

Hitachi ABB Power Grids, 15666 Mount Pleasant, United States

BUSINESS

California Air Resources Board (CARB)
Ms Carey Bylin, Director
Mr. Brian Cook
1001 I Street, Sacramento, CA 95814

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Comments to "Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear", as Available 5 May, 2021

Dear Ms. Bylin and Mr. Cook,

Thank you, for the opportunity to comment to the Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear. Hitachi ABB Power Grids is dedicated to a carbon neutral future and appreciates the opportunity to participate in the creation of such regulations.

Hitachi ABB Power Grids is one of the world's leading producers of high voltage electrical switchgear equipment. We deliver our live tank circuit breakers (LTB), dead tank circuit breakers (DTB), gas-insulated switchgear (GIS) and generator circuit breakers (GCB) around the world. In April, 2021, Hitachi ABB Power Grids launched a new strategy, EconiQ™, to deliver superior environmental performance compared to existing, conventional solutions.

EconiQ™ High Voltage Products do not contain SF₆ and the metal enclosed products use an alternative gas blend containing C4-FN (floronitrile), carbon dioxide and oxygen. Based on the recently published assessment report from the European Commission ([c_2020_6635_en.pdf \(europa.eu\)](#)), a gas blend using C4-FN is considered to be the only viable alternative to SF₆-based switchgear, specifically in applications where the voltage rating must be maintained but space is quite restricted (e.g. substations at power plants or in urban areas). EconiQ™ delivers on three key objectives:

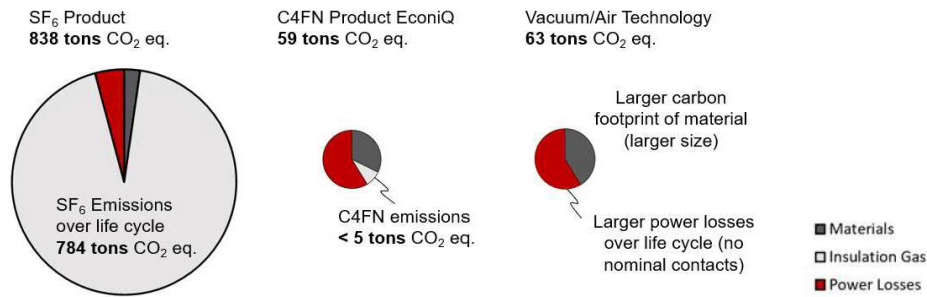
- Compact size, high reliability, scalability to all high voltage levels
- Creates customer value from the convergence to a common, eco gas
- Essentially eliminates the carbon footprint of the insulation gas

Considering all emissions from the production and operation of switchgear equipment, **EconiQ™ delivers the best overall solution for decarbonization**. Assuming a forty (40) year lifetime, 0.5% annual gas leakage rate and twenty percent (20%) other losses (e.g. manufacturing, handling errors), a Life Cycle Assessment (LCA) on a typical 145 kV, GIS yields the following total carbon footprint:

Postal Address
Hitachi ABB Power Grids
High Voltage Products
15666 Mount Pleasant, United States
<https://www.hitachiabb-powergrids.com>

Visiting Address
100 Distribution Circle
15666 Mount Pleasant, United States

www.hitachiabb-powergrids.com



With the above in mind, Hitachi ABB Power Grids recommends the following revisions targeted to incentivize both users and manufacturers of alternative gas blend gas-insulated equipment to pursue new products with higher ratings and optimized material usage without the reporting burden required by the current regulation for SF₆ and other high GWP green-house gases.

§ 95351 (a)

- Recommend that, for gases or gas blends which significantly reduce environmental impact as compared to SF₆ gas, a threshold above which reporting is required not be set.

In support of the above recommended change, Hitachi ABB Power Grids offers the following comments:

- In a full LCA, the impact of the insulating gas itself is essentially eliminated when using such SF₆ alternatives. Major climate impact contributions come not only from the insulating gas, but also from the size of the equipment (i.e. use of aluminum, power losses).
- Potential retrofit applications are still being explored. While retrofit applications may dramatically accelerate the timeline for phasing out SF₆ gas usage, existing designs require gas concentrations with higher dielectric withstand. That means that, potentially, a gas blend with a GWP ranging, for example, from 500 to 1,000 is required.
- As written, the reporting exemption threshold of GWP greater than one places a reporting burden on users of gas blends, despite the fact such gas blends offer a > 95% improvement compared to SF₆ gas. The GWP greater than one threshold thus provides a competitive advantage to other technologies which may in turn discourage broad development and adoption of gas blends. It is our contention that, at present, no limit should be set which potentially discourages innovation on relatively new technologies.

§ 95354 (m)

- Recommend that the method by which the GWP of a gas blend is quantified be modified.

In support of the above recommended change, Hitachi ABB Power Grids offers the following comments:

- Though often utilized, as typically defined, GWP is not a comprehensive measurement for assessing the impact on the climate of gas blends since it is based on mass ratios.
- While the formula presented works well for mixtures of liquids or liquified refrigerants, the medium in switchgear is use exclusively in the gas phase. As such, the critical parameter is the volume or mole fraction of each component in the gas blend, not its mass fraction.
- Calculating as defined in this section can lead to large discrepancies. For example, the GWP of a fluoronitrile (C4-FN) gas blend would vary significantly if mixed with CO₂ or N₂, however, the fluoronitrile molar content, and thus the climate impact, would be identical.

§ 95354 (f)

- Recommend adding a Point 5 that allows for the use of density sensors in lieu of pressure gauges and temperature gauges.

In support of the above recommended change, Hitachi ABB Power Grids offers the following comments:

- Density sensors, technically, provide the same information as a pressure gauge and temperature gauged used in combination.
- Even now, technical solutions for density sensors which meet other requirements may exist.

Thank you for the opportunity to review the proposed modifications to the regulation and submit the above comments. Should you have any questions, please feel free to contact me.

Yours sincerely,

Michael A. Lane
Global Product Manager, Dead Tank Breakers