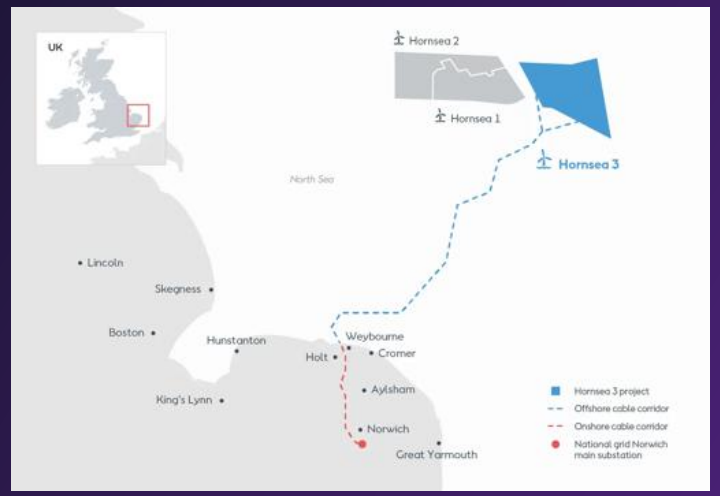
- Blue GIB technology replaces SF_6 with clean air and has Zero direct CO_2 emissions
- Easiest gas handling process
- More than 2 million kg CO_2e saved compared to a SF_6-based GIB during a lifetime of 40 years

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Hornsea 3: the largest wind park worldwide including the 2000th 8VM1 Blue GIS bay

Key facts

- Customer: Siemens Gamesa Renewable Energy for Ørsted
- 2.9 GW-capacity offshore wind farm located off the east coast of the UK
- Operation of GIS requires no SF_6 or any other greenhouse gas
- Year of order: 2024
- Energization: 2027



Gas-insulated switchgear

- Installation of 197 bays of SF_6-free 8VM1 Blue GIS™ for 72.5 kV within an area of 696 km²
- set to provide over 3 million UK homes with green energy
- Vacuum interrupter technology
- Clean air insulation technology





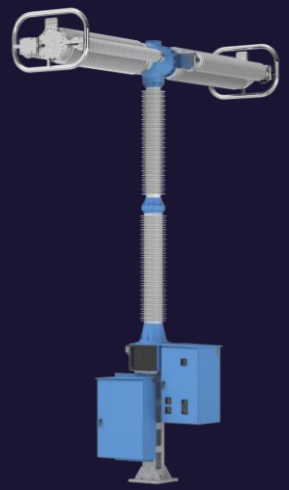
Customer benefits

- Zero direct CO_2 emissions
- 1.8 million tons CO_2e saved through avoidance of installed SF_6
- Easiest gas handling process
- Reduced quantities of cable
- Reduced cable installation times

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Currently EU supported GWP < 1 and PFAS-free developments from SE

Project MISSION





- Clean air LT
  420 kV, 4000 A, 63 kA
- Pilots in 2026
- Partners for pilot installation:
  RTE and Statnett

- Clean air DC GIS
  550 kV, 5000 A, 63 kA
- Lab pilot in 2026

read more on project website

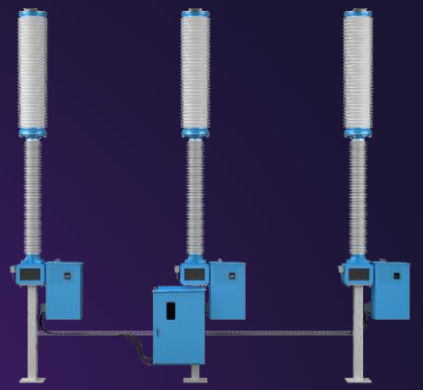
Project LIFE Blue GIS



- Clean air GIS
  420 kV, 4000 A, 63 kA
- Pilot in 2027
- Partner for pilot installation: Elia Group

read more on project website

Project LIFE Blue LT



- Clean air LT
  245 kV, 4000 A, 63 kA
- Pilot in 2029
- Partner for pilot
- installation: Red Eléctrica

read more on project website

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5. Outlook for the future

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Blue roadmap to zero emissions

F-gas-free high-voltage equipment for sustainable power grids

Blue portfolio available

2024
VI factory

2026 | **2027** | **2028** | **2029** | **beyond**

	2026	2027	2028	2029	beyond
Dead tank circuit breaker	145 kV 40 kA; 145 kV 63 kA; 72.5 kV 40 kA		245 kV 63 kA	362 kV 63 kA	550 kV 63 kA; 800 kV 63 kA
Live tank circuit breaker	72.5 kV 31.5 kA; 145 kV 40 kA; 420 kV 63 kA		420 kV 80 kA	245 kV 63 kA; 550 kV 63 kA	800 kV 63 kA
Gas-insulated switchgear	145 kV 40 kA; 420 kV GIB; 420 kV BP; 145 kV 63 kA; 72.5 kV 50 kA; 420 kV 63 kA		245 kV 63 kA	420 kV 80 kA	550 kV 80 kA
Gas-insulated switchgear wind	72.5 kV 31.5 kA 1CB; 72.5 kV 31.5 kA MultiCB; 145 kV 40 kA MultiCB				
DC switchgear	550 kV DC LT HSS	550 kV DC GIS BP	550 kV DC LT outdoor		550 kV DC GIS HSS

status: August 2026
CB – circuit breaker
BP – back parts
GIB – gas insulated busducts
HSS – high-speed switches

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