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The JEMA roadmap of non-SF6 switchgear development and industry-level discussions in Japan

Study Committee A3

PS 2/ Q13

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

Question and our contribution

Question A3 PS2 Q13

- A variety of C4-FN based mixtures (with and without oxygen) and composition ratios (some even undisclosed) is reported. With every manufacturer having its “proprietary gas” could “inter-operability” be realized? Can specialist predict whether a “one-gas-fits-all” solution is waiting at the horizon or at what time horizon convergence of various technologies can be expected?

Answer

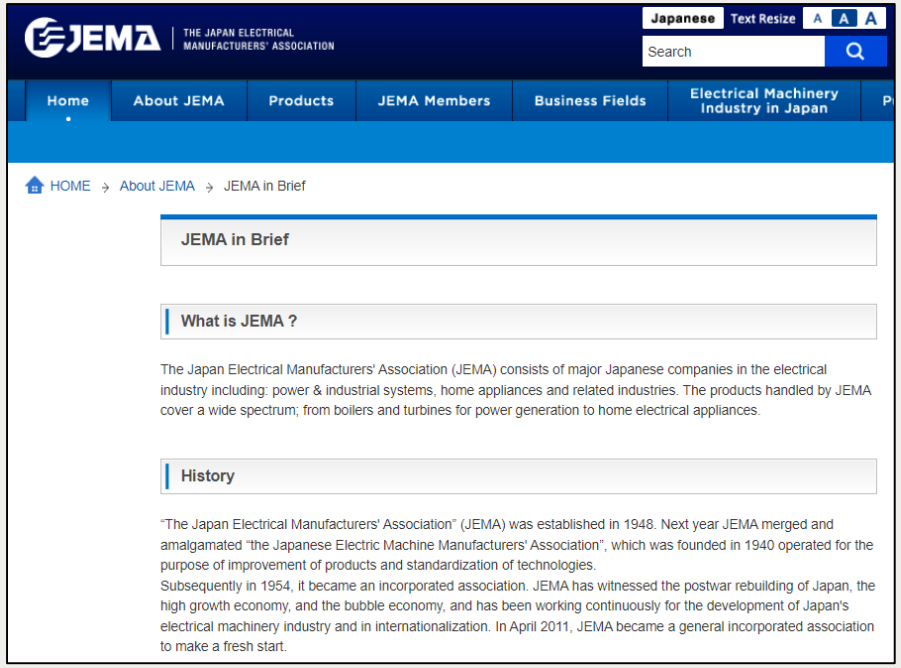
- Promoting industry-level discussions including relevant stakeholders (manufacturers, users, government and so forth) can be a good attempt to prevent a confusing situation with a variety of gases/mixtures.
- In Japan, industry-level organizations were established, where Japanese seven major switchgear manufactures have reached a common base of requirements for SF6 alternative solutions and created a joint roadmap to develop and release non-SF6 switchgears to the market.
- This helps users and government to consider most effective and reasonable plan of how and when to introduce the emerging technologies and products.

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/



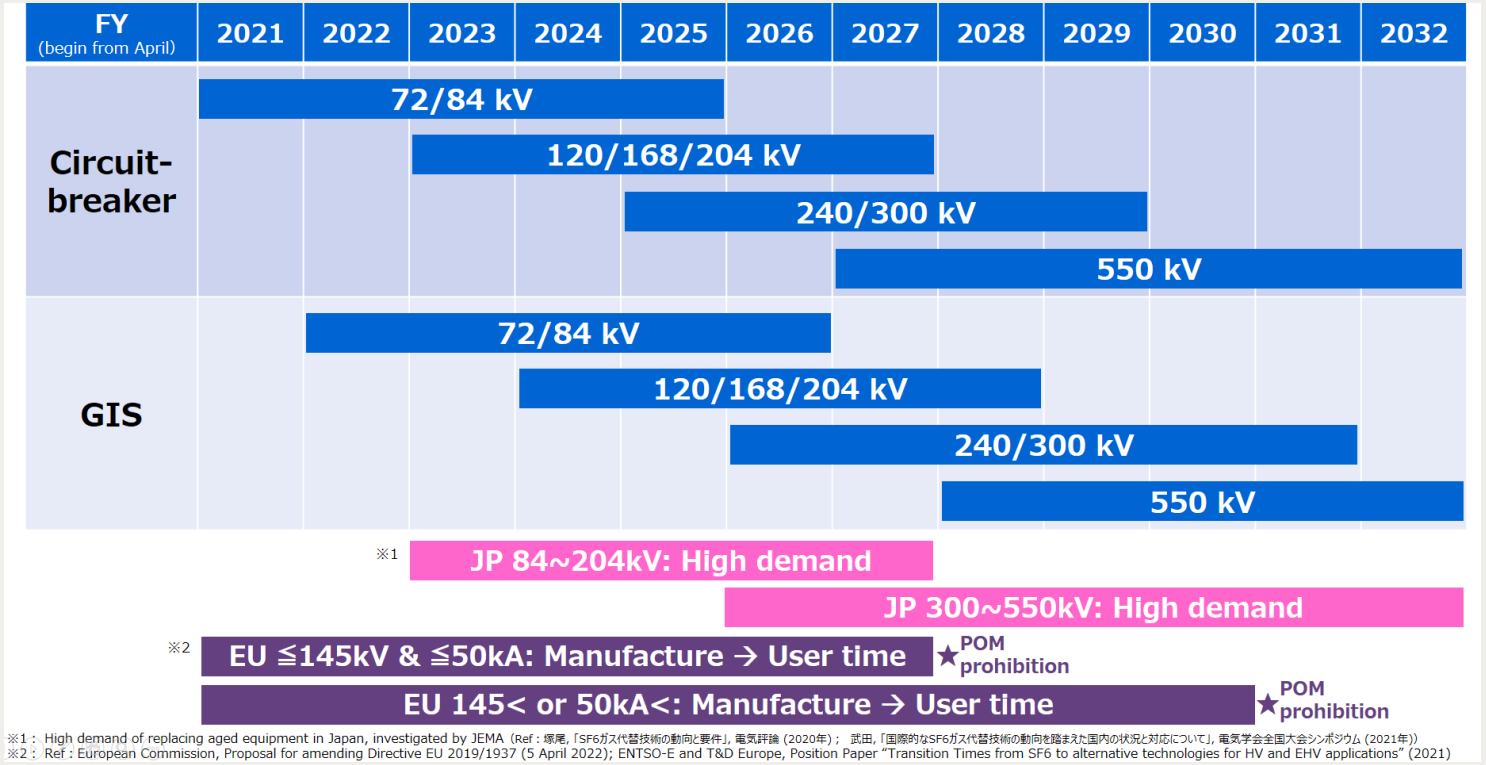
Development process of the roadmap

- Aimed a joint roadmap in order to show when non-SF6 switchgears will be available in the market, which activates industry-level discussions involving relevant stakeholders.
- Particularly in some countries including Japan, as huge existing SF6 switchgears will reach their end-of-life within 5 to10 years from now, it should be essential to get non-SF6 products ready by then.
- The roadmap was developed on the anonymous questionnaire basis by the different manufacturers.
- Summarized when the manufacturers would release non-SF6 switchgears to the market for the voltage ranges from 72 kV up to 550 kV.
- The “7 requirements" as a common boundary condition.

No.	Category	Requirement
1	**EHS**	Especially, toxicity of decomposition gas and decomposition
2	**Service Condition**	Normal use conditions specified in the standard
3	**Stable Supply**	Stable supply of alternative gases is possible in the future. It is desirable that gas can be supplied by multiple suppliers
4	**Gas Handling**	Simple handling of SF_6 alternative gas
5	Life Cycle Cost	Life cycle cost is equivalent or reasonable to SF_6 gas equipment
6	Footprint	Replacement in locations where installation space is limited
7	Voltage Coverage	Support up to the maximum operating voltage of 500 kV-63 kA

The JEMA roadmap of non-SF6 switchgear development

- The roadmap was published on the JEMA's website on 30 May 2022.
- Discussions have already begun between TDGC (users' side) and JEMA (manufacturers' side) based on this roadmap, regarding most effective and reasonable plan of how and when to introduce the emerging technologies and products.



※1： High demand of replacing aged equipment in Japan, investigated by JEMA（Ref：塚尾,「SF6ガス代替技術の動向と要件」, 電気評論（2020年）； 武田,「国際的なSF6ガス代替技術の動向を踏まえた国内の状況と対応について」, 電気学会全国大会シンポジウム（2021年））
※2： Ref：European Commission, Proposal for amending Directive EU 2019/1937 (5 April 2022); ENTSO-E and T&D Europe, Position Paper "Transition Times from SF6 to alternative technologies for HV and EHV applications" (2021)

https://www.jema-net.or.jp/English/businessfields/equipment/SF6phaseoutroadmap.html