

# Paris Session 2022



## JEMA's survey on footprint comparison between natural-origin gas and SF6 gas insulated switchgears

Study Committee A3

PS 2/ Q11

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(on behalf of the JEMA Task Force on SF6 Alternative Technologies)



## Question and our contribution

### Question A3 PS2 Q11

- Report 10848 states that a double break 420 kV C4-FN based circuit breaker, including grading capacitor has similar bay-width size as a single-break SF6 breaker of that rating. How would a compressed air-insulated 420 kV VCB (envisaged in 11068) compare with that?

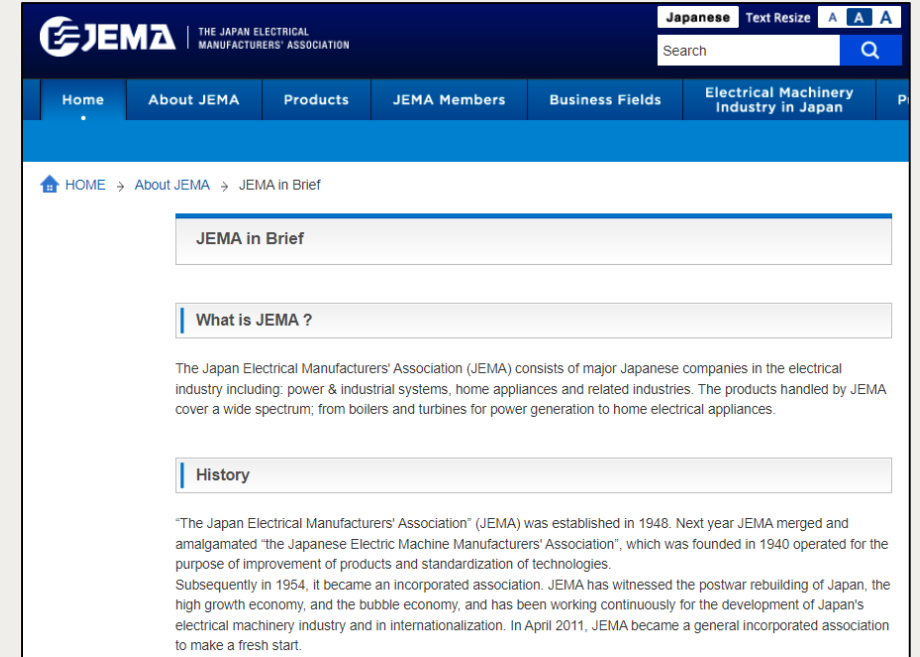
### Answer

- The task force on SF6 alternative technologies of JEMA (Japan Electrical Manufacturers' Association) did a survey on footprint comparison between emerging natural-origin gas (NOG) and existing SF6 gas insulated switchgears.
- According to the survey by the manufacturers of the TF, the following 2 points were concluded for the considered cases:
  - (1) **GIS**: Footprints of NOG products are **approx. 1.3 times larger** than those of SF6 products now, while they are still **applicable for near-term replacement needs** for existing SF6 products installed more than 30 years ago.
  - (2) **Circuit-breaker**: Footprints of NOG products are **relatively comparable** to those of SF6 products, because air insulating distance among bushings is the dominant factor in this case.

# What's the JEMA task force ?

- JEMA (Japan Electrical Manufacturers' Association) is an industrial association that covers power transmission & distribution fields.
- **The task force on SF6 alternative technologies** (hereafter called “TF”) was established in August, 2021 in JEMA, composed of **the Japanese major seven switchgear manufacturers**.
- The main missions of the TF are:
  1. Development of a roadmap of non-SF6 switchgear development
  2. Opinion coordination with stakeholders, such as TDGC (Japan T&D Grid Council), etc.
  3. Opinion coordination with policy makers to incubate and introduce non-SF6 technologies properly in Japan
  4. Enlightenment/education to promote environmental activities of T&D industries.

<https://www.jema-net.or.jp/English/>



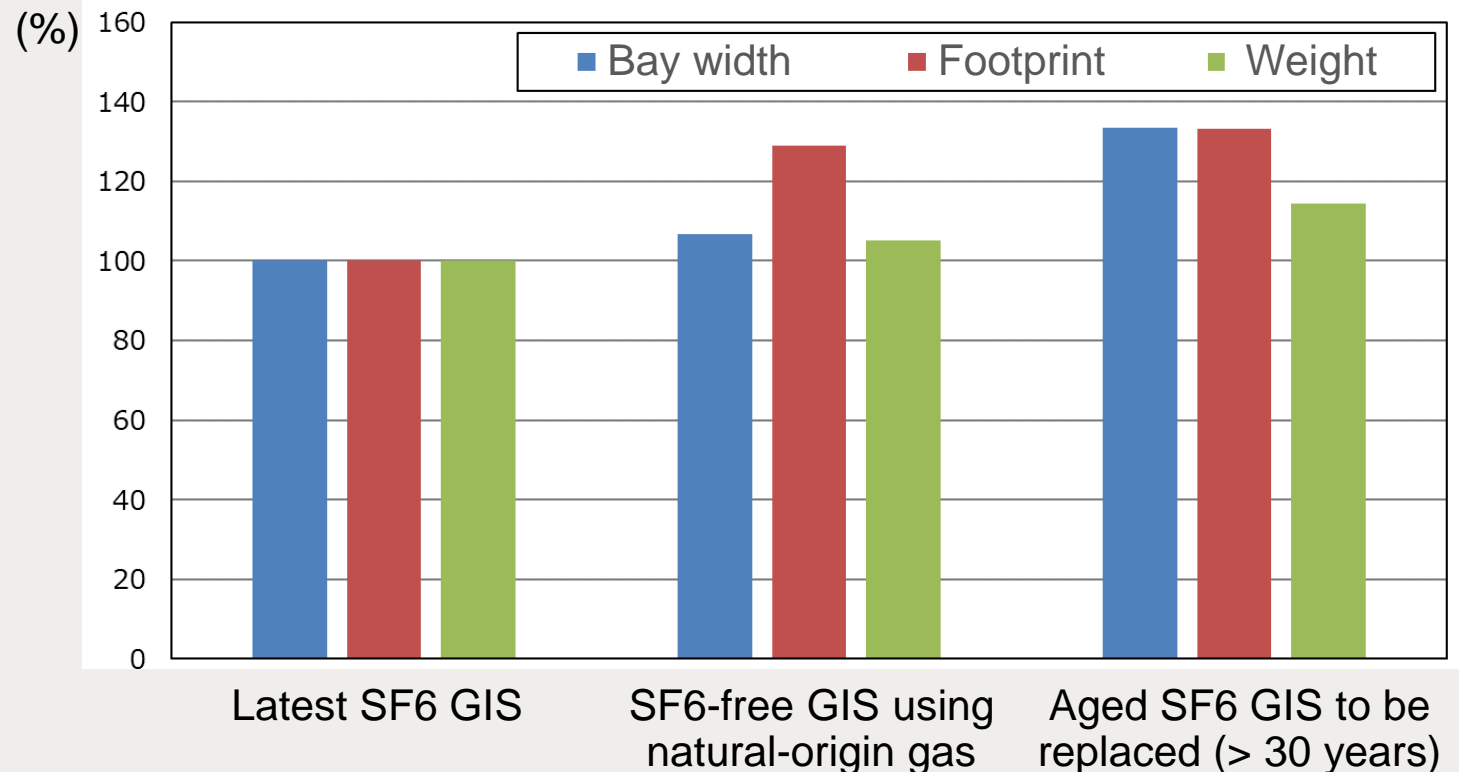
The screenshot shows the JEMA website interface. At the top, there is a navigation bar with the JEMA logo and the text 'THE JAPAN ELECTRICAL MANUFACTURERS' ASSOCIATION'. Below the navigation bar, there is a search bar and a menu with options: Home, About JEMA, Products, JEMA Members, Business Fields, and Electrical Machinery Industry in Japan. The main content area is titled 'HOME > About JEMA > JEMA in Brief'. It features three sections: 'JEMA in Brief', 'What is JEMA?', and 'History'. The 'What is JEMA?' section contains the following text: 'The Japan Electrical Manufacturers' Association (JEMA) consists of major Japanese companies in the electrical industry including: power & industrial systems, home appliances and related industries. The products handled by JEMA cover a wide spectrum; from boilers and turbines for power generation to home electrical appliances.'

# Footprint comparison (1/2): GIS cases

- Footprints of NOG products are approx. 1.3 times larger than those of SF6 products now, while they are still applicable for near-term replacement needs for existing SF6 products installed more than 30 years ago.
- Of course, continuous design improvements and technological innovations are necessary to make footprints of NOG products comparable to those of the latest SF6 products.



72.5kV GIS  
using natural-origin gas



# Footprint comparison (2/2): Circuit-breaker cases

- Footprints of NOG products are **relatively comparable** to those of SF6 products, because air insulating distance among bushings is the dominant factor in this case.

## Air insulation distance



72.5kV circuit breaker using natural-origin gas

	Projection drawing	Dimension A	Dimension B	Dimension C	Area S
SF <sub>6</sub> -free CB	# 1	2600	1630	2130	4.2 m <sup>2</sup> (100%)
SF <sub>6</sub> CB (manufacture A)	# 2	2410	1570	1770	3.8 m <sup>2</sup> (89%)
SF <sub>6</sub> CB (manufacture B)	# 2	2480	1530	<1530	3.8 m <sup>2</sup> (90%)

