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25 March, 2019

California Air Resources Board
Ms. Carey Bylin
Mr. Brian Cook

SUBJECT: Comments Regarding Draft Amendments to the Regulation for Reducing Sulfur Hexafluoride (SF_6) Emissions from Gas Insulated Switchgear (GIE)

Dear Ms. Bylin and Mr. Cook:

Thank you very much for the 25 February, 2019 public workshop in which the subject draft amendments to the regulation regarding SF_6 gas emissions from GIE were reviewed.

ABB is a global engineering company which provides live tank circuit breakers (LTB), dead tank circuit breakers (DTB) and gas-insulated switchgear (GIS) to GIE owners around the world. Though, like others, our GIE products have, for many years, utilized SF_6 gas, ABB has over eight years invested in developing eco-efficient variants of all aforementioned product types. The technology in focus for ABB eco-efficient products is called AirPlus™. Though the AirPlus™ technology takes different forms (e.g. CO_2+O_2+C5 FK, N_2+O_2+C5 FK or CO_2+O_2), depending on product type and requirements, each of the variants comes with a global warming potential (GWP) ≤ 1.

ABB's primary concern regarding the latest draft amendments to the regulation is the different way gases like AirPlus™ are treated with respect to reporting requirements in comparison to technical air (i.e. a mixture of, for example, 80% N_2 and 20% O_2 without any traces of GHG's). At present, the regulation treats all greenhouse gases (GHG's) equally with respect to reporting requirements. That is, all are reportable and, despite varying levels of GWP, all are treated equally with respect to reporting. Such requirements are in contrast with those for vacuum technology, insulated by technical air, which does not have any reporting requirement under the current draft regulation.

The above represents quite a departure from the regulation reviewed in May, 2018. At that time, though it was not strictly required to report technology utilizing GWP = 0 gases, the formulas were such that reporting on this technology was a benefit

to the end user. In addition, GHG's with a GWP > 0 were assigned different categories depending on the specific GWP. Thus making gases with various GWP's distinguishable from each other in the required reporting. The latest draft does not consider these aspects. CARB's rationale for such a change, and for treating two different technologies differently, has not been explained. The regulation today arbitrarily draws a line between gases with GWP = 0 and those with GWP ≤ 1. ABB does not believe there is a reasonable basis for treating such gases differently.

As described during the public workshop, CARB's economic analysis noted that one of the results of treating such technologies differently is a cost disadvantage for insulating gases that must be reported (i.e. those with GWP > 0). ABB is concerned that such a cost disadvantage will stymie future development of gases, like AirPlus™, which is being developed to provide essentially equivalent GHG reductions for those utilizing GIE. While vacuum technology may offer a GWP = 0, the technology presently has some limitations with respect to specific applications on a high-voltage network. In addition, while vacuum technology has existed for many years, it has never been utilized above voltages of 145 kV. Thus, for many applications at high-voltage, AirPlus™ and vacuum technology are both new, emerging technologies with no guarantees of the future limits or benefits. To essentially stymie the development of one of several competing technologies, which ABB believes the current draft regulation may do, does not seem to be prudent this early in the technology development.

During the May, 2018 public workshop, a customer inquired if gases with GWP ≤ 1 would be reportable in the future. The response from CARB, at that time, was that, presently, they are reportable. However, whether such gases would be reportable in the future depended on how significant a role they played in GHG emissions reported. With respect to the question of "significance", ABB has run a theoretical calculation considering all DTB delivered in our history. Had all units been delivered with AirPlus™ and presently leaked at a rate of 2% per year, far above current expected limits, the CO_2 footprint of the entire fleet would today be approximately 72.7 mTCO2e. That is, on an annual basis, the equivalent of about 16 average cars and far, far below the millions mTCO2e emitted by, for example, coal-fired power plants.

Finally, it is noted that the present draft regulation sets out a threshold for mTCO2e below which an emission limit does not apply. That limit is presently set at 5,500 MTCO2e. Considering the GWP of AirPlus™, if a GIE owner theoretically converted all assets to AirPlus™ technology, the owner would need to have an inventory of more than 12 million pounds (5.5 million kgs) gas to reach the proposed threshold. It is unlikely that such a threshold would be exceeded by any GIE owner. As such, ABB finds it to be a conflict that reporting is required for a gas that potentially puts a GIE owner well below the established threshold for emission limits.

Based on the above information, ABB requests that CARB consider modifying the definitions of GHG insulating gases in such a way as to preclude requirements for reporting on gases with a GWP ≤ 1. Based on present draft requirements, if a

design emerged with atmospheric air insulation, as opposed to technical air, it would be reportable. ABB does not believe that is the intent of the regulation. ABB's research indicates that a more reasonable GWP threshold for reporting would be to consider only GHG's with a GWP $\geq$ 10 to 50.

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

ABB Inc.

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