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

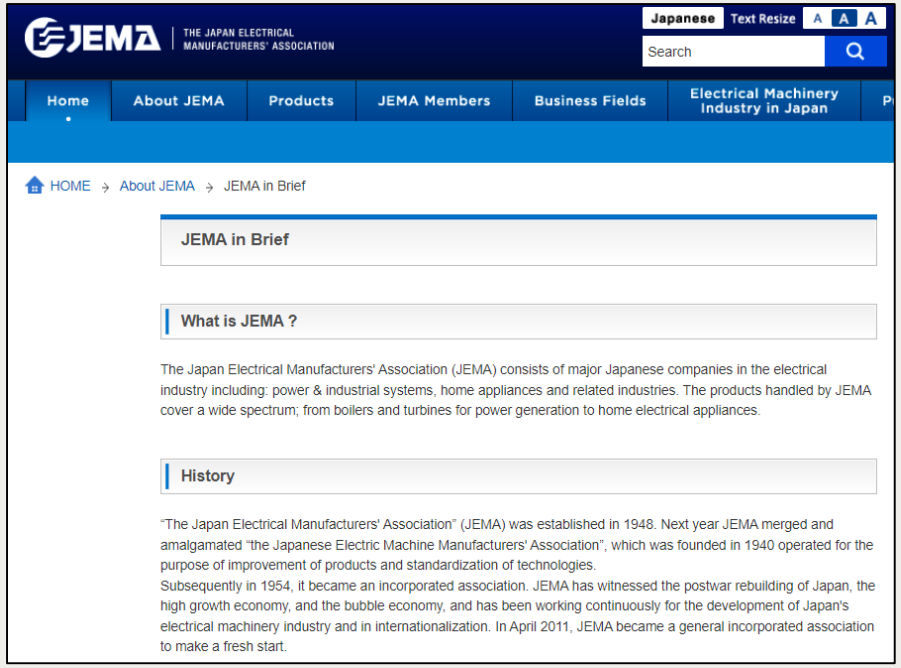
- The task force on SF6 alternative technologies of JEMA (Japan Electrical Manufacturers' Association) did a survey on footprint comparison between emerging natural-origin gas (NOG) and existing SF6 gas insulated switchgears.
- According to the survey by the manufacturers of the TF, the following 2 points 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.

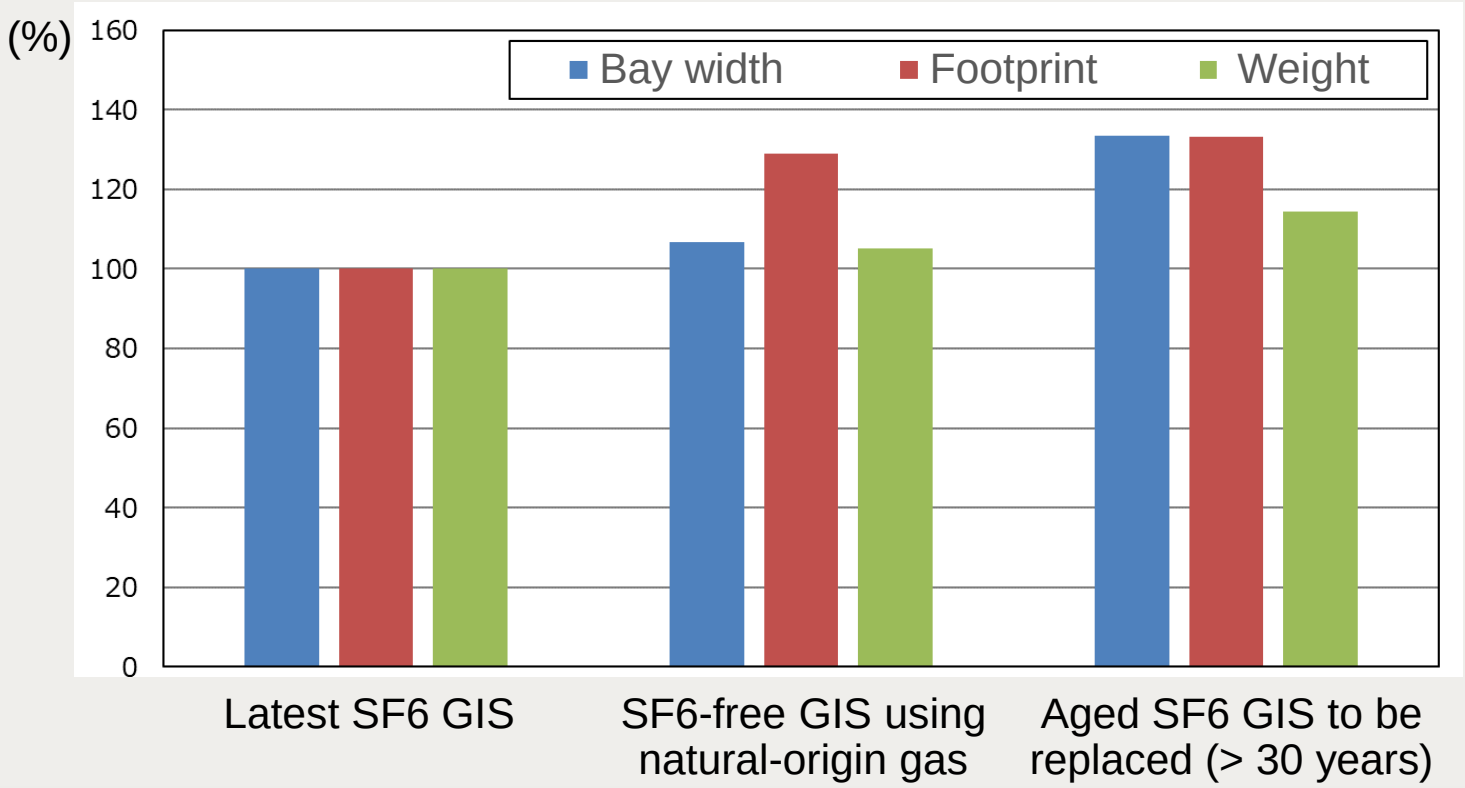
https://www.jema-net.or.jp/English/



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_6-free CB	#1	2600	1630	2130	4.2 m^2 (100%)
SF_6 CB (manufacture A)	#2	2410	1570	1770	3.8 m^2 (89%)
SF_6 CB (manufacture B)	#2	2480	1530	<1530	3.8 m^2 (90%)