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Mary Nichols
Chairman
California Air Resources Board
1001 I Street
Sacramento, California 95814

RE: Comments on Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear

Dear Chairman Nichols:

Pacific Gas & Electric Company (“PG&E”) appreciates the opportunity to offer comments on the California Air Resources Board (“CARB”) ‘Proposed Amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear’ (“Proposed Amendments”), released on July 21, 2020.

We support the Proposed Amendments which will help accelerate the reduction of high global warming potential (GWP) gas emissions via the proposed phase out of sulfur hexafluoride (SF₆) in gas insulated equipment (“GIE”). PG&E appreciates CARB staff’s active engagement with equipment manufacturers and regulated parties alike to understand how introducing alternative technologies in a systematic manner will ensure the safety, reliability and resilience of the electricity grid while supporting the state’s climate goals. This technical regulation has broader impacts to utility operations, and we appreciate that CARB staff deliberately evaluated and incorporated comments offered during the informal discussions and workshops since 2017. We particularly appreciate staff incorporating an early action credit which serves as an incentive to equipment manufacturers and utilities to accelerate introduction of SF₆ alternatives.

The following recommendations address four specific remaining areas of concern. PG&E believes that incorporating these proposed changes will allow successful implementation of the regulation:

- I. Amend the early action credit for equipment using alternative technology to grant credit to early adopters starting in 2017, and in the year an alternative was installed, instead of deferring the credit until the first phase-out period in 2025.
- II. Add a method that allows regulated parties to replace SF₆ GIE following equipment failure with a notification, rather than seeking prior CARB approval with a SF₆ Phase-out Exemption.
- III. Add the proposed method to accurately account for the mass of SF₆ gas in GIE installed prior to the adoption of the amendments. This method will allow utilities to accurately account for SF₆ gas inventories that are critical to allow regulated parties to eliminate the risk of

'phantom emissions' and demonstrate compliance with the leak limits proposed in the amendments.

- IV. Amend the Emergency Event Exemption to allow notification to CARB of the necessary equipment replacement and allow 180 days for the reporter to provide supporting documentation if such an exemption is sought.

The detailed comments that follow address the topics noted above, starting with recommended changes to Definitions that support our recommendations in the body of the regulation. The convention used to present our comments is blue text (e.g. **addition**) to note recommended additions and dark red text with a double-strikeout (e.g. ~~deletion~~) to note recommended deletions.

- I. § 95351 – Definitions. PG&E proposes the following changes to certain definitions to better clarify the regulatory requirements and provide context to the other recommendations that follow:

1. **ADD** a definition for “Covered Insulating Gas at Removal from Regular Use” as proposed below, to support the recommendation to resolve the uncertainty in gas weights from existing SF₆-containing equipment:

“Covered Insulating Gas at Removal from Regular Use” means the covered insulating gas at activation or the value calculated in section 95354(d)(1); if either value is not calculated, this term means the nameplate capacity of the GIE device.

2. **AMEND** the definition of “Catastrophic Failure” to “Failure” as proposed below, since the failure of a GIE does not always occur during a catastrophe, yet will require an unplanned response by a utility to ensure system safety, reliability and integrity/resilience:

~~**“Catastrophic Failure”**~~ means the sudden and unexpected failure of a GIE device that impacts human safety and/or substantially impairs, damages, or shuts down part or all of a system (e.g., the electrical grid, facility operations, a power producer’s availability for dispatch to the electrical grid).

3. **AMEND** the definition of “Gas Cart” as proposed below, to better describe the device:

~~**“Gas Cart”** means any device designed to transfer insulating gas into or out of GIE, with the gas coming from or going into a permanent or removable gas container or the gas cart itself.~~
“Gas Cart” means one or more vessels manifolded and designed to carry or transfer insulating gas into or out of GIE.

4. **AMEND** the definition of “Gas Container” as proposed below, to better describe the device:

~~(6)-~~**“Gas Container”** means a single vessel containing or designed to contain SF₆. ~~“Gas container”~~ a gas used as an insulating gas in GIE ~~This includes pressurized cylinders, any~~

~~container that can be removed from a gas carts, or other containers, but does not include GIE or the gas cart itself.~~

5. **AMEND** the definition of “Gas-Insulated switchgear-Equipment” or GIS-“GIE” as proposed below, to more accurately describe the GIE:

~~(7) “Gas-Insulated switchgear-Equipment” or GIS-“GIE” means all electrical power equipment, regardless of location that utilize a gas and insulating medium (e.g., solid dielectric, air, vacuum, SF6, alternative gas), insulated with SF6 gas that provides insulating and/or interrupting (arc quenching) functions related to the transmission of electric current in operation of electrical power systems regardless of location. Gas insulated switchgear or GIEs includes, but are not limited to, switchgear, switches, stand-alone gas-insulated equipment, and any combination of electrical disconnects, fuses, electrical transmission lines, transformers-circuit switchers, coupling capacitor potential devices, gas-insulated substations, station service voltage transformers and/or circuit breakers used to isolate gas insulated electrical equipment. This definition includes hermetically sealed GIE and non-hermetically sealed GIE.~~

6. **AMEND** the definition of “Non-Hermetically Sealed Gas-Insulated Equipment” or “Non-Hermetically Sealed GIE” as proposed, to simplify the description of a non-hermetically sealed GIE.

~~“Non-Hermetically Sealed Gas-Insulated Equipment” or “Non-Hermetically Sealed GIE” means GIE that contain a covered insulating gas and are designed by the manufacturer to be fillable by the GIE owner or a third party designee. is not hermetically sealed.~~

7. **AMEND** the definition of “Substantive Error” as proposed, to better align with other greenhouse gas emissions regulations:

“Substantive Error” means an error that affects calculated emissions, data used to calculate emissions, or any other data element required to be reported pursuant to section 95353(a), (b), (e), (f), (g), (h), (i) and (j) of the annual report, resulting in a change in emissions greater than 5%.

- II. Early Action Credit. PG&E appreciates CARB staff’s inclusion of an Early Action Credit (EAC) provision in the Proposed Regulation, §95353 - Annual Emissions Limit. We believe that the EAC will be very effective in incentivizing regulated entities to proactively move away from SF₆ GIE.

However, in order to recognize regulated parties that have already proactively replaced or installed non-SF₆ alternative GIE and encourage others to accelerate the transition away from SF₆ use, we recommend that: a) CARB extend the EAC to include zero-GWP equipment that was installed to 2017, when the phase-out regulatory concept was first introduced,

which would provide an equitable benefit to all regulated entities, and b) provide the EAC starting in the year when the early action was taken.

To address these recommendations, and update the conversion factor for SF₆ mass, we propose the following amendments to the Proposed Regulation:

1. **AMEND** §95353 (c) as follows to recognize the EAC in the year the early action was taken:

§95353 (c) GIE owners must calculate their average CO₂e capacity on an annual basis as follows for each covered insulating gas *j*:

$$\text{Average CO}_2\text{e capacity} = EAC_i + \sum_{n=j}^m (GWP_j * C_{avg, j, i}) / 2204.62$$

2. **AMEND** §95353 (d) as follows to recognize early actions starting in 2017:

§95353 (d) Beginning with data year ~~2021~~2017, GIE owners must calculate their early action credit (EAC) as follows on an annual basis:

3. **AMEND** § 95353 (g) as follows to apply the early action credit in the emissions limit:

§ 95353 (g) GIE owners shall establish their emissions limit using the following formulas in conjunction with Table 4 and Table 5:

(1) For data years 2020 to 2024, GIE owners shall establish their emissions limit using the following formula in conjunction with the applicable values provided in Table 4 and Table 5:

$$\text{Emission Limit}(i) = EAC(i) + \left[\frac{AEF}{100} * \text{AverageCO}_2\text{e capacity} \right]$$

- III. Accounting for Gas Mass in Existing GIE. GIE nameplate capacities assigned by the original equipment manufacturer (OEM) are nominal; the real nameplate capacity can only be determined at the time of initial installation or when gas is completely removed from the GIE. The Proposed Regulation does not address how reporters can reconcile these differences for an individual GIE, and this discrepancy results in the creation of ‘phantom emissions’ that are likely to manifest when GIE are removed from regular use. PG&E proposes the following method to resolve the concern of phantom emissions:

- a. Prior to evacuation of SF₆ gas from a GIE, a qualified technician validates that the GIE pressure gauge meets utility accuracy standards for in-service operational use.
- b. After the gas is evacuated from the GIE, the qualified technician certifies the accuracy of the mass of gas removed for the individual GIE. This value would be the “Covered Insulating Gas at Removal from Regular Use,” (CIGARR) as defined above.
- c. The reporter uses the certified mass of gas removed as the corrected nameplate capacity value for that specific reporting year.
- d. The nameplate capacity would be certified by the Designated Representative with the Annual Report.

PG&E believes that the requirements to assure that these procedures are followed can be included in the regulation in the requirements for data collection, data reporting and recordkeeping in §95354(a)(8), §95355(a) and §95356, respectively. The CIGARR value would be used while calculating the annual emissions for covered insulating gas.

1. **AMEND** § 95354.1 (a) Annual Emissions by Covered Insulating Gas using the proposed language:

Net increase in total capacity of active GIE owned and filled with covered insulating gas j = (covered insulating gas j at activation for GIE whose status changed to active GIE for the first time during the data year or after being considered removed from regular use during the data year pursuant to section 95354(c)(1)) - (covered insulating gas j at ~~activation~~ removal from regular use for GIE removed from regular use during the data year pursuant to section 95354(c)(1)) – (covered insulating gas j at activation for GIE transferred while in use to another entity during the data year pursuant to section 95354(c)(2)) + (covered insulating gas j at activation for GIE transferred while in use from another entity during the data year pursuant to section 95354(c)(2)).

- IV. Replacing SF₆ GIE following equipment failure. The Proposed Regulation requires the regulated party to seek an accelerated SF₆ phase-out exemption following a “Catastrophic Failure,” as defined in the Proposed Amendments. A GIE failure does not always occur during a catastrophe, yet a failure is an event that would require an unplanned response by a utility to ensure system safety, reliability and integrity/resilience. A GIE may fail under different unplanned conditions which may or may not result in a release of SF₆ gas. However, an unplanned replacement with another SF₆-containing or non-SF₆-containing GIE that meets operational requirements would be required in an expedited manner. For example, an electricity surge or ‘flashover’ can cause the failure of a 500kV dead tank circuit breaker. If the breaker is positioned in a critical part of the substation based on its physical location or equipment configuration, the failure creates a system-reliability risk. This will require expedited replacement of equipment that may not have a non- SF6 alternative readily available. The replacement breaker may be secured through a mutual aid agreement with a utility in California or another state, or directly from the supplier.

To assure that the utility can respond to these unplanned events and meet its regulatory obligations to all federal and state agencies, including the Federal Energy Regulatory

Commission (FERC) and the California Public Utilities Commission (CPUC), and its customers, PG&E recommends the following changes to § 95357 - SF6 Phase-Out Exemption:

1. **AMEND** § 95351, Definitions, by changing the term “Catastrophic Failure” with “Failure,” as proposed earlier in this letter.
2. **AMEND** § 95357(h) SF₆ Phase-out Exemption following GIE Failure. We propose replacing § 95357(h) as follows:

(h) In the event of a GIE failure as specified in § 95351, the GIE owner must notify the Executive Officer within 15 days of the failure event.

(1) The GIE owner must indicate that the SF6 phase-out exemption request is in response to a ~~catastrophic~~ failure pursuant to section 95357(h) and include a detailed description of the catastrophic failure, including, but not limited to the following:

3. **DELETE** § 95357(i) since this would no longer be applicable.

V. Amend the Emergency Event Exemption. PG&E supports the continued inclusion of the Emergency Event Exemption in the Proposed Regulation. Certain emergency events may result from GIE failure, such as an electrical current surge. The cause of the failure may only be determined after an apparent cause analysis that may take several months following the emergency event. However, if an emergency event occurs, as defined in the Proposed Amendments, the GIE owner should be permitted to replace the impacted GIE under the ‘Failure’ provision recommended above and request an exemption to exclude the resulting emissions from the annual report pursuant to § 95357 with the amendment proposed below:

1. **AMEND** § 95357.1 Emergency Event Exemption as follows:

§ 95357.1 (b) (3) A statement and supporting documentation that the release occurred as a result of an emergency event within 180 calendar days; and

Conclusion

PG&E appreciates that CARB staff have received and incorporated many of the comments previously submitted. With the incorporation of the suggested edits above, we believe that this regulation will support the state’s goal to reduce high GWP gas emissions while ensuring the continued safe and reliable operation of the statewide electricity grid.

Sincerely,

/s/

Linus Farias

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